Panduan Akademik

Program Diploma Kejuruteraan Universiti Malaysia Perlis

Sidang Akademik

2014/2015

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** Dari semasa ke semasa, pihak Universiti Malaysia Perlis (UniMAP) mungkin melakukan perubahan ke atas beberapa aspek kurikulum dan sistem akademik bagi memenuhi keperluan semasa. Perubahan ini, sekiranya ada, akan dihebahkan kepada pelajar. Semua pelajar adalah tertakluk kepada perubahan tersebut.*

Panduan Akademik Program Diploma Kejuruteraan Universiti Malaysia Perlis

Disediakan oleh
Unit Penyelarasan Program Diploma, Pejabat Timbalan Naib Canselor (Akademik & Antarabangsa)
Jabatan Canselori

Penasihat
YBhg. Brig. Jen. Datuk Prof. Dr. Kamarudin Hussin

Ketua Penulis & Penyelaras Projek
Prof. IR Dr. Rezuwan Kamaruddin
En. Noor Hasnizam Hanafi

Anggota Pasukan Penulis
Cik Norashikin binti Abdul
Pn. Aimi Shamshirah Azizan
Cik Noor Syazwani Mohamad Isa
Pn. Intan Marliana Ramli
En. Mohd Firdaus Shamshul
Dr. Ruslizam Daud
Dr. Ahmad Humaizi Hilmi
Pn. Sakinah Zakaria
Pn. Nur Hakimah Mohd Mukhtar
En. Mohd Rosydi Zakaria
En. Mohd Shaiful Aziz Rashid Ali
En. Murizam Darus
Cik Hajah Ruzalina Ibnu Ruslan
Pn. Rahaida Rahim
Pn. Noor Innar Md Noor
En. Muhamad Dhiyauddin Saharudin
Cik Nor Zaililah Zanoddin
Cik Farah Marzuliana Mat
Pn. Ku Nurmadihah Ku Yaacob
En. Syed Amir Fatir Syed Akhir
Pn. Zuraida Ismail
Pn. Rasidah Abdul Wahab
Pn. Noor Zeita Othman
Cik Afifah Azmi
Pn. Azilah Bidin
Pn. Alma Azizah Abdul Rahim
Pn .Isma Irini Shafie
Pn. Siti Nur Idayu Alias
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Dr. Muhamad Saifuldin Abdul Manan
Dr. Muhammad Asri Idris
Dr. Shahrul Nizam Yaakob
Dr. Shafriza Nisha Basah
Dr. Muammar Mohamad Isa
Dr. Hanif Suhairi Abu Bakar
En. Shafiq Hizwari Md Hashim
En. Muhammad Izmer Yusof
En. Wan Zuki Wan Muhamad
En. Mohd Syafarudy Abu
En. Shahrulnizam Mohd Mukhtar

Sekalung Penghargaan Kepada

YBhg. Brig. Jen. Datuk Prof. Dr. Kamarudin Hussin, Dato' Prof. Dr. Zul Azhar Zahid Jamal, Prof. Dr. Abdul Hamid Adom, En. Zuber Mohammad, Puan Mazmin Mat Akhir, Puan Saodah Hassan

dan

Semua Dekan Pusat Pengajian, Dekan Pengurusan Akademik, Dekan Pusat Teknologi Komunikasi & Pembangunan Insan, Dekan Pusat Kejuruteraan, Dekan Institut Matematik Kejuruteraan, Pengarah Pusat Kerjasama Industri, Pengarah Pusat Bahasa Antarabangsa, Pengarah Pusat Ko-Kurikulum

serta

Semua staf di Pejabat Timbalan Naib Canselor
(Akademik & Antarabangsa)

1.0 PENDAHULUAN

Buku Panduan Akademik Program Diploma Kejuruteraan ini disediakan untuk pelajar-pelajar Universiti Malaysia Perlis (UniMAP) Sidang Akademik 2014/2015. Para pelajar hendaklah menjadikan buku ini sebagai panduan dan rujukan utama dalam membuat perancangan dan menentukan pendaftaran kursus dari tahun pertama hingga ke tahun akhir pengajian.

Buku ini juga mengandungi maklumat asas tentang struktur rancangan Diploma Kejuruteraan, sistem akademik, senarai dan sinopsis kursus, bahan-bahan rujukan, senarai staf, dan maklumat lain yang berkaitan. Dengan meneliti maklumat yang terkandung dalam buku ini, pelajar akan dapat memahami sistem pengajian yang diikuti dengan jelas supaya perancangan akademik yang teratur dapat difikir dan dilaksanakan.

UniMAP menawarkan 21 program akademik peringkat Sarjana Muda Kejuruteraan, 2 program akademik peringkat Sarjana Muda Perniagaan, 16 program akademik peringkat Sarjana Muda Teknologi Kejuruteraan, 1 program akademik peringkat Sarjana Muda Sains Sosial dan 6 program akademik peringkat Diploma Kejuruteraan melalui 6 daripada keseluruhan 10 buah pusat pengajian. Walaubagaimanapun, penawaran program-program baru akan ditawarkan dari masa ke semasa. Penawaran 6 Program peringkat Diploma Kejuruteraan adalah seperti berikut:

Diploma Kejuruteraan (Kejuruteraan Elektrik)
Diploma Kejuruteraan (Kejuruteraan Komputer)
Diploma Kejuruteraan (Kejuruteraan Mekatronik)
Diploma Kejuruteraan (Kejuruteraan Metalurgi)
Diploma Kejuruteraan (Kejuruteraan Mikroelektronik)
Diploma Kejuruteraan (Kejuruteraan Pembuatan)

Pusat-pusat pengajian yang terdapat di UniMAP adalah seperti berikut:

Pusat Pengajian Kejuruteraan Sistem Elektrik
Pusat Pengajian Kejuruteraan Komputer & Perhubungan
Pusat Pengajian Kejuruteraan Mekatronik
Pusat Pengajian Kejuruteraan Bahan
Pusat Pengajian Kejuruteraan Mikroelektronik
Pusat Pengajian Kejuruteraan Pembuatan
Pusat Pengajian Kejuruteraan Bioproses
Pusat Pengajian Kejuruteraan Alam Sekitar
Pusat Pengajian Inovasi Perniagaan & Teknousahawan
Fakulti Teknologi Kejuruteraan

2.0 VISI, MISI DAN LAGU UNIVERSITI

VISI
Institusi akademik dan penyelidikan yang berdaya saing di persada antarabangsa.

MISI
Melahirkan modal insan kamil yang menyumbang kepada agenda pembangunan dan daya saing industri negara.

LAGU UNIVERSITI

WAWASANKU
Universiti Malaysia Perlis
Alam Kejuruteraan
Ilmu, Keikhlasan, Kecemerlangan
Wawasan jiwa kita

Berdikari rohaniah
Berteknologi
Pemimpin berbestari
Untuk bangsa, insan dan umat dunia
Negara yang tercinta

Universiti Malaysia Perlis
Alam Kejuruteraan
Ilmu, Keikhlasan, Kecemerlangan
Wawasan jiwa kita

3.0 CANSELOR UniMAP

DULI YANG TERAMAT MULIA
TUANKU SYED FAIZUDDIN PUTRA IBNI TUANKU SYED SIRAJUDDIN JAMALULLAIL
D.K., S.P.M.P., P.A.T., Doctor of Education (Honoris Causa) La Trobe University Melbourne, Australia

RAJA MUDA PERLIS (CANSELOR UNIVERSITI MALAYSIA PERLIS)

4.0 PRO-CANSELOR UniMAP

DULI YANG TERAMAT MULIA
TUANKU HAJAH LAILATUL SHAHREEN AKASHAH KHALIL
S.P.M.P., Honoris Causa in Health Sciences (Universidad Nacional Pedro Henriquez Urena, DR)

RAJA PUAN MUDA PERLIS (PRO-CANSELOR UNIVERSITI MALAYSIA PERLIS)

5.0 KATA ALUAN NAIB CANSELOR

Bismillah Hirrahman Nirrahim
Assalamualaikum Warahmatullahi Taaala Waharakatuh dan Salam Sejahtera

Sekalung tahniah dan syabas saya rakamkan sebagai pembuka bicara kepada saudara/saudari yang telah melanjutkan pengajian ke Universiti Malaysia Perlis, UniMAP. Selamat datang diucapkan. Bersyukur ke hadrat illahi di atas limpah kurnianya dapat saya mencoretkan sepatah dua kata dalam Buku Panduan Akademik Diploma 2014/2015 ini.

Kejayaan saudara/saudari ini merupakan langkah pertama kearah mengukir laluan kejayaan yang bakal diterokai nanti. Saudara/saudari adalah insan yang terpilih untuk berada di UniMAP bagi menelaah ilmu sebanyak mungkin sebelum menjadi warganegara yang mempunyai mentaliti kelas pertama. UniMAP amat komited kearah meningkatkan ilmu pengetahuan, mengasah bakat dan meluaskan minda saudara/saudari melalui pendekatan pengajaran dan pembelajaran yang berkesan. Saudara/saudari akan bersama-sama UniMAP dalam misi kearah membentuk insan kamil yang menjadi penyumbang kepada pembangunan negara.

Saudara/saudari merupakan asset penting bagi membentuk barisan penjana pembangunan negara dalam pengurusan sumber manusia negara. Jesteru itu, menjadi tugas dan tanggungjawab saudara/saudari sekalian untuk berusaha serta memperkemaskan diri dengan pelbagai kemahiran dan pengetahuan selaras dengan keperluan industri mahupun negara agar dapat bersaing di peringkat global bagi merealisasikan aspirasi negara dan seterusnya menyumbang kepada ketamadunan dunia.

Saya amat mengharapkan setiap saudara/saudari warga UniMAP akan menjadi pemimpin kepada kecemerlangan bukan sahaja kepada orang lain malah menjadi pemimpin kepada diri sendiri supaya menjadi manusia cemerlang dalam pelajaran dan juga hidup. Saudara/saudari yang berjiwa cemerlang mestilah berani menyahut apa jua cabaran untuk memajukan diri disamping pandai untuk memartabatkan masa sebaik mungkin semasa berada di puncak menara gading ini.

Saudara/saudari haruslah berusaha membuktikan kecemerlangan diri bukan sahaja melalui akademik tetapi melalui sahsiah diri yang ditunjukkan kerana itu pasti akan menjadi bukti kejayaan di sini. Cabaran globalisasi pada masa akan datang juga dapat dihadapi dengan menjadikan UniMAP sebagai medan ilmu untuk melengkapkan diri saudara/saudari dari segi mental dan fizikal.

Akhir kata, saya dan seluruh warga kerja UniMAP meletakkan harapan yang tinggi pada saudara/saudari agar dapat memanfaatkan kecemerlangan ilmu yang akan ditimba sepanjang pembelajaran di UniMAP seterusnya dapat menyumbangkan jasa kepada agama, bangsa dan negara kelak. Jagalah amanah dan tanggungjawab yang telah diberikan oleh kedua ibu bapa dalam menuntut ilmu demi kepentingan diri, keluarga, masyarakat dan negara.

Sekian, Wassalam.

Brigedier Jeneral Datuk Prof. Dr. Kamarudin Hussin
Naib Canselor
Universiti Malaysia Perlis

6.0 PEGAWAI - PEGAWAI UTAMA UNIVERSITI

YBhg. Brig. Jen. Datuk Prof. Dr. Kamarudin Hussin
Naib Canselor, UniMAP

Dato' Prof. Dr.
Zul Azhar Zahid Jamal
Timbalan Naib Canselor, Akademik dan Antarabangsa

Prof. Dr. Abdul Hamid Adom
Timbalan Naib Canselor, Penyelidikan dan Inovasi

Prof. Madya Dr.
Mohd. Fo'ad Sakdan
Timbalan Naib Canselor (Hal Ehwal Pelajar & Alumni)

En. Zuber Hj. Mohamad
Pendaftar

Puan Saodah Hassan
Bendahari

Pn. Mazmin Mat Akhir
Pemangku Ketua Pustakawan

7.0 UNIT PENYELARASAN PROGRAM DIPLOMA

En. Noor Hasnizam Hanafi
Pengarah
Program Diploma Universiti

Puan Nurhakimah Mohd Mukhtar
Pengerusi Rancangan Diploma Kejuruteraan
(Kejuruteraan Elektrik)

En. Mohd Shaiful Aziz Rashid Ali
Pengerusi Rancangan Diploma Kejuruteraan
(Kejuruteraan Komputer)

Dr. Ruslizam Daud
Pengerusi Rancangan Diploma Kejuruteraan
(Kejuruteraan Mekatronik)

En. Murizam Darus
Pengerusi Rancangan Diploma Kejuruteraan
(Kejuruteraan Metalurgi)

Dr. Ahmad Humaizi Hilmi
Pengerusi Rancangan Diploma Kejuruteraan
(Kejuruteraan Pembuatan)

En. Mohd Rosydi Zakaria
Pengerusi Rancangan Diploma Kejuruteraan
(Kejuruteraan Mikroelektronik)

Cik Norashikin Abdul
Penolong Pendaftar
Unit Penyelarasan Program Diploma

8.0 LATARBELAKANG UniMAP

Sejajar dengan lonjakan industri, ilmu serta keperluan melahirkan lebih banyak modal insan dalam bidang kejuruteraan di Malaysia, maka Universiti Malaysia Perlis (UniMAP), universiti awam yang ke-17, telah ditubuhkan oleh kerajaan pada tahun 2002. UniMAP yang dulunya dikenali sebagai Kolej Universiti Kejuruteraan Utara Malaysia (KUKUM) menerusi proses penjenamaan semula pada 1 Februari 2007 telah ditubuhkan di bawah Seksyen 20 Akta Universiti dan Kolej Universiti 1971 (Akta 30) menerusi Perintah Kolej Universiti Kejuruteraan Utara Malaysia (Pemerbadanan 2002) yang telah diwartakan sebagai P.U (A) 378 pada 12 September 2002.

Dalam usaha untuk menjadikan UniMAP sebagai sebuah universiti yang berdaya saing dan tersohor di persada antarabangsa, konsep penting telah diterapkan dalam visi dan misi UniMAP selaras dengan moto UniMAP iaitu "Ilmu, Keikhlasan, Kecemerlangan". Ini sejajar dengan visi UniMAP iaitu untuk menjadi "Institusi Akademik dan Penyelidikan yang Berdaya Saing di Persada Antarabangsa" dan misi UniMAP untuk "Melahirkan Modal Insan Kamil yang Menyumbang Kepada Agenda Pembangunan dan Daya Saing Industri Negara".

UniMAP menawarkan sebanyak 23 program akademik peringkat Sarjana Muda Kejuruteraan, 5 program akademik peringkat Sarjana Muda Teknologi Kejuruteraan dan 6 program akademik peringkat Diploma Kejuruteraan. Penambahbaikan secara komprehensif sistem penyampaian pendidikan, latihan dan pembelajaran akan dilaksanakan dengan program-program baru ditawarkan dari semasa ke semasa. Kurikulum peringkat Diploma Kejuruteraan yang disediakan di UniMAP direkabentuk dengan mengambil kira keperluan pasaran tenaga kerja dalam negara.

Kursus-kursusnya pula menyatukan komponen teori dan amali mengikut keperluan industri dengan jangka masa pengajian selama 3 tahun. Pelajar Diploma Kejuruteraan di UniMAP juga dibekalkan dengan kursus Keperluan Universiti dan pembangunan sahsiah demi melahirkan Pembantu Jurutera yang bukan sahaja cekap dalam bidang yang mereka ikuti, tetapi juga berkebolehan untuk berdikari serta punya sikap keterampilan diri yang tinggi.

9.0 OBJEKTIF PENDIDIKAN PROGRAM (PEO)

Objektif Pendidikan Program (Programme Educational Objectives) untuk keseluruhan program Diploma Kejuruteraan di Universiti Malaysia Perlis (UniMAP) adalah seperti berikut:

1. To produce specialized graduates who are technically competent in their respective engineering fields.
2. To produce graduates with technical skills and engineering knowledge who are able to apply them in the current engineering demands.
3. To produce graduates who are able to extend and expand their knowledge through independant learning and continuing education.
4. To contribute to the development of strategic engineering disciplines, in line with the requirements outlined in Malaysiaís Industrial Master Plan.

10.0 HASIL PROGRAM (PO)

Hasil program (Programme Outcome) pembelajaran yang akan diperolehi oleh pelajar - pelajar yang mengikuti Program Diploma Kejuruteraan di UniMAP adalah seperti berikut:

Technical Knowledge and Competencies

1. Ability to apply knowledge of basic mathematics, science and engineering.
2. Ability to acquire good technical competency in specific engineering discipline.
3. Ability to apply various techniques, skills and engineering tools necessary for current engineering practice to meet industrial needs.
4. Ability to identify and analyse problems to formulate solutions.

Soft Skills

5. Recognition of the need for, and ability to engage in life-long learning.
6. Ability to communicate effectively not only with colleagues but also with the community at large.
7. Ability to perform effectively as an individual and in multidisciplinary and multicultural teams with the capacity to be a leader or manager.
8. Ability to function effectively as an individual and in teams.
9. Understanding of the social, cultural, environmental and ethical responsibilities to the society.
10. Understanding of entrepreneurship, the process of innovation and the need for sustainable development.

11.0 KALENDAR AKADEMIK 2014/2015

KALENDAR AKADEMIK SIDANG 2014/2015

SEMESTER 1 (8 Jun 2014- 21 Oktober 2014) - 18 Minggu				
AKTIVITI	**JANGKA MASA**		**TEMPOH**	**CATATAN**
Pendaftaran Pelajar Baru / Minggu Suaikenal	8 Jun 2014	13 Jun 2014	8 hari	-
Kuliah	16 Jun 2014	27 Julai 2014	6 Minggu	**Nuzul Al-Quran** 15 Julai 2014
Cuti Pertengahan Semester	28 Julai 2014	3 Ogos 2014	1 Minggu	**Hari Raya Aidilfitri** 28 & 29 Julai 2014
Kuliah	4 Ogos 2014	28 September 2014	8 Minggu	**Hari Kebangsaan** 31 Ogos 2014 **Hari Malaysia** 16 September 2014
Minggu Ulangkaji	29 September 2014	5 Oktober 2014	1 Minggu	**Hari Raya Aidiladha** 5 & 6 Oktober 2014
Peperiksaan	8 Oktober 2014	21 Oktober 2014	2 Minggu	-
Cuti Antara Semester	22 Oktober 2014	23 November 2014	4 minggu	**Hari Deepavali** 23 Oktober 2014 **Awal Muharram/Maal Hijrah 1433** 25 Oktober 2014

SEMESTER 2 (24 November 2014 – 29 Mac 2015) - 19 Minggu				
AKTIVITI	**JANGKA MASA**		**TEMPOH**	**CATATAN**
Kuliah	24 November 2014	11 Januari 2015	7 Minggu	**Hari Krismas** 25 Disember 2014 **Maulidur Rasul** 3 Januari 2015
Cuti Pertengahan Semester	12 Januari 2015	18 Januari 2015	1 Minggu	
Kuliah	19 Januari 2015	8 Mac 2015	7 Minggu	**Tahun Baru Cina** 19 & 20 Februari 2015
Minggu Ulangkaji	9 Mac 2015	15 Mac 2015	1 Minggu	-
Peperiksaan	16 Mac 2015	29 Mac 2015	2 Minggu	-
Cuti Antara Semester	30 Mac 2015	7 Jun 2015	10 minggu	**Hari Pekerja** 1 Mei 2015 **Hari Keputeraan** **DYMM Tuanku Raja Perlis** 17 Mei 2015 **Hari Keputeraan SPB** **Yang Di-Pertuan Agong** 7 Jun 2015

12.0 SYARAT KEMASUKAN

SYARAT KEMASUKAN BAGI PROGRAM PENGAJIAN IJAZAH SIDANG AKADEMIK 2014/2015

CALON LEPASAN SPM

Bil	Program dan Tempoh Pengajian	Kod	Kelayakan Minimum (Kategori A – Lepasan SPM tahun 2013)
1.	Diploma Kejuruteraan (Kejuruteraan Mikroelektronik) (6 semester)	**R2427**	**Syarat Am Universiti** Memiliki kelayakan SPM / setaraf dengan mendapat sekurangkurangnya **LIMA (5) C** termasuk **Bahasa Melayu** dan lulus dengan mendapat sekurang-kurangnya **LAPAN (8) E** dalam matapelajaran **Sejarah.** **MEMENUHI SYARAT AM UNIVERSITI SERTA SYARAT KHAS PROGRAM** 1. Mendapat sekurangkurangnya **GRED C** dalam mata pelajaran-mata pelajaran berikut: • Mathematics • Additional Mathematics • Salah **SATU (1)** daripada mata pelajaran berikut: - Physics - Chemistry - Biology - Pengajian Kejuruteraan Mekanikal - Pengajian Kejuruteraan Awam - Pengajian Kejuruteraan Elektrik dan Elektronik - Teknologi Kejuruteraan - Lukisan Kejuruteraan • Mana-mana salah **SATU(1)** mata pelajaran lain yang belum diambilkira. dan 2. Lulus atau mendapat sekurang-kurang **GRED E** dalam mata pelajaran Bahasa Inggeris. **dan** 3. Calon tidak buta warna dan tidak cacat anggota sehingga menyukarkan kerja amali.
2.	Diploma Kejuruteraan (Kejuruteraan Komputer) (6 semester)	**R2404**	
3.	Diploma Kejuruteraan (Kejuruteraan Pembuatan) (6 semester)	**R2432**	
4.	Diploma Kejuruteraan (Kejuruteraan Metalurgi) (6 semester)	**R2433**	
5.	Diploma Kejuruteraan (Kejuruteraan Elektrik) (6 semester)	**R2420**	
6.	Diploma Kejuruteraan (Kejuruteraan Mekatronik) (6 semester)	**R2423**	

SYARAT KEMASUKAN BAGI PROGRAM PENGAJIAN DIPLOMA SIDANG AKADEMIK 2014/2015

CALON LEPASAN SPM (Bukan tahun semasa)

Bil	Program dan Tempoh Pengajian	Kod	Kelayakan Minimum (Kategori B – Lepasan SPM Tahun 2012 atau 2011)
1.	Diploma Kejuruteraan (Kejuruteraan Mikroelektronik) (6 semester)	**R2427**	**Syarat Am Universiti** Memiliki kelayakan SPM/setaraf dengan mendapat sekurangkurangnya **LIMA (5) C** termasuk **Bahasa Melayu**. **MEMENUHI SYARAT AM UNIVERSITI SERTA SYARAT KHAS PROGRAM** 1. Mendapat sekurangkurangnya **GRED C** dalam mata pelajaran-mata pelajaran berikut: • Mathematics • Additional Mathematics • Salah **SATU (1)** daripada mata pelajaran berikut: - Physics - Chemistry - Biology - Pengajian Kejuruteraan Mekanikal - Pengajian Kejuruteraan Awam - Pengajian Kejuruteraan Elektrik dan Elektronik - Teknologi Kejuruteraan - Lukisan Kejuruteraan • Mana-mana salah **SATU(1)** mata pelajaran lain yang belum diambilkira. dan 2. Lulus atau mendapat sekurang-kurang **GRED E** dalam mata pelajaran Bahasa Inggeris. **dan** 3. Calon tidak buta warna dan tidak cacat anggota sehingga menyukarkan kerja amali.
2.	Diploma Kejuruteraan (Kejuruteraan Komputer) (6 semester)	**R2404**	
3.	Diploma Kejuruteraan (Kejuruteraan Pembuatan) (6 semester)	**R2432**	
4.	Diploma Kejuruteraan (Kejuruteraan Metalurgi) (6 semester)	**R2433**	
5.	Diploma Kejuruteraan (Kejuruteraan Elektrik) (6 semester)	**R2420**	
6.	Diploma Kejuruteraan (Kejuruteraan Mekatronik) (6 semester)	**R2423**	

SYARAT KEMASUKAN BAGI PROGRAM PENGAJIAN DIPLOMA SIDANG AKADEMIK 2014/2015

CALON LEPASAN SIJIL

Bil	Program dan Tempoh Pengajian	Kod	Kelayakan Minimum (Kategori C – Lepasan Sijil)
1.	Diploma Kejuruteraan (Kejuruteraan Mikroelektronik) (6 semester)	**R2427**	**Syarat Am Universiti** Memiliki kelayakan SPM/setaraf dengan mendapat sekurang-kurangnya **Gred C atau KEPUJIAN** di dalam mata pelajaran **Bahasa Melayu**. **MEMENUHI SYARAT AM UNIVERSITI SERTA SYARAT KHAS PROGRAM** Lulus dengan memiliki Sijil atau setaraf dalam bidang yang berkaitan dari Politeknik atau Kolej Komuniti atau institusi lain yang diiktiraf setaraf dengannya, dengan mendapat sekurang-kurangnya **PNGK 3.00.** **dan** Calon tidak buta warna dan tidak cacat anggota sehingga menyukarkan kerja amali.
2.	Diploma Kejuruteraan (Kejuruteraan Komputer) (6 semester)	**R2404**	
3.	Diploma Kejuruteraan (Kejuruteraan Pembuatan) (6 semester)	**R2432**	
4.	Diploma Kejuruteraan (Kejuruteraan Metalurgi) (6 semester)	**R2433**	
5.	Diploma Kejuruteraan (Kejuruteraan Elektrik) (6 semester)	**R2420**	
6.	Diploma Kejuruteraan (Kejuruteraan Mekatronik) (6 semester)	**R2423**	

13.0 SISTEM AKADEMIK

Kurikulum Program Diploma Kejuruteraan di UniMAP dirangka untuk dilengkapkan dalam tempoh tiga tahun, dengan setiap tahun akademik (atau 'sidang akademik') dibahagikan kepada Semester I dan Semester II. Pelajar dikehendaki mendaftar kursus pada setiap semester yang mengandungi 14 minggu pembelajaran, iaitu 7 minggu pembelajaran, diikuti dengan satu minggu rehat, dan disusuli dengan 7 lagi minggu pembelajaran. Terdapat satu minggu yang diperuntukkan untuk tujuan ulangkaji, di mana kuliah dan aktiviti rasmi pembelajaran tidak boleh diadakan semasa minggu ini. Selepas minggu ulangkaji ialah minggu peperiksaan yang diadakan selama 3 minggu pada setiap penghujung semester. Kursus yang ditawarkan dibahagikan mengikut peringkat pengajian iaitu peringkat 100, 200, dan 300 yang secara amnya boleh dianggap setara dengan Tahun 1, 2 dan 3.

a. Semua pelajar diwajibkan mengumpul sekurang-kurangnya 102 kredit. Dari 102 kredit ini, 83 terdiri dari Kursus Teras, manakala 19 lagi adalah Kursus Keperluan Universiti. Pelajar juga perlu mendapat sekurang-kurangnya gred C bagi kursus keperluan universiti (W) dan mendapat sekurang-kurangnya gred D bagi kursus teras (T) serta mendapat PNGK sekurang-kurangnya 2.00 sebelum layak dipertimbangkan untuk penganugerahan diploma. Pelajar digalakkan untuk mengambil Kursus-kursus Keperluan Universiti dalam tempoh 3 semester pertama pengajiannya di sini. Kebiasaannya, pelajar memerlukan 3 tahun (6 semester) untuk melengkapkan pengajian. Tempoh maksimum yang dibenarkan adalah selama 10 semester.

   Perincian struktur kurikulum ini diberikan di dalam **Jadual 1**:

Jadual 1: Struktur Kurikulum

KURSUS		UNIT
i. KURSUS TERAS		83
ii. KURSUS KEPERLUAN UNIVERSITI		19
a. Keusahawanan Kejuruteraan	2	
b. Kemahiran Komunikasi	2	
c. Bahasa Melayu Universiti	2	
d. Bahasa Inggeris I	2	
e. Bahasa Inggeris II	2	
f. Tamadun Islam & Tamadun Asia (TITAS)	2	
g. Hubungan Etnik	2	
h. Badan Beruniform	5	
JUMLAH		102

13.1 Pendekatan Pengajaran dan Pembelajaran

UniMAP menitikberatkan pendekatan pengajaran dan pembelajaran seiring dengan perkembangan industri, sama ada dalam bentuk komponen teori mahupun komponen amali. Kefahaman pelajar terhadap komponen teori dipertingkatkan melalui pembelajaran amali yang disediakan disamping komponen kemahiran, penyelesaian masalah, kerja berkumpulan, penyediaan dan perbentangan laporan.

Secara amnya, bagi sesebuah kursus Teras 3 unit, 2 unit terdiri dari komponen teori manakala 1 unit adalah komponen amali. Satu unit komponen teori terdiri dari 1 jam kuliah, manakala 1 unit komponen amali merangkumi 2 jam pembelajaran di dalam makmal. Kursus-kursus ini dirangka dengan sebegitu rupa agar, bagi kursus 3 unit, pelajar menjalani 2 jam kuliah, diikuti dengan 2 jam makmal dalam minggu pembelajaran. Namun begitu, sesetengah kursus dijalankan dengan komponen 100% teori atau 100% amali.

13.1.1 Komponen Teori

Komponen teori terdiri dari sesi kuliah atau tutorial. Satu unit komponen teori adalah bersamaan dengan 1 jam kuliah/ bacaan seminggu atau 14 jam dalam 14 minggu pembelajaran bagi satu semester. Selain kuliah, tutorial juga diberikan semasa proses pengajaran dan pembelajaran dijalankan, dimana dilakukan dalam waktu makmal.

13.1.2 Komponen Amali

Komponen amali terdiri daripada sesi kerja amali. Satu unit komponen amali adalah bersamaan dengan 2 jam amali/tutorial seminggu atau 28 jam dalam 14 minggu pembelajaran bagi satu semester. Pelajar akan dinilai terhadap kerja amali, laporan kerja amali, perbentangan dan ujian amali semasa proses pengajaran dan pembelajaran dijalankan.

Komponen amali terdiri daripada kaedah-kaedah pengajaran-pembelajaran berikut:

» **Pembelajaran di dalam makmal** - di mana sekumpulan pelajar (yang terdiri dari 2-4 orang) menjalankan sesuatu eksperimen. Di dalam beberapa makmal asas, setiap pelajar menjalankan sesuatu eksperimen secara individu (1:1) dan bukannya secara berkumpulan. Pelajar dikehendaki menulis laporan makmal mengikut modul makmal/ bengkel sebaik sahaja sesi makmal/bengkel berakhir. Selain menduduki peperiksaan bertulis, pelajar juga akan diuji dengan mengadakan ujian makmal secara individu untuk memantapkan kebolehan teknikal mereka.

» **Pembelajaran menggunakan *teaching factory*** - Sekumpulan pelajar (yang terdiri dari 5-6 orang) menjalankan sesebuah ujilari (process run) dengan menggunakan peralatan skala sebenar yang terdapat di industri.

» **Pengajaran Berbantukan Komputer (*e-learning*)** - Pelajar belajar topik-topik yang dikenalpasti secara individu atau berkumpulan dengan bantuan komputer.

» **Latihan Industri (InTra)** - Latihan Industri dijalankan di luar kampus, iaitu di pelbagai sektor industri yang berkaitan dengan bidang pengkhususan pelajar selama satu semester.

» **Projek Semestral** - Pelajar melaksanakan satu projek teknikal secara individu atau berkumpulan.Sebagai tambahan, pelajar juga digalakkan untuk memikirkan bagaimana menukar hasil projek mereka kepada satu produk atau perkhidmatan yang boleh dikomersialkan. Ini merupakan komponen keusahawanan yang mungkin akan dinilai.

» **Lawatan ke Industri** - Pelajar melawat kilang-kilang di industri melalui program yang disusun berdasarkan kursus (sebagai contoh - bagi kursus Keusahawanan Kejuruteraan) ataupun berdasarkan pusat pengajian masing-masing.

13.2. Takrifan Kursus

Untuk program Diploma Kejuruteraan di UniMAP, terdapat dua jenis kursus sahaja, iaitu Kursus Teras dan Kursus Keperluan Universiti.

13.2.1. Kursus Teras

Kursus Teras merupakan kursus tulen kejuruteraan atau berkaitan dengan kejuruteraan yang perlu diambil oleh pelajar dalam bidang berkaitan. Secara tipikalnya 28 kursus teras perlu diambil sepanjang pengajian dengan majoriti kursus memberi nilai 2 - 3 unit. Jumlah keseluruhan unit adalah 83 unit dan ini mewakili 84.6% dari jumlah keseluruhan unit. Pelajar perlu lulus setiap kursus teras sebelum bergraduat. Sekiranya pelajar gagal kursus teras, mereka perlu mengulang kursus tersebut pada semester seterusnya yang menawarkan kursus tersebut .

13.2.2. Kursus Keperluan Universiti

Kursus Wajib Keperluan Universiti merupakan kursus yang selain dari kursus domain kejuruteraan. Kursus ini walaupun tidak dikaitkan dengan kejuruteraan secara langsung, ianya berperanan membentuk peribadi dan sahsiah pelajar. Kursus keperluan universiti sebanyak

15 unit adalah kursus yang wajib diambil oleh setiap pelajar yang menyumbang kepada 15.4% keseluruhan unit. Pelajar perlu lulus sekurang-kurangnya gred C bagi semua kursus wajib keperluan universiti.

Kursus Badan Beruniform dikira sebagai sebahagian kursus keperluan universiti. Kursus ini dibangunkan selaras dengan falsafah universiti ini yang mementingkan pembangunan sahsiah di samping kecemerlangan akademik pelajar. Pasukan badan beruniform yang terdiri dari Bridged Bomba dan Penyelamat, Jabatan Pertahanan Awam 3 (JPA 3), Pandu Puteri Siswi, PALAPES Darat, Persatuan Bulan Sabit Merah Malaysia (PBSM), St. John Ambulans Malaysia dan Kumpulan Latihan Kelanasiswa Malaysia merupakan program Badan Beruniform yang telah dikhaskan kepada pelajar program diploma.

Program Badan Beruniform ini adalah secara berpakej, di mana pelajar itu perlu melengkapkan keseluruhan pakej itu selama 5 semester. Mereka akan diberi nilai 5 unit seperti yang ditunjukkan pada Jadual 2.Penilaian dibuat pada setiap penghujung semester sepanjang pengajian di universiti.

Jadual 2: Pemberian unit dan penilaian untuk Badan Beruniform bagi pelajar diploma

TAHUN 1		TAHUN 2		TAHUN 3	
Semester 1	Semester 2	Semester 3	Semester 4	Semester 5	Semester 6
1 unit	1 unit	1 unit	1 unit	1 unit	Latihan Industri

13.3. Latihan Industri

Selain daripada menghadiri kuliah, tutorial dan amali, pelajar juga diwajibkan menjalani Latihan Industri. Latihan Industri merupakan kursus 6 unit. Pelajar wajib menjalani Latihan Industri selama 16 minggu sebelum layak dianugerahkan 6 kredit bagi kursus ini. Penilaian jam pertemuan (berbentuk jam bekerja di pusat/ organisasi terbabit) dilakukan dengan mengambilkira purata 8 jam pertemuan sehari selama 5 hari seminggu, iaitu 8 jam sehari X 5 hari = 40 jam seminggu.

Tujuan utama Latihan Industri ialah:-

- Menyemai sikap profesional yang harus ada pada setiap Pembantu Jurutera.
- Menyedarkan pelajar tentang kepentingan dan kaitan yang kuat antara latihan industri, makmal/ amali dan teori kejuruteraan.
- Membiasakan pelajar dengan persekitaran dan keadaan yang mengawal bagaimana teori-teori dapat diaplikasikan menurut sumber-sumber yang sedia ada dan kekangan-kekangannya. Ini supaya aspek akademik sesuatu kursus dapat difahami daripada perspektif yang praktikal, dan digunakan dengan lebih berkesan.
- Memberi pendedahan awal tentang persekitaran dan suasana di industri. Justeru itu, para pelajar berpeluang melengkapkan diri sebagai bekalan untuk menghadapi situasi sebenar alam pekerjaan, baik dalam pengajian akademik mahupun latihan-latihan seterusnya. Latihan Industri dijalankan di luar kampus, iaitu di pelbagai sektor industri yang berkaitan dengan bidang pengkhususan pelajar.

13.4. Kod Kursus

Setiap kursus yang ditawarkan mempunyai kodnya yang tersendiri seperti yang ditunjukkan pada Jadual 3 dan Jadual 4. Huruf pertama kod adalah 'D', dan ini bererti kursus ini adalah kursus peringkat Diploma. Huruf kedua menunjukkan pusat pengajian yang menawarkan kursus, sementara huruf ketiga menunjukkan samada kursus itu adalah Kursus Teras (T) atau Kursus Keperluan Universiti (W). Jadual 3 menunjukkan huruf yang digunakan bagi pusat pengajian yang berkaitan:

Jadual 3: Kod Kursus dan pusat pengajian yang menawarkan kursus

Huruf Kedua Dalam Kod	Pusat Pengajian Yang Menawarkan Kursus
E	PPK Sistem Elektrik
M	PPK Mikroelektronik
K	PPK Komputer & Perhubungan
N	PPK Mekatronik
B	PPK Bahan
P	PPK Pembuatan
U	PP Pembangunan Insan Dan Teknokomunikasi
C	Pusat Kejuruteraan
Q	Institut Matematik Kejuruteraan
I	Pusat Kerjasama Industri
V	Pusat Bahasa Antarabangsa

Tiga angka terakhir bagi sesebuah kod kursus mewakili perkara-perkara berikut, iaitu angka pertama adalah tahap kursus (1 = subjek tahun 1, 2 = subjek tahun 2, dsb); angka kedua dan ketiga adalah nombor kursus. Jadual 4 menunjukkan sistem pemberian kod kursus.

Jadual 4 : Sistem Pemberian Kod Kursus

A	B	C	1	2	3		Nombor Kursus
↓	↓	↓	↓	↓	→		
↓	↓	↓	∟	→	→	**Peringkat**	**Kursus**
↓	↓	↓				1 =	Peringkat 100
↓	↓	↓				2 =	Peringkat 200
↓	↓	↓				3 =	Peringkat 300
↓	↓	∟	→	→	→	**Jenis**	**Kursus**
↓	↓					T =	Teras
↓	↓					W =	Keperluan Universiti
↓	∟	→	→	→	→	**Pusat Pengajian/ Pusat**	(sila rujuk **Jadual 3**)
∟	→	→	→	→	→	**D**	Peringkat Diploma Kejuruteraan

13.5 Pentarafan Pelajar

Taraf pengajian seseorang pelajar tidak boleh ditentukan secara langsung mengikut bilangan tahun dia berada di universiti. Umpamanya terdapat pelajar yang sungguhpun berada di universiti selama dua tahun tetapi masih dianggap pada tahun pertama kerana tidak memenuhi syarat-syarat pengajian yang tertentu. Taraf bagi seseorang pelajar ditentukan berasaskan kepada pengumpulan unit kredit yang terkumpul seperti dalam Jadual 5 berikut :-

Jadual 5: Penentuan taraf Pelajar

Tahun 1	Tahun 2	Tahun 3
0 – 39 unit	40 – 76 unit	77 – 98

Taraf akademik pelajar juga diukur dengan sistem PNGK (CGPA) sepanjang pengajian di universiti. Seseorang pelajar yang berjaya mendapat sekurang-kurangnya 2.00 bagi Purata Nilai Gred (PNG) pada satu-satu semester diberi taraf 'Aktif' (A) dan boleh meneruskan pengajian dalam semester yang berikutnya. Pelajar juga dikehendaki mendapatkan Purata Nilai Gred Kumulatif (PNGK) sekurang-kurangnya 2.00 untuk penganugerahan diploma. PNGK ialah gred yang dikira bagi keseluruhan pencapaian yang dikumpulkan.

PNG pelajar yang kurang dari 2.00 pada satu-satu semester akan diberi taraf **Percubaan I (PI). Taraf Percubaan II (P2**) pula diberikan kepada pelajar yang mendapat purata kurang dari 2.00 bagi 2 semester berturut-turut. Jika PNG pelajar masih mendapat kurang dari 2.00 pada semester berikutnya, pelajar berkenaan tidak akan dibenarkan meneruskan pengajian, melainkan sekiranya PNGK pelajar melebihi 2.00, dan pihak universiti memperakukannya. Pihak universiti berkuasa menamatkan pengajian mana-mana pelajar yang didapati tidak memenuhi prestasi dan kemajuan akademik yang ditetapkan.

13.6. Pendaftaran Kursus

Pendaftaran Kursus dilakukan secara ***online*** oleh semua pelajar UniMAP dari mana-mana lokasi dari dalam atau luar UniMAP. Pelajar lama akan mendaftar kursus secara 'online' selepas keputusan peperiksaan dikeluarkan. Pelajar baru akan mendaftar kursus pada satu (1) hari yang ditetapkan di dalam jadual minggu suai kenal pelajar dan ia dilakukan secara '*online*' mengikut Pusat Pengajian masing-masing.

Para pelajar akan diberikan taklimat dan penerangan mengenai kursus semasa program bersama Pusat Pengajian dalam minggu suai kenal tersebut. Pelajar yang sedang bercuti / menangguh pengajian boleh mendaftar kursus setelah melapor diri pada semester berikutnya. Pelajar yang mendaftar kursus lewat

mungkin akan dikenakan denda **RM 50 (RINGGIT MALAYSIA LIMA PULUH)**

Para pelajar adalah diwajibkan untuk bertemu dengan Rakan Pendamping Siswa (RPS) / Penasihat Akademik (PA) masing-masing selepas membuat pendaftaran kursus dengan membawa bersama slip pendaftaran kursus sementara yang telah dicetak. Rakan Pendamping Siswa (RPS) / Penasihat Akademik (PA) akan mengesahkan / tidak mengesahkan pendaftaran kursus yang dibuat oleh pelajar. Sekiranya Rakan Pendamping Siswa (RPS) / Penasihat Akademik (PA) bersetuju dengan kursus yang didaftarkan oleh pelajar, maka pengesahan akan dibuat di dalam sistem. Rakan Pendamping Siswa (RPS) / Penasihat Akademik (PA) dan pelajar akan mencetak slip pendaftaran yang telah disahkan. Sekiranya Rakan Pendamping Siswa (RPS) / Penasihat Akademik tidak bersetuju dengan kursus yang didaftarkan maka pelajar perlu membuat pendaftaran semula mengikut persetujuan Rakan Pendamping Siswa (RPS) / Penasihat Akademik. Hanya dengan pengesahan dari Rakan Pendamping Siswa (RPS) / Penasihat Akademik sahaja maka pendaftaran kursus seseorang pelajar di anggap sah.

13.6.1 Pendaftaran Kursus Pelajar Aktif

Pendaftaran Kursus dilakukan secara *onlline* oleh semua pelajar UniMAP dari mana-mana lokasi dari dalam atau luar UniMAP. Pelajar lama akan mendaftar kursus secara 'online' selepas keputusan peperiksaan secara 'online' dikeluarkan iaitu selama dua (2) minggu/empat belas (14) hari pada tarikh yang ditetapkan atau tertakluk kepada perubahan yang ditetapkan pada semester tersebut.

Pelajar berstatus Aktif boleh mendaftar kursus secara 'online' tidak melebihi 22 unit dan tidak kurang dari 10 unit kecuali pelajar yang mengikuti Latihan Industri dan pelajar semester akhir yang akan menamatkan pengajian. Bagi pelajar yang mendaftar kursus melebihi 22 unit, perlulah mendapatkan kebenaran daripada Penasihat Akademik dengan kelulusan Dekan. Pelajar perlu mengisi Borang HEA-09c-Borang Pendaftaran Kursus.

Para pelajar adalah diwajibkan untuk bertemu dengan Rakan Pendamping Siswa (RPS) / Penasihat Akademik (PA) masing-masing dalam masa dua (2) hari pertama semester bermula selepas membuat pendaftaran kursus dengan membawa bersama slip pendaftaran kursus sementara yang telah dicetak. Rakan Pendamping Siswa (RPS) / Penasihat Akademik akan mengesahkan / tidak mengesahkan pendaftaran kursus yang dibuat oleh pelajar. Sekiranya Rakan Pendamping Siswa (RPS) / Penasihat Akademik bersetuju dengan kursus yang didaftarkan oleh pelajar, maka pengesahan akan dibuat di dalam sistem. Rakan Pendamping Siswa (RPS) / Penasihat Akademik dan pelajar akan mencetak slip pendaftaran yang telah disahkan. Sekiranya Rakan Pendamping Siswa (RPS)/ Penasihat Akademik tidak bersetuju dengan kursus yang didaftarkan maka pelajar perlu membuat pendaftaran semula mengikut persetujuan Rakan Pendamping Siswa (RPS) / Penasihat Akademik. Hanya dengan pengesahan dari Rakan Pendamping Siswa (RPS) / Penasihat Akademik sahaja maka pendaftaran kursus seseorang pelajar di anggap sah.

13.6.2 Pendaftaran Kursus Pelajar Baru

Pelajar baru akan mendaftar kursus pada satu (1) hari yang ditetapkan di dalam jadual minggu suai kenal pelajar dan ia dilakukan secara *online* mengikut Pusat Pengajian masing-masing.

Para pelajar akan diberikan taklimat dan penerangan mengenai kursus semasa program bersama Pusat Pengajian dalam minggu suai kenal tersebut. Pelajar yang sedang bercuti / menangguh pengajian boleh mendaftar kursus setelah melapor diri pada semester berikutnya. Pelajar yang mendaftar kursus lewat mungkin akan dikenakan denda RM50.
Para pelajar adalah diwajibkan untuk bertemu dengan Rakan Pendamping Siswa (RPS) / Penasihat Akademik (PA) masing-masing dalam

masa dua (2) hari pertama semester bermula selepas membuat pendaftaran kursus dengan membawa bersama slip pendaftaran kursus sementara yang telah dicetak. Rakan Pendamping Siswa (RPS) / Penasihat Akademik akan mengesahkan / tidak mengesahkan pendaftaran kursus yang dibuat oleh pelajar. Sekiranya Rakan Pendamping Siswa (RPS) / Penasihat Akademik bersetuju dengan kursus yang didaftarkan oleh pelajar, maka pengesahan akan dibuat di dalam sistem. Rakan Pendamping Siswa (RPS) / Penasihat Akademik dan pelajar akan mencetak slip pendaftaran yang telah disahkan. Sekiranya Rakan Pendamping Siswa (RPS) / Penasihat Akademik tidak bersetuju dengan kursus yang didaftarkan maka pelajar perlu membuat pendaftaran semula mengikut persetujuan Rakan Pendamping Siswa (RPS) / Penasihat Akademik. Hanya dengan pengesahan dari Rakan Pendamping Siswa (RPS) / Penasihat Akademik sahaja maka pendaftaran kursus seseorang pelajar di anggap sah.

13.6.3 Pendaftaran Kursus Pelajar Berstatus Akademik Percubaan (P)

Pelajar yang mendapat keputusan peperiksaan dan bertukar status akademik tidak dibenarkan untuk mendaftar kursus secara 'online'. Pelajar perlu berjumpa dengan Penasihat Akademik dan Dekan Pusat Pengajian masing-masing untuk membolehkan pelajar mendaftar kursus. Pelajar perlu membawa bersama semua keputusan peperiksaan dalam masa dua (2) hari pertama semester bermula.

Pelajar berstatus P hanya dibenarkan mendaftar kursus maksimum 12 unit dan minimum 10 unit. Pelajar perlu berjumpa dengan Penasihat Akademik terlebih dahulu untuk mendapatkan pandangan terhadap kursus-kursus yang akan didaftarkan. Pelajar yang ingin mendaftar melebihi unit maksimum iaitu 12 unit atau kurang dari unit minimum 10 unit perlu mendapatkan kebenaran Dekan Pusat Pengajian masing-masing terlebih dahulu sebelum didaftarkan oleh Penolong Pendaftar Pusat Pengajian masing-masing.

Kategori pelajar bertukar status akademik adalah seperti berikut :

Aktif (A) ke Percubaan 1 (P1)
Percubaan 1 (P1) ke Percubaan 2 (P2)
Percubaan 2 (P2) ke Aktif (A)

Pelajar bertukar status perlu mengisi borang pendaftaran kursus (HEA 09b- Borang Pendaftaran Kursus) dan mendapatkan kelulusan Penasihat Akademik dengan pengesahan Dekan Pusat Pengajian. Borang yang telah diperakukan akan diserahkan oleh Penasihat Akademik kepada Penolong Pendaftar Pusat Pengajian masing-masing untuk didaftarkan.

13.6.4 Pendaftaran Kursus Pelajar Lewat

Pelajar yang mendaftar lewat selepas tamat tarikh pendaftaran wajib boleh didenda RM50 (lima puluh ringgit). Pendaftaran lewat tidak boleh melewati minggu ketiga selepas tarikh pendaftaran kursus sebenar.

Pelajar perlu mengisi borang HEA-09-Borang Pendaftaran Kursus Lewat dan mendapat kelulusan Dekan Pusat Pengajian masing-masing.

13.6.5 Penambahan / Pengguguran / Tarik Diri Kursus

Pelajar adalah diwajibkan untuk membuka sistem pendaftaran kursus pada awal semester untuk mengetahui status terkini pendaftaran kursus masing-masing. Pelajar yang ingin menambah / menggugur kursus boleh melakukannya sendiri secara 'online' selama dua (2) minggu.

Para pelajar dibenarkan memohon untuk menggugur kursus selepas minggu kedua hingga minggu keenam dengan menggunakan borang HEA-10 (Borang Gugur Kursus) dan perlu mendapatkan sokongan Dekan Pusat Pengajian

sebelum menyerahkannya ke Jabatan Pendaftar untuk direkodkan. Borang gugur kursus boleh didapati di Jabatan Pendaftar, Pusat Pengajian atau dari portal.

Sekiranya sudah melepasi tarikh gugur kursus, pelajar boleh memohon untuk menarik diri bagi sesuatu kursus selepas minggu keenam iaitu selepas tamat tempoh gugur kursus yang dibenarkan (dengan syarat tidak melebihi minggu keempatbelas atau sebelum minggu peperiksaan bermula) dengan mengisi borang HEA-19 (Borang Tarik Diri Kursus) dan akan dikenakan denda RM 50 (**RINGGIT MALAYSIA LIMA PULUH)** bagi setiap kursus. Borang tarik diri boleh didapati di Jabatan Pendaftar, Pusat Pengajian atau di portal. Borang yang lengkap dan mendapat sokongan Dekan perlu dihantar ke Jabatan Pendaftar untuk direkodkan. Pelajar perlu ambil maklum bahawa walaupun sudah menarik diri, maklumat mengenai pendaftaran pelajar bagi kursus yang ditarik diri itu akan tetap dimasukkan ke dalam transkrip pelajar. Walau bagaimanapun, gred tidak akan dikira di dalam pengiraan PNG atau PNGK pelajar.

13.7 Pertukaran Program Pengajian

Pertukaran program pengajian tidak digalakkan kerana ia melibatkan penukaran agihan sumber yang sudah dirancang dengan rapi pada awal sesebuah sidang akademik. Walau bagaimanapun, permohonan rayuan pertukaran program pengajian boleh dipertimbangkan dengan alasan-alasan yang kukuh sahaja dan tertakluk kepada syarat-syarat seperti berikut:

» Permohonan hanya boleh dibuat oleh pelajar setelah tamat sekurang-kurangnya satu semester pengajian dengan mengisi Borang Permohonan Pertukaran Program Pengajian (HEA-12) dengan lengkap. Borang permohonan boleh didapati di Jabatan Pendaftar atau di Pusat Pengajian. Walau bagaimanapun, bagi kes-kes tertentu permohonan pelajar untuk pertukaran program pengajian pada permulaan pengajian boleh dipertimbangkan dengan kelulusan Naib Canselor/Timbalan Naib Canselor (Akademik & Antarabangsa).

» Permohonan perlu dikemukakan dalam masa dua minggu pertama semester bermula.

» Setiap permohonan perlu menyertakan sebab-sebab yang kukuh secara bertulis untuk bertukar program dan perlu ada sokongan daripada kedua-dua Rakan Pendamping Siswa (RPS) dan Dekan Pusat Pengajian program asal dan program yang dipohon.

» Setiap permohonan yang telah mendapat sokongan Dekan Pusat Pengajian perlu mendapat perakuan Dekan Pengurusan Akademik dan seterusnya kelulusan Naib Canselor/Timbalan Naib Canselor (Akademik & Antarabangsa) sebelum direkodkan oleh Jabatan Pendaftar (Unit Kemasukan dan Rekod Pelajar).

» Bagi pelajar yang mendapat biasiswa/PTPTN atau sebagainya, pelajar mestilah mendapat kelulusan dari penganjur masing-masing. Pelajar perlu berurusan secara terus dengan pihak penganjur atau memohon penerangan daripada Jabatan Hal Ehwal Pelajar dan Alumni (JHEPA).

13.8 Penangguhan Pengajian

Permohonan penangguhan pengajian dibenarkan kepada pelajar yang mempunyai masalah kesihatan dan disahkan sakit oleh hospital kerajaan atau doktor panel universiti. Permohonan selain dari masalah kesihatan boleh dipertimbangkan sekiranya mempunyai alasan yang munasabah dan mendapat perakuan Rakan Pendamping Siswa (RPS), Dekan Pusat Pengajian, Dekan Pengurusan Akademik dan akhir sekali, kelulusan Timbalan Naib Canselor (Akademik & Antarabangsa)/ Naib Canselor.

Pelajar boleh memohon penangguhan pengajian dengan mengisi Borang HEA/HEP13 – Borang Permohonan Penangguhan Pengajian yang boleh didapati di Jabatan Pendaftar atau di Pusat-pusat Pengajian atau didalam portal. Permohonan hendaklah dikemukakan kepada Rakan Pendamping Siswa dan seterusnya Dekan Pusat Pengajian. Dekan Pusat Pengajian boleh mengarahkan

pelajar merujuk kepada Kaunselor dan mendapatkan komen Kaunselor sebelum membuat pertimbangan sekiranya perlu.

Permohonan penangguhan pengajian perlu dikemukakan sebelum minggu ketujuh pengajian kecuali dengan sebab-sebab tertentu yang diluluskan. Permohonan selepas minggu ketujuh hanya dibenarkan atas sebab kesihatan sahaja dan mendapat perakuan hospital kerajaan atau doktor panel Universiti. Pelajar tidak dibenarkan menangguh pengajian melebihi dua semester berturut-turut kecuali atas sebab-sebab tertentu yang boleh dipertimbangkan.

Bagi pelajar yang menangguhkan pengajian atas sebab kesihatan atau sakit, semester tersebut tidak akan diambilkira dalam pengiraan semester yang digunakan untuk penganugerahan diploma/ijazah (tanpa penalti). Bagi pelajar yang menangguh pengajian atas sebab selain dari sebab kesihatan, semester berkenaan akan diambilkira dalam pengiraan semester yang digunakan untuk penganugerahan diploma/ijazah (dengan penalti) kecuali dengan kebenaran. Pelajar yang menghadapi masalah kesihatan yang agak lama boleh diberhentikan dari pengajian sekiranya didapati tidak boleh meneruskan pengajian dan mendapat perakuan daripada hospital kerajaan atau doktor panel Universiti.

Pelajar akan diberikan amaran secara bertulis sekiranya didapati tidak mendaftar pada sesuatu semester tanpa memberi sebarang permohonan penangguhan pengajian. Pelajar berkenaan yang tidak menyertakan sebarang permohonan penangguhan di dalam sesuatu tempoh yang diberikan, boleh dikeluarkan dari senarai nama pelajar berdaftar Universiti atau disahkan berhenti dari Universiti ini.

13.9 Tempoh Minimum / Maksimum Pengajian Pelajar

Pelajar perlu menamatkan program pengajian dalam tempoh masa yang telah ditetapkan, iaitu minimum 6 semester (3 tahun) dan tempoh maksimum 10 semester (5 tahun). Walau bagaimanapun, bagi pelajar yang diberi pengecualian unit, tempoh maksimum yang dibenarkan adalah bergantung kepada jumlah pengecualian unit atau pengecualian semester yang diluluskan (tempoh minimum tidak boleh kurang dari 4 semester (2 tahun) keseluruhan pengajian) dan tempoh maksimum adalah 8 semester (4 tahun).

13.10 Kursus Kuratif

Kursus Kuratif (iaitu kursus yang ditawarkan semasa cuti panjang) diadakan selepas Semester II. Pendaftaran Kursus Kuratif adalah amat terhad dan tertakluk kepada penawaran semula kursus tersebut oleh Pusat Pengajian serta kelulusan Senat. Pelajar hanya dibenarkan mengambil maksimum 10 unit (3 jenis) Kursus Kuratif pada satu-satu masa. Pengajaran-pembelajaran adalah dalam bentuk tutorial sahaja. Kursus Kuratif mengandungi 2 minggu tutorial dan 1 minggu peperiksaan.

Bagi pelajar yang dibenarkan mengambil kursus kuratif, keputusan peperiksaan kursus - kursus kuratif akan digabungkan dengan keputusan kerja kursus terbaik yang telah diambil pada semester sebelumnya bagi mendapatkan keputusan keseluruhan. Jika keputusan keseluruhan terkini (kuratif) lebih baik dari sebelumnya, maka keputusan keseluruhan terkini akan digunakan.

13.11 Pengecualian Unit

13.11.1 Takrifan Pengecualian Unit

Pengecualian unit ditakrifkan sebagai pengecualian sebahagian keperluan unit untuk pengijazahan yang diberi berdasarkan mata pelajaran di peringkat sijil dan didapati setara dengan mata pelajaran di peringkat diploma yang akan diikuti.

Namun bagi peringkat sijil ke Diploma, tiada pengecualian dapat dibuat.

13.12 Sistem Peperiksaan dan Penilaian

Peperiksaan bertulis diadakan pada hujung semester. Setiap pelajar mestilah terlebih dahulu memenuhi syarat-syarat kuliah, tutorial, amali dan sebagainya

sebelum layak menduduki peperiksaan. Tempoh peperiksaan adalah seperti pada Jadual 6 berikut :-

Jadual 6: Tempoh Masa Peperiksaan

Nilai Kursus	Tempoh Peperiksaan
2 unit	2 jam
3 unit atau lebih	3 jam

Keputusan peperiksaan pelajar ditentukan berdasarkan penilaian secara berterusan dari komponen kerja kursus dan peperiksaan bertulis. Sumbangan kerja kursus menjadi 100% jika sesebuah kursus itu keseluruhannya berbentuk makmal. Kerja kursus biasanya merangkumi tugasan, laporan makmal dan ujian. Penilaian prestasi pelajar adalah berdasarkan kepada gred abjad dan mata penilaian seperti pada jadual 7. Jadual 8 menunjukkan contoh pengiraan purata nilai Gred (PNG) dan purata nilai Gred keseluruhan (PNGK) pelajar.

Jadual 7: Gred abjad dan mata penilaian

GRED	MATA NILAI	STATUS
A	4.00	LULUS
A-	3.75	
B+	3.50	
B	3.00	
B-	2.75	
C+	2.50	
C	2.00	
C-	1.75	GAGAL
D+	1.50	
D	1.00	
D-	0.75	
F	0.00	

Jadual 8: Contoh pengiraan PNG dan PNGK

Kursus	Unit	Nilai Gred [NG]	Gred	Jumlah NG
DBT101	3	1.75	C-	5.25
DET101	3	2.50	C+	7.50
DMT111	3	3.50	B+	10.50
DNT111	2	3.75	A-	7.50
DQT101	3	4.00	A	12.00
DUT102	2	2.75	B-	5.50
	16			48.25
PNG = 48.25/16 = 3.02	Contoh PNG yang diperolehi pada Semester I			

Kursus	Unit	Nilai Gred [NG]	Gred	Jumlah NG
DET102	3	4.00	A	12.00
DKT121	3	2.00	C	6.00
DKT122	3	3.50	B+	10.50
DNT123	3	3.50	B+	10.50
DQT102	3	3.75	A-	11.25
	15			50.25
PNG = 50.25/15 = 3.35	Contoh PNG yang diperolehi pada Semester II			

PNGK = Jumlah NG Terkumpul / Jumlah Bil. Unit Terkumpul

$$= \frac{48.25 + 50.25}{16 + 15}$$

$$= 3.18$$

13.13 Rayuan Penyemakan Keputusan Peperiksaan Akhir Semester

Atas sebab-sebab tertentu, pelajar mungkin hendak memohon untuk penyemakan dijalankan ke atas keputusan peperiksaan akhir semester pelajar. Semakan semula keputusan peperiksaan ini hanya melibatkan kursus yang diambil pada semester berkenaan sahaja. Pelajar perlu menghantar borang HEA-15m [Borang Rayuan Penyemakan Semula Keputusan Peperiksaan] kepada Unit Peperiksaan & Pengijazahan dengan menyertakan Kiriman Wang/Wang Pos Malaysia/Bank Deraf/Cek atas nama BENDAHARI UNIMAP atau resit pembayaran dari Jabatan Bendahari bernilai RM50.00 bagi satu (1) kursus. Borang rayuan tersebut hendaklah dikemukakan dalam tempoh 15 hari selepas keputusan rasmi diumumkan. Rayuan penyemakan selepas tempoh di atas tidak akan dipertimbangkan. Sekiranya permohonan rayuan pelajar berjaya iaitu berlaku perubahan peningkatan gred, maka wang semakan semula sebanyak RM50.00 akan dikembalikan kepada pelajar dan sekiranya tidak berjaya, wang semakan tersebut tidak akan dikembalikan.

13.14 Penggunaan Bahasa Inggeris

Bahasa Inggeris adalah bahasa akademik sedunia dan dari itu ia dianggap amat penting sekali. Sungguhpun begitu, Bahasa Melayu tetap bahasa rasmi universiti dan ia digunakan dengan sewajarnya.

Pendekatan pengajaran Bahasa Inggeris di UniMAP menekankan faktor kebolehan dan keyakinan pelajar bertutur dan menulis dengan baik dalam bahasa ini di khalayak ramai.Kuliah dan makmal bagi kursus-kursus teras dan Kursus Keperluan Universiti dijalankan dengan sepenuhnya dalam Bahasa Inggeris.

13.15 Sistem Penasihatan Akademik Dan Rakan Pendamping Siswa

Sistem Penasihatan Akademik menjadi 'Jambatan Perhubungan' antara pelajar dengan pensyarah untuk berbincang dan merancang pengajian pelajar. Walaupun pelajar mendaftar secara *'online',* pelajar diminta berjumpa dengan Penasihat Akademik (PA) untuk mendapatkan nasihat semasa tempoh pendaftaran.

Rakan Pendamping Siswa(RPS) merupakan program yang melengkapi sistem Penasihatan Akademik. Setiap pelajar akan diberikan seorang RPS yang terdiri daripada staf Akademik UniMAP. RPS bertanggungjawab menasihati pelajar dalam hal-hal akademik dan bukan akademik. RPS berperanan sebagai rakan pelajar yang benar-benar ingin membantu pelajar menjalani kehidupan yang sihat di universiti ini. Pelajar perlu mengenali RPS masing-masing dengan lebih baik lagi dan merujuk kepada RPS sekiranya pelajar menghadapi masalah yang memerlukan nasihat atau pandangan daripada orang yang lebih berpengalaman dalam kehidupan ini.

Selain itu, program RPS juga merangkumi 4 kursus wajib (4 pillars) yang perlu diambil oleh pelajar. Untuk Pelajar Diploma Kejuruteraan UniMAP mereka perlu menghadiri dan menjalani 4 buah program RPS iaitu **Kursus Bina Negara Mahasiswa (Asas)**,**Program Wacana Sosial**, **Bengkel Kepimpinan** dan **Baktisiswa**.

14.0 PUSAT PEMANTAPAN AKADEMIK

Selain pusat-pusat pengajian, **iKOM**, Pusat Bahasa, **Pusat Kejuruteraan** dan **Institut Matematik Kejuruteraan (IMK)** yang menawarkan Kursus Teras dan Kursus Keperluan Universiti terdapat beberapa pusat yang ditubuhkan bagi menyokong kepentingan akademik UniMAP.

14.1 Pusat Pengajian Pembangunan Insan Dan Teknokomunikasi (iKOM)

Pusat ini menawarkan Kursus-Kursus Keperluan Universiti. Kurusus-Kursus Keperluan Universiti adalah terdiri dari:
DUW233-Tamadun Islam & Tamadun Asia TITAS (2 unit)
DUW235-Hubungan Etnik (2 unit)
DUW123-Kemahiran Komunikasi (2 unit)
DUW224-Keusahawanan Kejuruteraan (2 unit)

14.2 Pusat Bahasa Antarabangsa

Pusat ini menawarkan Kursus-Kursus Keperluan Universiti. Kurusus-Kursus Keperluan Universiti adalah terdiri dari:
DVW410-Bahasa Melayu Universiti (2 unit)
DVW112-Bahasa Inggeris Universiti 1 (2 unit)
DVW212-Bahasa Inggeris Universiti (2 unit).

14.3 Pusat Kejuruteraan

Pusat Kejuruteraan ditubuhkan bagi mengendalikan makmal dan bengkel umum(gunasama) yang diperlukan oleh pelbagai program yang ditawarkan di UniMAP. Peranan Pusat Kejuruteraan dalam memastikan kelincinan penggunaan makmal-makmal gunasama. Di sampaing itu, Pusat Kejuruteraan juga menyokong aktiviti-aktiviti penyelidikan dan pembangunan (R&D) di UniMAP. Pusat Kejuruteraan juga menawarkan kursus DCT100/2-Kemahiran Asas Kejuruteraan yang wajib diambil oleh semua Pelajar Diploma Kejuruteraan dari PPK Sistem elektrik, PPK Mekatronik dan PPK Komputer&Perhubungan.

14.4 Institut Matematik Kejuruteraan

Institut Matematik Kejuruteraan (IMK) adalah sebuah pusat bagi merancang, menawarkan dan pemantauan kurikulum matematik kejuruteraan di UniMAP. IMK juga berperanan sebagai institut penyelidikan matematik kejuruteraan dan juga sebagai pusat rujukan dan

memberi perkhidmatan kepakaran dalam bidang kaedah penyelidikan matematik, simulasi, kaedah statistik dan penyelidikan operasi.IMK juga sebagai pusat latihan bagi masyarakat kampus dan luar kampus dalam bidang yang berkaitan dengan matematik. IMK menawarkan tiga kursus matematik yang wajib diambil oleh semua program diploma. Kursus-kursus ini adalah DQT101/3-Matematik I, DQT102/3-Matematik-II dan DQT203/3-Matematik III.

14.5 Pusat Kerjasama Industri dan Agensi Kerajaan

Pusat Kerjasama Industri berperanan menjalin hubungan dengan pihak industri dalam pelbagai aspek terutama dalam program-program yang berkaitan terus dengan pembelajaran pelajar. Program yang dijalankan seperti pendedahan pelajar. Program yang dijalankan seperti pendedahan kepada industri, forum bersama industri, Latihan Perindustrian Staf dan beberapa lagi program yang diselia dan diselaraskan oleh pusat ini. Sesetengah dari program ini wajib diambil oleh semua pelajar. Jadual program-program ini dihebahkan kepada pelajar dari semasa ke semasa.

14.6 Pusat Teknologi Maklumat Dan Komunikasi

Pusat Teknologi Maklumat dan Komunikasi diwujudkan untuk menyokong penggunaan dan perlaksanaan teknologi maklumat di samping membantu fungsi akademik dan pentadbiran universiti. Pusat ICT juga membangun dan menyelanggara sistem maklumat berkomputer universiti serta sistem rangkaian komunikasi kampus.Ia menyediakan khidmat pakar runding dalam bidang teknologi maklumat dan komunikasi, membantu membudayakan penggunaan teknologi maklumat di universiti dan melaksanakan tugas-tugas lain yang diarahkan oleh universiti.

14.7 Perpustakaan Tuanku Syed Faizuddin Putra

Perpustakaan Universiti telah ditubuhkan untuk menyediakan kemudahan dan perkhidmatan yang berkualiti bagi menyokong rancangan pengajaran/ pembelajaran, serta penyelidikan di universiti ini. Sebagai salah sebuah gedung ilmu yang terkemuka di utara Semenanjung Malaysia,terdapat ribuan koleksi buku dan jurnal, termasuk dalam bentuk elektronik. Namun begitu beberapa bidang lain juga tidak dipinggirkan.Maklumat lanjut mengenai perkhidmatan-perkhidmatan yang disediakan boleh didapati di Perpustakaan.

14.8 Unit Pengajaran Dan Pembelajaran

Unit ini berperanan menyelaras dan melaksanakan perkhidmatan yang dapat meningkatkan tahap profesionalisme tenaga akademik dan juga merangka kursus/bengkel serta memberikan perkhidmatan bimbingan dan kaunseling kepada pelajar agar mereka mempunyai kemahiran membentuk kepercayaan terhadap potensi diri serta cara dan gaya belajar yang cemerlang ke arah merealisasikan visi dan misi UniMAP.

15.0 BAHAGIAN PENGURUSAN AKADEMIK, JABATAN PENDAFTAR

Bahagian Pengurusan Akademik ini bertanggungjawab untuk mengendalikan urusan-urusan yang berkaitan kemasukan pelajar, pemprosesan data dan rekod pelajar, peperiksaan, senat dan pengijazahan pelajar.

Unit-unit yang terdapat di Bahagian Pengurusan Akademik, Jabatan Pendaftar terbahagi kepada:

I. Unit Kemasukan dan Rekod Pelajar
II. Unit Peperiksaan dan Pengijazahan
III. Unit Senat

I. Unit Kemasukan dan Rekod Pelajar

Unit Kemasukan dan Rekod Pelajar bertanggungjawab untuk mengendalikan urusan-urusan yang berkaitan dengan kemasukan pelajar dan pemprosesan data dan rekod pelajar. Antara tugas dan tanggungjawab yang dijalankan adalah:

- Mengendalikan secara keseluruhan ke atas proses pengambilan dan pendaftaran pelajar dalam negara di peringkat ijazah pertama dan diploma.
- Mengendalikan proses pengambilan dan pendaftaran pelajar antarabangsa di peringkat ijazah pertama.
- Mengurus dan mengendalikan aspek-aspek pemprosesan data di dalam Sistem Maklumat Pelajar.
- Menguruskan rekod peribadi pelajar dan status pelajar termasuk permohonan penangguhan pengajian dan pertukaran program pengajian pelajar.
- Menguruskan pendaftaran kursus pelajar secara *online* bagi setiap semester pengajian.
- Menguruskan proses pemberian pengecualian unit dan pemindahan kredit pelajar.

II. Unit Peperiksaan dan Pengijazahan

Unit Peperiksaan bertanggungjawab untuk mengendalikan dan memantau perjalanan Peperiksaan Akhir Semester dan perkara-perkara yang berkaitan dengannya. Di antara tugas dan tanggungjawab yang dijalankan adalah seperti berikut:

- Mengeluarkan Pekeliling Peperiksaan kepada Pusat Pengajian/ Pusat/Institut.
- Mengeluarkan Jadual Waktu Peperiksaan untuk Program Diploma dan Ijazah.
- Menguruskan Peperiksaan Akhir Semester di dalam jangkamasa yang ditetapkan.
- Menjadi Sekretariat kepada Majlis Peperiksaan Universiti.
- Menguruskan pemprosesan data peperiksaan mengunakan Sistem Maklumat Pelajar.
- Mengeluarkan keputusan peperiksaan akhir semester.
- Menguruskan proses rayuan pelajar untuk menyemak semula keputusan peperiksaan.
- Mengeluarkan Transkrip Akademik selepas Konvokesyen.
- Mengendalikan pengurusan jubah dari segi peminjaman dan pemulangan jubah staf akademik.
- Menyemak kelayakan pengijazahan untuk pelajar tahun akhir serta mengeluarkan surat penamatan pengajian dan kelayakan pengijzahan untuk pelajar yang layak bergraduat.
- Bertanggungjawab terhadap konvokesyen pelajar dari segi jemputan serta pinjaman dan pemulangan pakaian konvokesyen.
- Menguruskan proses penyediaan dan penyerahan skrol pengijazahan kepada graduan.
- Merekod dan mengemaskini data-data graduan yang telah bergraduat.

III. Unit Senat

Unit Senat bertanggungjawab untuk mengendalikan urusan-urusan yang berkaitan dengan Senat Universiti. Antara tugas dan tanggungjawab yang dijalankan adalah:

- Merancang aktiviti-aktiviti Senat dan Jawatankuasa di bawahnya, untuk memberi khidmat Urusetia dan menyelaraskannya dengan pihak-pihak lain yang berkaitan di dalam penawaran program-program sedia ada dan baru.
- Menyediakan Kalendar Akademik, menguruskan senarai penawaran kursus serta berurusan dengan Kementerian Pendidikan Malaysia (KPM) dan Jabatan Perkhidmatan Awam (JPA) mengenai penawaran program baru, penubuhan pusat pengajian/Jabatan dan Unit.
- Menguruskan pencalonan penerima Ijazah Kehormat

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Pusat Pengajian Kejuruteraan

Sistem Elektrik

PENGENALAN

Pusat Pengajian Kejuruteraan Sistem Elektrik menawarkan satu program Diploma iaitu Diploma Kejuruteraan Elektrik. Program yang dijalankan di Pusat Pengajian ini memberi lebih penekanan kepada rekabentuk pemasangan, peralatan sistem elektrik dan juga peralatan elektronik kuasa untuk kegunaan industri.

Program ini bertujuan melahirkan tenaga kerja di peringkat ikhtisas yang mahir serta mempunyai pengetahuan yang kukuh dalam bidang kejuruteraan elektrik. Pelajar akan dilatih untuk menjadi Pembantu Jurutera Elektrik yang berkemampuan menjalankan tugas dalam bidang merekabentuk pemasangan, penyelenggaraan, pengujian, pentauliahan, jualan, perundingan, pendidikan serta latihan. Para graduan akan berkemampuan menjalankan tugas-tugas pengurusan yang memerlukan kebolehan membuat pertimbangan yang teliti dan tepat.

Dengan adanya kemudahan makmal yang baik seperti Makmal Loji Sistem Kuasa (11kV), Makmal Mesin Elektrik, Makmal Sistem Kuasa, Makmal Elektronik Kuasa, Makmal Elektronik Termaju, Makmal Instrumentasi & Pengukuran yang mempunyai peralatan yang setaraf dengan industri, maka pelajar yang dilatih oleh pusat pengajian ini mampu menjalankan tugas semasa bekerja nanti. Selain itu juga, pelajar-pelajar disarankan supaya mengambil pemeriksaan Sijil Kompetensi dengan Suruhanjaya Tenaga seperti Sijil Kompetensi Pendawai Fasa Tiga dan Penjaga Jentera.

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DIPLOMA IN ELECTRICAL ENGINEERING CURRICULUM						
YEAR	**FIRST**		**SECOND**		**THIRD**	
SEMESTER	**FIRST**	**SECOND**	**FIRST**	**SECOND**	**FIRST**	**SECOND**
ENGINEERING CORE COURSES	(DQT 101/3) Mathematic I	(DQT 102/3) Mathematic II	(DQT 203/3) Mathematic III	(DET 214/3) Programmable Logic Controller	(DET 308/3) Power System II	DIT361/6 Industrial Training
	(DET 101/3) Electric Fundamental I	(DET 102/3) Electric Fundamental II	(DET 203/3) Electrical Instrumentation & Measurement	(DET 205/3) Electrical Machine & Applications II	(DET 309/3) Power Electronic	
	(DCT 100/2) Basic Engineering Skills	(DET 113/3) Digital System	(DET 204/3) Electrical Machine & Applications I	(DET 206/3) Power System I	(DET 310/3) Power System Commissioning & Maintenance Practice	
	(DMT 111/3) Engineering Science	(DET 115/3) Electronic Devices	(DET 218/3) Analogue Electronics	(DET 207/3) Electrical Installation Design	(DET 351/3) Semestral Project	
	(DUT 122/2) IT Skills	(DET 116/3) Basic Computer Programming	(DET 219/3) Microcontroller 1	(DET 212/3) Control Principle	DPT333/3 Industrial Safety and Quality Management	
	(DNT 111/2) Engineering Drawing	(DET 117/2) Computer Aided Drafting				
83	**15**	**17**	**15**	**15**	**15**	**6**
UNIVERSITY REQUIREMENT COURSES (19)		DUW123/2 Communication Skills	DUW233/2 Islamic & Asian Civilization	DUW235/2 Ethnic Relationship	DUW224/2 Engineering Entrepreneurship	
	DVW112/2 English 1	DZWXXX/1 Badan Beruniform 2	DVW212/2 English 2	DZWXXX/1 Badan Beruniform 4	DZWXXX/1 Badan Beruniform 5	
	DZWXXX/1 Badan Beruniform 1		DZWXXX/1 Badan Beruniform 3	DVW410/2 Malay Language		
19	**3**	**3**	**5**	**5**	**3**	
102	**18**	**20**	**20**	**20**	**18**	**6**

Course Code
Ex: ABC123/4
(**A**: Degree/Diploma Programme); (**B**: School); (**C**: Types of Courses): (**1**: Stage (Stage 1, 2, 3 & 4)); (**2 & 3**: Course number); (**/4**: unit)

PELUANG KERJAYA

Graduan lulusan Diploma Kejuruteraan Elektrik mempunyai prospek pekerjaan yang luas sama ada dalam syarikat swasta, industri, jabatan kerajaan dan badan-badan berkanun. Bidang kerjaya untuk graduan boleh terdiri dari sektor elektrik secara khususnya dan elektronik secara amnya antaranya:

- Industri Pengeluaran dan Pembuatan,
- Industri Pemasangan dan Pertauliahan
- Industri Penyelenggaraan dan baikpulih
- Firma Perunding Kejuruteraan Elektrik
- Industri Semikonduktor
- Firma Penyelidikan dan Pembangunan
- Institusi Pendidikan dan Kemahiran

Antara kerjaya berkaitan bagi graduan Diploma Kejuruteraan Elektrik:

- Juruteknik
- Pembantu Jurutera
- Pembantu Pegawai Latihan Vokasional

KURSUS – KURSUS YANG DITAWARKAN

1.	DET101/3	ELECTRIC FUNDAMENTAL I
2.	DET102/3	ELECTRIC FUNDAMENTAL II
3.	DET113/3	DIGITAL SYSTEM
4.	DET115/3	ELECTRONIC DEVICES
5.	DET116/3	BASIC COMPUTE PROGRAMMING
6.	DET117/2	COMPUTER AIDED DRAFTING
7.	DET203/3	ELECTRICAL MEASUREMENT AND INSTRUMENTATION
8.	DET204/3	ELECTRICAL MACHINES AND APPLICATIONS I
9.	DET205/3	ELECTRICAL MACHINES AND APPLICATIONS II
10.	DET206/3	POWER SYSTEM I
11.	DET207/3	ELECTRICAL INSTALLATION DESIGN
12.	DET211/3	BASIC ELECTRICAL TECHNOLOGY
13.	DET212/3	CONTROL PRINCIPLE
14.	DET214/3	PROGRAMMABLE LOGIC CONTROLLER
15.	DET218/3	ANALOGUE ELECTRONICS
16.	DET219/3	MICROCONTROLLER 1
17.	DET308/3	POWER SYSTEM II
18.	DET309/3	POWER ELECTRONICS
19.	DET310/3	POWER SYSTEM COMMISSIONING AND MAINTENANCE PRACTICES
20.	DET351/3	SEMESTRAL PROJECT

DET101/3
ELECTRIC FUNDAMENTAL I

Course Outcomes

The overall course objective is to teach electrical, microelectronic, computer and mechatronic engineering students the fundamental concepts, and methods of analysis for linear circuits. By the end of the course, the students should be able to:

1. Apply and explain the concepts of charge, current, voltage and power in electrical circuit.
2. Explain the operation and elementary application of resistors, capacitors, inductors ideal current and voltages source.
3. Analyse linear circuits using Kirchoff's voltage and current laws, node and mesh analysis, superposition, circuit reduction techniques and thevenin and Norton equivalent circuits.
4. Apply real, reactive and apparent power into the power triangle method and power factor correction calculation.
5. Explain three phase current and voltages for wye-wye, wye-delta, delta-delta and delta-wye connection.

Syllabus

VARIABLES AND CIRCUIT ELEMENTS
- Revision of SI Unit
- Voltage and current
- Power and energy
- Ideal basic circuit elements (passive and active)
- Basic circuit connections

Application of Ohm's Law and power calculation with passive sign convention

RESISTIVE CIRCUITS
- Series/Parallel equivalent circuits
- Kirchhoff's Law
- Voltage divider rule
- Current divider rule
- Voltage and current measurement
- Delta and Wye equivalent circuits

METHODS OF CIRCUIT ANALYSIS AND CIRCUIT THEOREMS
- Introduction to Nodal Analysis (Node-Voltage), basic concept and analysis steps on simple circuits and special cases circuits (involved dependent sources and voltage sources) in Nodal Analysis.
- Introduction to Mesh Analysis (Mesh-current), basic concept, analysis steps on simple circuits and special cases circuits (involved dependent sources and current sources) in Mesh Analysis
- Superposition theorem, Thevenin and Norton equivalent circuits
- Source transformation and maximum power transfer

INDUCTANCE AND CAPACITANCE
- Inductor, Relationship between voltage, current, power and energy for inductor
- Capacitor, Relationship between voltage, current, power and energy for capacitor
- Series/parallel combination of inductor and capacitor

AC CIRCUIT
- Alternating Current system
- Definition of waveform
- Reactance and impedance
- Phasor concept and j notation
- RL, RC and RCL circuit
- Voltage and current divider
- AC power calculation and power factor correction

BALANCE THREE PHASE SYSTEM
- The three phase voltage generation
- Illustrate Three phase voltages and currents
- The standard of three phase source and load connections (Delta and star connection).
- Balanced three phase circuits
- The Active Power, Reactive Power and Apparent Power in a three phase system.

MAGNETIC CIRCUIT
- The magnetic fields using Faraday's Flux Concept
- Ampere's Law
- B-H curve Series, Series-Parallel magnetic circuits

Practical

1. Introduction to basic laboratory equipment
2. Ohm's law
3. Series/parallel circuit
4. Kirchhoff' Law
5. Node-voltage and mesh-current method

References

1. Charles K. Alexander & Matthew N.O.Sadiku, 'Fundamentals of Electric Circuits',
2. International 4th Ed., McGraw-Hill, 2009.
3. Nilsson, J.W., Riedel, S.A., 'Electric Circuits', 8th Ed., Prentice Hall, 2008.
4. Irwin, J.D., Nelms, R.M., 'Basic Engineering Circuit Analysis', 9th Ed., John Wiley, 2008.
5. Robbins, A.H, Miller, W.C., 'Circuit Analysis: Theory and Practice, 3rd Ed., Thomson/Delmar Learning', 2003.
6. Hyat W.H., Durbin, S.M., Kimmerly, J.E., Engineering Circuit Analysis, 7th Ed., McGraw Hill, 2007.

DET102/3
ELECTRIC FUNDAMENTAL II

Course Outcomes

The overall course objective is to teach electrical, microelectronic and computer engineering students the fundamental concepts, and methods of analysis for linear circuits. By the end of the course, the students should be able to:

1. Define and identify the electrical component and electrical rules
2. Analyze method of analysis for AC Circuit and also use that method to solve the electrical problem
3. Apply the Fourier Series in circuit applications.
4. Apply the two port networks parameter.
5. Explain the basic magnetic circuit and practice the knowledge

Syllabus

APPLICATION OF CIRCUIT LAWS
- Kirchhoff's Laws (Voltage & Current)
- Voltage and Current Divider
- Star/delta transformation

METHODS OF CIRCUIT ANALYSIS
- Using Mesh analysis
- Using Nodal analysis

NETWORK THEOREMS
- Using Superposition theorem
- Source transformation
- Using Thevenin & Norton theorem
- Maximum power transfer
- Power factor correction

RESONANT CIRCUIT
- The parameters for series resonance circuits
- The parameters for Parallel resonance circuits
- Quality factor Bandwidth and Selectivity

FOURIER SERIES
- Trigonometric Fourier Series
- Symmetry considerations
- Circuit applications
- Average power and RMS values
- Exponential Fourier Series

TWO PORT NETWORKS
- Z parameter
- Y parameter
- T (ABCD) parameter
- Describe, Apply and Solve Terminated two port network

DC TRANSIENT ANALYSIS
- Natural Response of RL circuit
- Response of RC circuit
- Step Response of RL circuit
- Step Response of RC circuit

MAGNETICALLY COUPLED CIRCUITS
- Self and mutual inductance
- Coupling coefficient (K)
- Dot determintation

Practical

1. Introduction to Laboratory Equipment & Measurement
2. Measurement of Phase Shift
3. Capacitor in AC Circuit
4. Inductor in AC Circuit
5. Series Resonant Circuit
6. Application of Resonant circuit

References

1. Charles K. Alexander & Matthew N.O.Sadiku, 'Fundamentals of Electric Circuits',
2. International 4th Ed., McGraw-Hill, 2009.
3. Nilsson, J.W., Riedel, S.A., 'Electric Circuits', 8th Ed., Prentice Hall, 2008.
4. Irwin, J.D., Nelms, R.M., 'Basic Engineering Circuit Analysis', 9th Ed., John Wiley, 2008.
5. Robbins, A.H, Miller, W.C., 'Circuit Analysis: Theory and Practice, 3rd Ed., Thomson/Delmar Learning', 2003.
6. Hyat W.H., Durbin, S.M., Kimmerly, J.E., Engineering Circuit Analysis, 7th Ed., McGraw Hill, 2007.

DET113/3
DIGITAL SYSTEM

Course Outcomes

1. By the end of the course, the students should be able to:
2. Explain the concept of digital system.
3. Apply Mathematical models to solve digital circuit configuration.
4. Reproduce digital circuit for various digital applications.
5. Perform in group to **construct** digital circuit and **demonstrate** its function.

Syllabus

INTRODUCTION
- Overview of Digital and Analog Signals; Logic Level and Digital Waveform.

NUMBER SYSTEMS
- Number systems; Number representation; Number conversion; arithmetic operations and code systems.

LOGIC GATES
- The Inverter, AND, OR, NAND, NOR, EX-OR and EX-NOR Gates.

BOOLEAN ALGEBRA AND LOGIC SIMPLIFICATION
- Boolean Operations and Expression;
- Laws and Rules of Boolean Algebra;
- DeMorgan`s Theorem;
- Boolean Analysis of Logic Gates;
- Simplification using Boolean Algebra;
- Standard Form of Boolean Expression;
- Truth Table, Karnaugh Map SOP and POS Minimization.

COMBINATIONAL LOGIC ANALYSIS
- Basic Combinational Logic Circuits;
- Implementing Combinational Logic;
- The Universal Property of NAND and NOR Gates;
- Logic Circuit Operation with Pulse Waveform Inputs.

FUNCTIONS OF COMBINATIONAL LOGICS
- Introduction to various type of arithmetic combinational logic circuit(e.g Basic Adders; Comparators; Converters - DAC & ADC; etc)

LATCH, FLIP-FLOPS AND TIMERS
- Latches;
- Edge-Triggered Flip-Flops, Flip-Flop Operating Characteristic and Applications;
- One-Shots;
- The 555 Timer

SHIFT REGISTER
- The basic form of data movement in shift register, operation of bidirectional shift register, shift register as counter and the application.

COUNTERS
- Introduction to various type of counter(e.g Asynchronous and synchronous counter, the operation and different of synchronous and asynchronous counter operation.

Practical

1. Logic Gates
2. Boolean Theorem(De Morgan's Theorem
3. Karnaugh Mapping Techniques
4. Flip Flop
5. Counters

References

1. Floyd, Thomas L., "Digital Fundamentals", 9th Edition by Prentice Hall 2009.
2. Ronald J. Tocci, "Digital Systems – Principles and Applications," 10th Ed., Prentice Hall, 2007.
3. Godse, Atul P. Godse, Deepali A. Godse, Gurpreet Singh Ghai, "Digital Electronics", Technical Publications Pune, 2007.
4. Nigel, P.C. "A First Course in Digital Electronics" 1st Ed. Prentice Hall, 1999.

DET 115/3
ELECTRONIC DEVICES

Course outcome

1. This course introduces basic semiconductor devices such as diode, Bipolar Junction Transistor (BJT) and Field-Effect Transistor (FET) theory. By the end of the course, the students should be able to:
2. Understanding the principles and operation of semiconductor devices.
3. Investigates the applications of these devices.

4. Solving BJT and FET parameters using various type of biasing.

Syllabus

INTRODUCTION TO SEMICONDUCTOR
- The atomic structures, semiconductors, conductors, insulators and covalent bonds.
- The conduction in semiconductor, n-type and p-type semiconductor.
- Diode, diode operation and biasing.
- Voltage and current characteristics of various diode models.

DIODE APPLICATIONS
- Diode application.
- Half-wave and full-wave rectifiers.
- Diode limiting and clamping circuits.
- Rectifiers, power supply filters, regulations, limiting, clamping circuit and voltage multipliers related problems
- The output waveform.
- Zener d_iode operation and **solve** related problem.

BIPOLAR JUNCTION TRANSISTOR (BJT)
- Types of transistor structure and symbol.
- Basic transistor operation, transistor characteristic and parameters.
- BJT configuration. **Calculate** BJT parameters.
- DC load-line.

DC BJT BIASING
- Types of biasing and DC operating points.
- Fixed bias (Base Bias) and Emitter Bias operation parameters.
- Voltage divider bias parameters by using exact and approximation analysis.
- Collector feedback and other bias parameters.

FIELD-EFFECT TRANSISTORS (FETS)
- Type of FET.
- FET structure and symbol.
- JFET operation.
- JFET characteristic and parameters.
- JFET transfer characteristic.
- JFET biasing, JFET bias related problem.

FIELD-EFFECT TRANSISTORS (FETS)
- MOSFET.
- Type of MOSFET structure and symbol.
- MOSFET operation.
- MOSFET biasing.
- MOSFET bias related problems.

Practical

1. Introduction to Basic Laboratory Equipment
2. Introduction to Diode
3. Diode as Rectifiers
4. Limiter Circuits & Clamper Circuits
5. Current and Voltage Characteristic of BJT
5. Voltage Divider Biasing
6. JFET Characteristic

References

1. Floyd, T.L., "Electronic Devices", 8th edition, Prentice Hall 2008.
2. Boystead, R.L. & Nashelsky, L., "Electronic Devices and Circuit Theory", 10th edition, Prentice Hall, 2009.
3. Cathey, J.J., "Schaum's outline of theory and problems of electronic devices and circuits", 4th ed, McGraw-Hill, 2002.

DET 116/3
BASIC COMPUTER PROGRAMMING

Course Outcomes

1. By the end of the course, the students should be able to:
2. Describe and explain programming concept and principle.
3. Identify, analyze and design program using flowchart and pseudocode.
4. Use computer for coding, compiling, executing and debugging computer software program.
5. Acquire logical, creative and innovative thinking skills.
6. Work as a team

Syllabus

INTRODUCTION TO COMPUTER PROGRAMMING
- Introduction to C
- Algorithm
- Pseudo-code
- Flow chart
- C Program Structure
- Variables
- Operators

CONDITIONAL STATEMENTS
- if-else; switch
- Nested If

LOOPS
- while; do-while; for
- Nested Loop

FUNCTIONS
- Library (Math & String)
- User-define
- Scope (global & local)
- Passing arguments (by value & by reference)

POINTERS

FILES OPERATION

ARRAY & MULTI-DIMENSIONAL ARRAY
- Strings

STRUCTURES

Practicals

1. Basic to Writing C
2. Conditional Statements
3. Loops
4. Functions
5. Pointers & Files Processing
6. String
7. Array & Structure
8. Mini Project: To develop a prototype working as a team by using a software development methodologies suitable with the case study proposed.

References

1. Deitel & Deitel, Suhizaz Sudin, R. Badlishah, Yasmin Yacob "C How To Program", Pearson-Prentice Hall, 2006
2. Tan & D Orazio "C Programming for Engineering & Computer Science", McGraw Hill, 1999
3. Forouzan, B. A. & Gilberg R. F., "Computer Science: A Structured Programming Approach Using C". Brooks/Cole, 2001
4. Al Kelley, Ira Pohl, "C by Dissection: The Essentials of C Programming" 4th ed., Addison-Wesley, 2000

DET 117/3
COMPUTER AIDED DRAFTING

Course Outcomes

The main objective of this course is to expose the Diploma Engineering students with skills of Computer Aided Drafting and its application. This course is an extension from manual hand drawing into the usage of AutoCAD software which focuses on product design in 2D and 3D.

Syllabus

INTRODUCTION TO COMPUTER AIDED DRAFTING
- The AutoCAD screen, typing commands, starting a new drawing, using limits, using grid, using snap, using zoom, using line, using absolute coordinates, using erase, using offset, using undo, adding text, inserting a block and method to print.

BASIC CONSTRUCTION TECHNIQUES
- The use of relative X-Y coordinate, polar coordinate, layers, object snap, arc, circle, ellipse, panning in real time.
- The relation with traditional drafting method.

BASIC EDITING AND DIMENSIONING 2D DRAWING
- The use of trim, fillet, chamfers, viewport, editing text and explodes function.
- The use of dimension styles, create and name dimension style, adding linear dimensions, creating a diameter dimension, baseline dimension, using continue dimension and adding the angular dimension

CREATING 2D DRAWING (GEOMETRIC CONSTRUCTIONS)
- The use of polygon, polar tracking, extends, rotate, move, mirror and array.

CREATING 2D SECTION VIEWS
- How to cut planes lines and use boundary hatch.
- Demonstration for the functions explained.

INTRODUCTION TO 3D SOLID MODELING
- The 3D coordinate system, user coordinates system (UCS), and the solids toolbar.
- Demonstration on the use of the view toolbar, view point function.
- How to create solid models with extrude and revolve function, how to use Boolean operations and create solid models using revolution function.

TO PRODUCE 2D DRAWING FROM 3D SOLID MODELING

- How to convert a solid model to a multi-view drawing using solview and soldraw functions.
- Demonstration of the functions usage.

Practical

1. Introduction to Computer Aided Drafting
2. Basic construction techniques
3. Basic editing and dimensioning 2D drawing
4. Creating 2D drawing (geometric constructions)
5. Creating 2D section views
6. Introduction to 3D solid modeling
7. To produce 2D drawing from 3D solid modeling

References

1. Shawna Lockhart, A Tutorial Guide to AutoCad 2005, Prentice Hall, 2005.
2. Mark Dix & Paul Riley, Discovering AutoCad 2005, Prentice Hall, 2006.
3. Shawna Lockhart, A Tutorial Guide to AutoCad 2002, Prentice Hall, 2003.
4. Khairul Anwar Hanafiah, Lukisan Kejuruteraan Berbantu Komputer, UTM Skudai, 1999.
5. Timothy Sean Sykes, 3D AutoCad 2002 One Step at a Time, Prentice Hall, 2003.

DET203/3
ELECTRICAL MEASUREMENT & INSTRUMENTATION

Course Outcomes

By the end of the course, the students should be able to:

1. Apply the basic principles of measurement & instrumentation to minimize error
2. Apply the concept of D'Arsonval for current, voltage measurement .
3. Demonstrate the electrical measurement using alternating meters .
4. Differentiate the DC bridges & AC bridges for electrical measurement
5. Use the basic principle of electrical measurement using transducers for non electrical quantity.

Syllabus

BASIC CONCEPTS OF INSTRUMENTATION AND MEASUREMENT

- Measurement process and instrumentations; Standards and calibration; Classification of instruments; Characteristics of instruments; Error; Types of errors; Statistical analysis of error in measurement; Limiting error

DIRECT CURRENT METERS

- Construction and function of Permanent magnet moving coil (PMMC) or D'Arsonval meter; D'Arsonval meter movement used in a DC ammeter; Multiple range ammeter (Ayrton shunt); Ammeter insertion effects.

DIRECT CURRENT METERS

- Measurement of current, voltage, power, energy and resistance, insulation resistance, current transformers and sensitivity.

ALTERNATING CURRENT METERS

- The D'Arsonval meter movement used with half wave rectification, D'Arsonval meter movement used with full wave rectification; AC ammeter.

ALTERNATING CURRENT METERS

- Reactive power measurement using wattmeter, Instrument transformer: Current transformer, voltage transformer, Power measurement without wattmeter: Three voltmeters method, Three ammeter methods.

OSCILLOSCOPES

- Construction and basic function of Cathode Ray Tube (CRT); Types of oscilloscope; Measurement of voltage, frequency and phase; Lissajous figure

DC BRIDGES

- Construction and principle operations of DC bridges; Wheatstone bridge; Kelvin bridge, Insulation resistance measurement.

AC BRIDGES

- Construction and principle operations of AC bridges; Maxwell bridge; Opposite angle bridge (Hay bridge), Schering bridge and Wein bridge.

SENSOR AND TRANSDUCER

- The sensor and transducer; Temperature transducer; Light transducer; Optic sensor; Fluids flow measurement, Distance measurement transducer; Torque and pressure measurement; Resistive strain transducer; Level transducer.

Practical

1. Error in measurement
2. Basic voltmeter design
3. Oscilloscope
4. Wheatstone Bridge
5. Maxwell Bridge

References

1. Rajendra Prasad. (2004). Electrical Measurements and Measuring Instruments. 4th ed. Khanna Publishers.
2. H.S Kalsi. (2003). Electronics Instrumentation. Tata-McGraw Hill
3. David A. Bell. (1994). Electronics Instrumentation & Measurements. 2nd ed. Prentice Hall.
4. L.R. Jones & A.F. Chin. (1991). Electronic Instruments and Measurements. 2nd ed. Prentice Hall.

DET204/3
ELECTRICAL MACHINES & APPLICATION I

Course Outcomes

By the end of the course, the students should be able to:

1. Describe and explain the basic principles of the DC machines, three-phase Induction motor and transformer (including its general construction) and the fundamental equations describing its behavior.
2. Apply a standard equivalent circuit models for various general purpose DC machines, Three-phase induction motor and transformers.
3. Demonstrate characteristic of various general purpose DC machines, three-phase induct.
4. Perform in group to construct and measure the transformer, DC machines and three-phase induction motor testing.

Syllabus

SINGLE PHASE TRANSFORMER

- The basic Construction
- The equivalent circuits
- The Phasor Diagram
- The Per unit system
- The efficiency and voltage regulation
- The Open circuit test and Short circuit test
- The Instrument transformer: class, burden and selection

THREE PHASE TRANSFORMER

- The principles of three phase transformer
- The types of transformer
- The transformer component and functions
- The Open circuit test and Short circuit test for three phase transformer
- The three phase transformer connections
- The parallel transformer operations
- The cooling types of transformer
- Types of tap changer and their operations
- The principle operation of autotransformer

DC MACHINE FUNDAMENTAL

- The construction and operations, commutation and armature windings
- Induced voltage and developed torque, the power flow and losses.

DIRECT CURRENT MOTOR

- The basic construction
- The equivalent circuit
- The magnetizing curve
- The separately excited and shunt motor, terminal characteristics and speed control
- Induced torque, terminal characteristics, speed control of the series motor
- The torque-speed characteristics, speed control of the compounded DC motor
- DC motor starter
- The efficiency.

DC GENERATOR

- The principles of separately excited generator
- Circuit of separately excited generator

- Characteristic and control terminal voltage of a separately excited generator.
- The principles of shunt generator
- Equivalent circuit of shunt generator
- The terminal characteristic of shunt DC generator
- The control voltage of shunt generator
- The principles and terminal characteristic of series generator
- Equivalent circuit of series DC generator
- The principles and terminal characteristic of DC compounded generator
- Equivalent circuit of DC compounded generator
- The control voltage of DC compounded generator

AC MACHINES FUNDAMENTAL

- The induced voltage and torque in AC Machines;

THREE PHASE INDUCTION MACHINE

- The basic construction and operations, Modes of operation: Motoring, Generating and Plugging
- The equivalent circuit model
- The no load and blocked rotor test
- Power and torque
- The classes of squirrel cage induction motors, starting of induction motors
- The speed control: pole changing, line voltage control, line frequency control, rotor resistance control
- The selection of induction motor and degree of protection.

Practical

1. Lab. Introduction
2. Parameters Determination Of A Transformer
3. Developing three phase transformer using three single phase transformer
4. Characteristics of DC series motor
5. Load characteristic of separately excited DC generator
6. Principle of 3 – phase induction motor

References

1. Stephen J. Chapman. (2006). Electric Machinery Fundamentals. 5th ed. McGraw Hill.
2. Charles I. Hubert. (2002). Electric Machines: Theory, Operation, Applications, Adjustment and Control. 2nd ed. Prentice Hall.
3. K.C. Agrawal. (2001). Industrial Power Engineering and Applications Handbook. Newnes.
4. P.C. Sen. (1997). Principles of Electric Machines and Power Electronics. 2nd ed. Wiley & Sons.

DET205/3
ELECTRICAL MACHINES & APPLICATION II

Course Outcomes

By the end of the course, the students should be able to:

1. Describe and analyse the operational characteristics of single phase induction motor and synchronous motor.
2. Describe and explain the various types of single phase induction motors and to choose the best motor for given application.
3. Explain the industrial applications of transformer and electrical machines.
4. Perform in group to construct the motor starter and demonstrate the motor and generator testing.

Syllabus

SINGLE PHASE INDUCTION MOTOR

- Principle operation of single phase induction motor
- Equivalent circuit of a single phase induction motor
- The classification of single induction motor
- The characteristics and typical application of induction motor

SYNCHRONOUS GENERATOR

- The principles and construction
- The power and torque characteristics
- The parameter of the synchronous generator and the effect of load changes
- The parallel operation condition of synchronous generator
- The ratings of synchronous generator

SYNCHRONOUS MOTOR

- Principles operation of synchronous motor
- Equivalent circuit of synchronous motor
- The steady state operation of synchronous motor: Torque-speed characteristic curve and the effect of load and field current changes

- Principle of power correction using synchronous motor

INTRODUCTION TO MOTOR STARTER
- The importance of motor starters
- The principle of direct on line, star delta, auto-trans, rotor resistance starters and soft starter.

TESTING & MAINTENANCE OF ELECTRICAL MACHINES
- The motor and generator testing: Insulation test, winding resistance test, winding impedance test
- The motor and generator maintenance

Practical

1. Principle of a three-phase synchronous generator and no-load characteristic
2. Load characteristic of synchronous generator
3. V-curve characteristic of synchronous motor
4. Motor starter
5. Testing of electrical machines

References

1. Stephen J. Chapman. (2006). Electric Machinery Fundamentals. 5th ed. McGraw-Hill.
2. Charles I. Hubert. (2002). Electric Machines: Theory, Operation, Applications, Adjustment and Control. 2nd ed. Prentice Hall.
3. K.C. Agrawal. (2001). Industrial Power Engineering and Applications Handbook. Newnes.
4. P.C. Sen. (1997). Principles of Electric Machines and Power Electronics. 2nd ed. Wiley & Sons.

DET206/3
POWER SYSTEM I

Course Outcomes

By the end of the course, the students should be able to:
1. Define and explain basic principles of electrical power systems.
2. Classify the priciple of typical power generation plants and their operation concept in electrical power system.
3. Demonstrate Power transmission line and their element's parameters concept.
4. Demonstrate theory and analysis of faults.

Syllabus

REVIEW OF BASIC POWER SYSTEM PRINCIPLE AND CALCULATION
- Basic equations of single and three phase AC circuits.
- The power triangle, voltage, current and power in balance three phase circuits.
- Introduction of electrical component diagrams. Draw single line diagram.
- Per phase, per unit equivalent circuits.

ELECTRICAL POWER GENERATION
- E modern electrical power generation system and Disscuss the economics of generation based on the following generation plants;Fossil Fuel (Coal, steam, diesel, gas turbine and combine cycle)Renewable Energy (Solar, hydro, wind)

POWER TRANSMISSION LINE PARAMETERS
- The overhead and underground systems, types of conductor and conductor's material.
- Transmission line construction and Accessories
- Transmission parameters; resistance, inductance & capacitance.

SYMMETRICAL FAULT ANALYSIS
- The symmetrical components including 'a' operator, transform matrices, Sequence Components, Power Invariance, Phase and line sequence realtions, Delta and Star transformer bank; sequence V and I relation, Power Sstem Element; sequence Impedance and network, Zero sequence rule, Unbalanced load operation
- Transmission line type of faults.
- Faults including Short Circuit MVA and Current limitting reactor.

ASYMMETRICAL FAULT ANALYSIS
- Single line to ground fault, line to line fault and line to line to ground faults at unloaded generator.
- Asymmetrical faults using the bus impedance matrix. DRAW Equivalent sequence network diagram

Practical
1. Review on MATLAB & Introduction to Power System
2. Transmission Line Parameters
3. Industrial visits to power utilities and industries
4. Introduction to MiPower Software
5. Symmetrical Fault in Power System Using MiPower

References

1. S.J. Chapman. (2002). Electric Machinery and Power System Fundamentals. McGraw Hill.
2. Hadi Saadat. (2004). Power System Analysis. 2nd ed. Mc Graw Hill.
3. Timothy L. Skvarenina. (2004). Electrical Power and Controls. 2nd ed. Prentice Hall.
4. D.P. Kothari. (2003). Modern Power System Analysis. 3rd ed. Tata Mc Graw Hill.

DET207/3
ELECTRICAL INSTALLATION DESIGN

Course Outcomes

By the end of the course, the students should be able to:

- Describe , explain and apply the IEE Regulations and IEC Standards.
- Define the general characteristics of an electrical installation.
- Design of electrical installation in indoor and outdoor of the building.
- Prepare tender documents in keeping technical specifications.
- Prepare actual working drawings of electrical project.

Syllabus

INTRODUCTION ELECTRICAL INSTALLATION DESIGN

- IEC voltage standard and recommendations
- TNB supply schemes
- Types of supply application.

FINAL CIRCUIT AND LOAD ESTIMATION

- The final circuit
- IEE Regulation for Installation circuit arrangement (Regulation 314)
- The maximum demand and diversity factor
- BS 1363 socket outlet circuits and Industrial socket outlet circuits
- The connected load
- Diversity factor
- The maximum demand.

LIGHTING SYSTEM

- The common lighting terms
- The types of lamps and their operations
- The lumen method
- Recommended levels of illuminance (IES code and JKR standard)
- Coefficient of utilization (CoU) factor from the ceiling and wall reflection factors
- Maintenance factor
- Room Index
- Quantity of lamp based on specified area.

SWITCHGEAR, PROTECTION DEVICES AND POWER FACTOR CORRECTIONS

- The main functions of switchgear
- The component of the switchgear
- The classification of switchgear
- The form separation of switchgear
- The types of protection devices
- The principle operation of protection devices
- Characteristics of protection devices
- Fuse and circuit breaker size
- Fusing factor of the protective devices
- The size and maximum operating time of the protective devices
- The IEE Wiring Regulation for overcurrent protection
- The functions of power factor correction
- The components of power factor correction
- The types of power factor correction
- The location of correction capacitor
- The size of capacitor.

CABLE SELECTION AND WIRING SYSTEM

- The types of cables
- The types of wiring
- The types of cable Installation
- The design current in the circuit
- The types and rating of protection devices
- The relevant correction factors of cable
- The size of cables
- The cable voltage drop
- The actual size of cables if needed
- The IEE Wiring Regulation for cable selection (Regulation 521-07, 523, Appendix 4 and 525).

EARTHING SYSTEM

- The principle of earthing
- The characteristic of earthing system (TT, TN-S, TN-C-S,TN-C, IT)
- The principle and the important of earth fault loop impedance
- The protective conductor cross-section calculation
- The IEE Wiring Regulation for earthing system

TESTING AND INSPECTION OF ELECTRICAL INSTALLATION

- The important of testing and inspection
- The testing sequence
- The types of testing(polarity, insulation resistance, continuity and earthing test)
- The phase sequence testing

Practical

1. Introduction to AutoCAD (Schematic Diagrams)
2. Final Circuit and Load Calculation (Using Microsoft Excel)
3. Lighting Design (Using Microsoft Excel and Autocad)
4. Cable and Switchboard Sizing (Using Microsoft Excel and Autocad)

References

1. N.Hasnizam & M.Rafi. (2009). *Lectures Notes: Electrical Installation Design*. PPKSE.
2. BSI & IEE. (2008). BS 7671 (2008) *Requirements For Electrical Installations – IEE Wiring Regulations*. 17th Edition. Polestar Wheatones.
3. G.Stokes & J.Bradley. (2009). *A Practical Guide To The Wiring Regulations – 17th Edition IEE Wiring Regulations (BS 7671:2008)*.4th ed. John Wiley & Sons.
4. T.Linsley. (2008). *Basic Electrical Installation Work*. 5th ed. UK: Elsevier & Newnes Press.
5. T.Linsley. (2008). *Advanced Electrical Installation Work*. 5th ed. UK: Elsevier & Newnes Press.
6. T.Linsley. (2008). *Electrical Installation Work – Tutor Support Material*. 2nd ed. UK: Elsevier & Newnes Press.
7. Brian Scaddan. (2008). *Electric Wiring: Domestic*. 13th ed UK: Elsevier & Newnes Press.

DET212/3
CONTROL PRINCIPLE

Course Outcomes

By the end of the course, the students should be able to:

1. Apply various mathematical principles (from calculus and linear algebra) to solve control system problems.
2. Produce mathematical models, equivalent differential equation for such mechanical and electrical systems, transfer function and state space model for a given system.
3. Produce system's time and frequency-domain analysis with response to test inputs.
4. Perform in group by analyzing system's time and frequency-domain.
5. Solve problems related to Control Principles.

Syllabus

INTRODUCTION TO CONTROL SYSTEMS

- Concepts of control systems.
- Control system examples, types and effects of feedback in various
- applications.
- Control system design process.

THE BASICS OF CONTROL THEORY

- Differential equation of physical system.
- The Laplace transform.
- Derive the transfer function of linear system.
- State space variable, block diagram and signal-flow graph model.

MATHEMATICAL MODELS OF SYSTEM

- Differential equation, Laplace transform , transfer function and signal- flow graph model for electrical networks and mechanical system.

LINEAR SYSTEM STABILITY

- Bounded-input, bounded-output, zero-input stability, the concept of stability.
- The Routh-Hurwitz stability criterion.

THE ROOT LOCUS METHOD

- Root locus concept, root locus characteristics, building root locus and root contour.
- The root locus procedure.
- Root locus sketch.

FREQUENCY RESPONSE METHOD

- Bode diagram.
- Phase and gain margin.

TIME –DOMAIN ANALYSIS

- Test input signal.
- Performance of a second-order system.
- The transient response, test signals, time-domain specifications,
- Steady-state error, transient response of second-order systems.

Practical

1. Introduction To Matlab Simulink
2. Open-Loop Systems Characteristics
3. Stability Analysis
4. Feedback Control of a Process Using MATLAB Simulink
5. Root Locus
6. Bode Plot

References

1. Norman S. Nise: Control System Engineering-5th ed, John Wiley & Sons, 2008.
2. Richard C. Dorf & Robert H. Bishop: Modern Control Systems-10th ed, Prentice Hall, 2005.
3. Ogata, Katsuhito: Modern Control Engineering-4th ed, Prentice Hall, 2002.
4. W. Bolton: Control Engineering-2nd ed, Prentice Hall, 1998.
5. Franklin G. F., Power J. D & Emani-Naeni A.: Feedback Control System-3rd ed, Addison Wesley, 1994.

DET211/3
BASIC ELECTRICAL TECHNOLOGY

Course Outcomes

By the end of the course, the students should be able to:

1. The basic concept of electric circuit and magnetic circuit.
2. The basic principles of the electrical machines and transformer (including its general construction) and the fundamental equations describing its behavior.
3. Parameters for various general purpose electrical machines and transformers.
4. The industrial applications of transformer and electrical machines.

Syllabus

BASIC CONCEPT, DC CIRCUIT AND AC CIRCUIT

- Electrical circuit: Quantity and Unit;
- Current, Voltage, Resistance, Inductance, Capacitance and Power;
- Series and parallel circuit
- Ohm's Law, Kirchhoff Current Law, Kirchhoff Voltage Law, Source Transformation;
- Thevenin and Norton Theorem;
- Characteristics of three-phase system
- Star-Delta connections, Delta-Star connections
- Balanced and unbalanced load
- Three-phase power

MAGNETISM/ELECTROMAGNETISM

- Magnetic field, magnetic relationship, magnetic core losses, magnetic circuit, self and mutual inductance, magnetic force, electromagnetic induction, induced emf.

SINGLE PHASE TRANSFORMER

- Basic construction
- Principle operation and the importance of transformer
- Ideal transformer
- Equivalent circuit of a transformer
- Voltage regulation and efficiency of a transformer

INTRODUCTION TO ELECTRICAL MACHINES

- Basic construction, principles and application of: DC Machines, induction machines, synchronous machines, universal motor, stepper motor, AC and DC servomotor

Practical

1. Kirchhoff's Law
2. Introduction to Lab Volt Virtual Laboratory (LVVL) software
3. Three phase power measurement
4. Single phase transformer – Transformer regulation
5. Separately excited, shunt and compound Dc generators
6. Single phase induction motors

References

1. Stephen J. Chapman. (2005). Electric Machinery Fundamentals. 4th ed. McGraw Hill.
2. Stephen L. Herman. (2006). Electrical Transformers and Rotating Machines. 2nd ed. Thomson Delmar Learning.
3. Edward Hughes, Ian Mckenzie Smith, John Hiley, Keith Brown. (2003). Hughes Electrical & Electronic Technology. Prentice Hall.
4. P.C. Sen.(1997). Principles of Electric Machines & Power Electronics. 2nd ed. John Wiley & Sons.

DET 214/3
PROGRAMMABLE LOGIC CONTROLLER (PLC)

Course Outcomes

At the end of this course the student should be able to:

1. Explain the type of components in an electrical controller.
2. Explain the basic concept of PLC and its applications in industrial control application
3. Construct logic function, timer/ counter programming, editing and program observation.
4. Construct PLC program and demonstrate the application of PLC in group.

Syllabus

ELECTRICAL CONTROLLER EQUIPMENT

- Basic principle of electric switching, toggle, push button, selection switch, solenoid switch, relay electromagnetic and solid state relay, timer and contactor.
- Fundamental aspect of PLC systems and Induction motor controller.
- PLC design approach.

CONTROLLER TYPES

- Programmable Logic Controller (PLC).
- Digital logic controller and Fuzzy logic controller.
- PLC application.

INTRODUCTION TO PLC

- PLC operation, series and parallel circuit, numbering system, Boolean algebra and ladder logic

PLC PROGRAMMING AND ITS APPLICATION

- Introduction to pendant programming.
- Input and output with internal relay. Describe, Explain, Design and Compute *AND* and *OR* circuit and latching relay. Define and Explain program editing and program observation.

PLC INTERFACING

- Analysis timer, counter and cascading counter. Describe, Explain timer/counter programming and introduction to special PLC function.
- Master controller relay, sequential output and shift register.

Practical

1. Introduction to OMRON CPM1A
2. Ladder diagram & Mnemonic code
3. Ladder diagram& Mnemonic code (Cont.)
4. Relation of digital logic to ladder diagram
5. Programming PLC using CX-programmer

References

1. Frank D. Petruzella "Programmable Logic Controller", 3rd ed, Mcgraw-Hill International, 2005.
2. Jon Stenerson, "Fundamental of Programmable Logic Controllers, Sensors, and Communication", PEARSON-Prentice Hall, 2005.
3. Gary Dunning "Introduction to Programmable Logic Controller" 3rd ed, Thmpson delmar Learning, 2006
4. John W. Webb, Ronald A. Reis, "Programmable Logic Controllers Principles and Applications" 4th ed, Prentice Hall, 199

DET 218/3
ANALOGUE ELECTRONICS

Course Outcomes

This course introduces the application and analysis of Bipolar Junction Transistor (BJT) and Field Effect Transistor (FET) and the usage in amplifier and power amplifier circuit as well as the analysis of frequency response.

Syllabus

BJT TRANSISTOR AMPLIFIERS

- Amplifier operation, Transistor AC equivalent circuits.
- Common-Emitter Amplifier, Common-Collector Amplifier.
- Common-Base Amplifier.
- Multistage Amplifier
- Differential Amplifier.

FET AMPLIFIERS

- FET Amplification
- Common-Source Amplifiers
- Common-Drain Amplifiers
- Common-Gate Amplifiers.

CASCADE AMPLIFIER
- Cascade Connection.
- Cascode Connection.
- Darlington Connection.
- Feedback Pair.

POWER AMPLIFIERS
- Class A power amplifiers
- Class B and class AB Push-Pull Amplifiers
- Class C amplifiers

AMPLIFIER FREQUENCY RESPONSE
- Concept, Decibels
- Low-Frequency Amplifier Response
- High-Frequency Amplifier Response
- Total Amplifier Frequency Response

Practical

1. Introduction To Lab Equipment
2. BJT Common Emitter Amplifier (Q point, DC current voltage load line & voltage line).
3. BJT Common Emitter Amplifier (Voltage gain versus Frequency Response).
4. BJT Common Collector Amplifier (Voltage gain input & output impedance).
5. FET Common source Amplifier.
6. Class A power Amplifier

References

1. Edward Hughes, Ian McKenzie Smith, John Hiley, Keith Brown. (2008). 'Electrical and Electronic Technology', 10th Ed., Prentice Hall.
2. Theraja B.L. (2007). 'A Text Book of Electrical Technology', Volume II (AC & DC Machines), S.Chand & Company Ltd.
3. Boylestad, Robert L. (2007). 'Introductory Circuit Analysis', 11th Edition, Prentice Hall.
4. John Bird. (2007). 'Electric Circuit Theory and Technology', Newnes.
5. Chapman, Stephen J. (2005). 'Electric Machinery Fundamentals', 4th Ed., New York: McGraw-Hill.

DET 219/3
MICROCONTROLLER 1

Course Outcomes

The aim of this course is to study the Intel 8051 Microcontroller architecture and relate that knowledge to the design of microcontroller based systems. This includes the design technique using internal I/O interfacing, internal memory and introduction to interrupt configuration for the systems. The study of 8051 instruction set and various software development tools are also emphasized as the knowledge are needed in the designing of controller-based systems.

Syllabus

INTRODUCTION TO MICROCONTROLLERS
- The basic architecture of a digital computer, memory system, input/output devices, microprocessor and microcontroller interface, busses, typical control signals;

ASSEMBLY LANGUAGE PROGRAMMING
- The assembly language programming, 8051 instruction set, programming model, and data transfer instruction, arithmetic instruction, logic instruction, branch instruction, stack, I/O and machine control instructions.

INTRODUCTION TO I/O INTERFACING
- 8051 Input and Output Port.
- Interfacing 8051 with LEDs and Switch, Seven Segment and LCD, Keypad, ADC, DAC and Motor Control.

INTRODUCTION TO TIMER AND INTERRUPT OPERATION
- Timer Mode Register, Timer Control Register, Timer Modes, and Clocking Sources, Interrupt Vector and Interrupt Services Routing.
- Timer module and Interrupt application.

INTRODUCTION TO SERIAL PORT OPERATION
- Serial communication with full duplex operation, Serial Port Buffer, Serial Port Control and Serial Port Modes.
- Serial communication through PC.

Practical
1. Introduction to 8051 Microcontroller Development Systems.
2. Introduction to Assembly Language Programming and Cross Assembler.
3. Introduction to Input/Output (I/O) port [LED & Switch]

4. Interfacing to 7-segment.
5. Interfacing to LCD
6. Introduction to other External Devices *[Keypad, ADC, DAC and Motor Control]*
7. Introduction to Timer Operation.
8. Introduction to Interrupt Operation
9. Introduction to Serial Port Operation

References

1. Muhammad Ali Mazidi, Janice Gillispie Mazidi, Rolin D. McKinlay, *"The 8051 Microcontroller and Embedded Systems Using Assembly and C"*, 2nd Edition, Prentice Hall, 2006.
2. Scott MacKenzie, Raphael C. W. Phan, *"The 8051 Microcontroller"*, 4th Edition, Prentice Hall, 2007.
3. James W. Stewart, Kai X. Miao, *"The 8051 Microcontroller – Hardware, Software and Interfacing"*, 2nd Edition, Prentice Hall, 1999

DET309/3
POWER ELECTRONICS

Course Outcomes
By the end of the course, the students should be able to:
1. Explain Power electronics system, devices and its applications.
2. Solve and Demonstrate Basic power computations in power electronics.
3. Explain, Analyze and Construct Basic power electronics converter.
4. Solve problems related to power electronics.

Syllabus

POWER ELECTRONICS CONCEPT
- Power electronics concept as power conversion.
- Peak value, RMS value and average value.
- Application of power electronics.

POWER COMPUTATION
- Instantaneous power, energy and average power
- The effect of DC source on power computation.
- Power and energy recovery computation of inductor and capacitor.

POWER SEMICONDUCTOR DEVICES
- The operation and characteristics of Power Diodes or Rectifiers.
- The operation and characteristics of Thyristor such as SCR, Diac and Triac.
- The operation and characteristics of Power MOSFET
- The controller circuit requirement for Thyristors and MOSFET and circuit implementation.

AC-DC CONVERTERS
- The operation of Half-wave rectifier and Full-wave rectifier by using Power Diodes.
- The operation of Controlled Half-wave rectifier and Full-wave rectifier by using Thyristors.
- Problems related to the operation of Half-wave rectifier and Full-wave rectifier for both controlled and uncontrolled circuit.
- The waveforms of Half-wave rectifier and Full-wave rectifier for both controlled and uncontrolled circuit.

AC-AC CONVERTERS
- Method of controlling AC Voltages such as Phase Angle Control, Integral Cycle Control etc and also circuit implementation.
- The operation of AC Voltage Controller by using SCR, Diac and Triac.
- Problems related to the operation of AC Voltage Controller.'
- The waveforms of AC Voltage Controller for R Load and R-L Load.

DC-DC CONVERTER
- The principles of DC-DC Converters by using switch mode.
- Types of DC-DC Converters such as Buck, Boost and Buck-Boost, their operation and circuit implementation.
- Problems related to the operation of DC-DC Converters.
- The effect of the inductor value to the Continuous Conduction Mode (CCM) and Discontinues Conduction Mode (DCM)
- The waveforms of Buck, Boost and Buck-Boost Converters and Compare between CCM and DCM.

DC-AC CONVERTER
- Types of DC-AC Converters such as Full-bridge, Square-wave and Half-bridge, their operation and circuit implementation.
- Problems related to the operation of DC-AC Controller.'
- The waveforms of DC-AC Voltage Controller for PWM output between unipolar and bipolar switching methods.

Practical

1. Introduction to PSIM
2. AC-DC Half-wave Rectifier
3. AC-DC Full-wave Rectifier
4. AC-AC Controller
5. DC-DC Controller
6. DC-AC Controller

References

1. R. Shaffer. (2007). Fundamentals of Power Electronics with MATLAB. Charles River Media.
2. Muhammad H. Rashid. (2004). Power Electronics: Circuits, Devices & Applications.
3. 3rd ed. Prentice-Hall.
4. N. Mohan, T. M. Undeland, W. P. Robbins. (2003). Power Electronics: Converters, Applications & Design. 3rd ed. Wiley
5. Cyril W. Lander. (1993). Power Electronics. 3rd ed. McGraw-Hill.

DET310/3
POWER SYSTEM COMMISSIONING AND MAINTENANCE PRACTICES

Course Outcomes

At the end of this course the student should be able to:

1. Describe, identify and prepare for maintenance inspection, testing, documentation used and commissioning plan of electrical power equipment.
2. Describe, use and apply principle of testing, commissioning and methodology used. (including data analysis and parameter determination)
3. Demonstrate and apply the knowledge of using test equipment, its application and ability to choose recommended method and setting .
4. Demonstrate and apply electrical power system equipment testing.

Syllabus

COMMISSIONING MANAGEMENT

- Commissioning and maintenance of electrical power system;
- Commissioning panel;
- Commissioning program and standard operating procedure;
- Standard and proper documentation and paperwork prior to commissioning;
- Safety procedure

MAINTENANCE AND FAULT INVESTIGATION

- Testing and maintenance policy, specifications and record;
- Investigation technique, damage investigation and diagnostics, Collection and analysis

TESTING AND COMMISSIONING OF DISTRIBUTION SYSTEM

- Principle operation of power transformer, Tap Changer, cables, switchgear and earthing.
- Principles and theory behind all testing involve.
- Testing methodology.
- Methodology and procedures;
- Data collection and analysis;
- Standard report prior to the data collection and analysis

TESTING AND COMMISSIONING OF PROTECTION SYSTEM AND SUBSTATION POWER SUPPLY

- Principle operation of circuit breaker, Voltage and Current Transformer, Stationary Batteries, Over-current, Earth Fault and differential relay protection.
- Principles and theory behind all testing involve.
- Testing methodology.
- Testing methodology and procedures;
- Data collection and analysis;
- Standard report prior to the data collection and analysis.

Practical

1. Electrical Equipment Insulators Testing.
2. Power Transformer Testing
3. Earth/Grounding Resistance Measurement Testing.
4. Current and Voltage Transformer Testing.
5. Relay Testing

References

1. S. Rao. (2004). Testing Commissioning Operation and Maintenance of Electrical Equipments. 6th ed. Khanna Publishers.
2. Abd. Samad Hanif. (2000). Pemasangan & Penyelenggaraan Elektrik. Kuala Lumpur: Dewan Bahasa & Pustaka.
3. K. Harker. (1998). Power System Commissioning & Practice. UK: IEE Power Series.

4. Paul Gill. (1998). Electrical Power Equipment Maintenance and Testing. USA: CRC Press Taylor & Francis Group.

DET308/3
POWER SYSTEM II

Course Outcomes

By the end of the course, the students should be able to:
1. Demonstrate knowledge and describe the economics of generations
2. Analyze the short, medium and long line models of tranmission line
3. Demonstrate knowledge and analyze power system protection in electrical power system
4. Demonstrate knowledge and explain the components of transmission and distribution system

Syllabus

ECONOMICS OF GENERATIONS:
- Demand patterns - load profile, load-duration characteristics, load factor, utilization factor, and load estimation. Tariffs - Principle of tariff formulation, typical tariff structures, tariffs.

TRANSMISSIONS LINES MODELS:
- Short, medium and long line models and calculations, Ferranti effects, shunt and series compensation. Generalized circuit constants, equivalent T and PI models, receiving end, sending end and universal circle diagrams, line power limits, representation of power systems: per unit system and one line reactance diagrams, over voltages, wave propagation and surges.

POWER SYSTEM PROTECTION
- Protections philosophy, Power system protection schemes, transducers, Protection CT selection and design, relay logical functions and implementation, overcurrent relay coordination and earth fault protection, transmission line distance protection, differential protection of transformer and generator, earthing, applications of digital devices protection.

INTRODUCTION TO COMPONENTS OF TRANSMISSION & DISTRIBUTION SYSTEM IN MALAYSIA:
- Transmission: Insulator: material, types, surge protection: spark gaps & surge arrester, Tower & Poles: Typical tower outline - sizing, Overhead line conductor: ASCR, AAAC, ABC conductor.
- Substation: Configuration: Single busbar, Double busbar, Safety clearances, Auxiliary power supply: battery-capacity & sizing, genset, substation equipments: RMU, LBS, transformer, Switchgear

Practical

1. Load Profile Analysis
2. Analysis on line performance of the transmission lines.
3. Exposure on protection and relay coordination
4. Exposure to real and practical applications and installation of components of transmission and distribution system in Malaysia

References

1. Marizan Sulaiman. (2004). *Analisis Sistem Kuasa*. Universiti Sains Malaysia.
2. Hadi Saadat. (2004). Power System Analysis. 2nd ed. USA: Prentice Hall.
3. J.D. Glover & M. Sarma. (2001). Power System Analysis Design with Personal Computer Applications. 3rd ed. USA: PWS Publishing Company.
4. A.R. Bergen & V. Vittal. (2000). Power System Analysis. 2nd ed. USA: Prentice Hall.
5. W.D. Stevenson. (1982). Elements of Power System Analysis. 4th ed. USA: McGraw-Hill.

DET 351/3
SEMESTRAL PROJECT

Course Outcomes

At the end of this course the student should be able to:
1. Identify problem/project, managing and implementing the project, writing report and presentation.
2. Demonstrate skills acquired in practical work.
3. Think logically, decide the right and effective approaches in finding solutions.
4. Apply theory into practical

Syllabus

An individual project selected related to the electrical engineering. This project involves searching the reference book, theoretical analysis if required, design and apparatus development, result discussion and summarize.

References

Reference books and journals is available from the library.

17.0

Pusat Pengajian Kejuruteraan

Komputer & Perhubungan

PENGENALAN

Pusat Pengajian Kejuruteraan Komputer dan Perhubungan, telah ditubuhkan pada 30 April 2002. Pusat Pengajian Kejuruteraan Komputer dan Perhubungan berpegang teguh kepada falsafah penubuhan UniMAP yang menekankan pentingnya kesepaduan antara pengetahuan dan praktikal yang membentuk konsep penghayatan ilmu yang sejati. Justeru itu, jika asas-asas ilmu ini digabungkan dengan nilai-nilai murni kehidupan supaya budaya intelektual dapat dijalinkan dan dicernakan membentuk cara hidup yang dinamik, maju dan bertamadun. Oleh yang demikian, para pelajar perlulah memahami dengan lebih terperinci apakah pentingnya peranan falsafah tersebut dikalangan masyarakat UniMAP amnya.

Dengan merujuk kepada peranan falsafah tersebut, kurikulum yang dibangunkan memberikan keseimbangan intelektual antara teori dan praktikal disamping subjek-subjek keperluan universiti yang dapat membentuk keperibadian murni di kalangan pelajar. Penggabungan budaya intelektual dengan nilai-nilai murni kehidupan ini, dapat dicernakan menjadi cara hidup yang lebih teratur, berdaya saing dan lebih berdinamik.

PPK Komputer juga telah menawarkan program Ijazah Sarjana Muda Kejuruteraan Komputer dan juga Ijazah Sarjana Muda Kejuruteraan Perhubungan. Tetapi kini, PPK Komputer ingin mengorak langkah maju kehadapan dengan menambah lagi satu program Diploma iaitu program pengajian Diploma Kejuruteraan (Kejuruteraan Komputer) yang bermula kemasukan pelajar pada Julai 2006. Tujuan program diploma ini ditawarkan adalah untuk melahirkan pelajar Diploma yang cekap dengan kemahiran *'Lab Intensive'* dan mempunyai semangat profesionalisme yang tinggi.

Justeru itu, Program Diploma Kejuruteraan ini diharapkan dapat melahirkan tenaga mahir sebagai Pembantu Jurutera bagi memenuhi keperluan guna tenaga negara terutama dalam bidang Komputer secara khusus dan elektronik secara amnya. Oleh yang demikian, program ini perlulah sentiasa diperhalusi secara berterusan dengan:

- Mengambilkira pandangan dan kesimpulan hasil-hasil kajian serta maklumbalas dari masyarakat, khususnya industri.
- Memenuhi kehendak badan-badan penasihat profesional yang berkaitan seperti Jabatan Perkhidmatan Awam (Bahagian Jaminan Kualiti & Akreditasi)
- Memastikan keseimbangan antara kepakaran teori dan kemahiran amali.
- Memastikan tahap pengajaran dan pembelajaran sentiasa bertaraf dunia.

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DIPLOMA IN COMPUTER ENGINEERING CURRICULUM						
YEAR	**FIRST**		**SECOND**		**THIRD**	
SEMESTER	**FIRST**	**SECOND**	**FIRST**	**SECOND**	**FIRST**	**SECOND**
ENGINEERING CORE COURSES	DQT101/3 Mathematic I	DQT102/3 Mathematic II	DQT203/3 Mathematic III	DKT221/3 Operating System Principles	DPT333/3 Industrial Safety and Quality Management	DIT361/6 Industrial Training
	DKT111/3 Electrical Circuits Principles	DKT123/3 Electrical Technology	DKT215/3 Signals and System Principles	DKT224/3 Data Communication and Network	DKT315/3 Computer Security (Elective)	
	DKT113/3 Engineering Physics	DKT124/3 Electronic Devices	DKT214/3 Electronic Circuits	DKT226/3 Basic Communication Engineering	DKT 316/3 Electronics Instrumentation and Process Control (Elective)	
	DKT114/2 Computer Systems Principles	DKT121/3 Fundamental of Computer Programming	DKT216/2 Object-Oriented Programming	DKT223/3 Database System	DKT311/3 Software Engineering	
	DCT 100/2 Basic Engineering Skills	DKT122/3 Digital System I	DKT212/3 Digital System II	DKT225/3 Microcontroller I	DKT312/3 Microcontroller II	
	DUT122/2 IT Skills		DKT217/3 Computer System		DKT351/3 Semestral Project	
					DKT317/3 Network Computing (Elective)	
83	**15**	**15**	**17**	**15**	**15**	**6**
UNIVERSITY REQUIREMENT COURSES (15)	DVW410/2 Malay Language	DUW123/2 Communication Skills	DUW233/2 Islamic & Asian Civilization	DUW235/2 Ethnic Relationship		
	DVW112/2 English 1	DVW212/2 English 2	DZWXXX/1 Badan Beruniform 3	DUW224/2 Engineering Entrepreneurship	DZWXXX/1 Badan Beruniform 5	
	DZWXXX/1 Badan Beruniform 1	DZWXXX/1 Badan Beruniform 2		DZWXXX/1 Badan Beruniform 4		
19	**5**	**5**	**3**	**5**	**1**	
102	**20**	**20**	**20**	**20**	**16**	**6**

Course Code

Ex: ABC123/4
(**A**: Degree/Diploma Programme) ; (**B**: School) ; (**C**: Types of Courses) : (**1**: Stage (Stage 1, 2, 3 & 4)) ; (**2 & 3**: Course number) ; (**/4**: unit)

PELUANG KERJAYA

- Graduan lulusan Diploma Kejuruteraan (Kejuruteraan Komputer) mempunyai prospek pekerjaan yang luas sama ada dalam syarikat swasta, industri, jabatan kerajaan dan badan-badan berkanun. Bidang kerjaya untuk graduan boleh terdiri dari sektor komputer secara khususnya dan elektronik secara amnya antaranya:
- Komputer dan Teknologi Maklumat
- Telekomunikasi
- Mikroelektronik dan Peralatan
- Pembuatan dan Perindustrian
- Antara kerjaya berkaitan bagi graduan Diploma Kejuruteraan (Kejuruteraan Komputer)
- Juruteknik.
- Pembantu Jurutera.
- Pembantu Pegawai Latihan Vokasional

KURSUS-KURSUS YANG DITAWARKAN OLEH PPK KOMPUTER UNTUK PROGRAM DIPLOMA KEJURUTERAAN.

1.	DKT 111/3	ELECTRICAL CIRCUITS PRINCIPLES
2.	DKT 113/3	ENGINEERING PHYSICS
3.	DKT 114/2	COMPUTER SYSTEMS PRINCIPLES
4.	DKT 121/3	FUNDAMENTAL OF COMPUTER PROGRAMMING
5.	DKT 122/3	DIGITAL SYSTEM I
6.	DKT 123/3	ELECTRICAL TECHNOLOGY
7.	DKT 124/3	ELECTRONIC DEVICES
8.	DKT 212/3	DIGITAL SYSTEM II
9.	DKT 214/3	ELECTRONIC CIRCUITS
10.	DKT 215/3	SIGNALS AND SYSTEM PRINCIPLES
11.	DKT 216/3	OBJECT-ORIENTED PROGRAMMING
12.	DKT 217/3	COMPUTER SYSTEM
13.	DKT 221/3	OPERATING SYSTEM PRINCIPLE
14.	DKT 223/3	DATABASE SYSTEM
15.	DKT 224/3	DATA COMMUNICATION AND NETWORK
16.	DKT 225/3	MICROCONTROLLER I
17.	DKT 226/3	BASIC COMMUNICATION ENGINEERING
18.	DKT 311/3	SOFTWARE ENGINEERING
19.	DKT 312/3	MICROCONTROLLER II
20.	DKT 315/3	COMPUTER SECURITY
21.	DKT 316/3	ELECTRONICS INSTRUMENTATION AND PROCESS CONTROL
22.	DKT 317/3	NETWORK COMPUTING
23.	DKT 351/3	SEMESTRAL PROJECT

DKT 111/3
ELECTRICAL CIRCUITS PRINCIPLES

Course Outcomes

By the end of the course, the students should be able to:
1. Describe the basic concept of electrical measurement and RLC Circuits Theorems.
2. Explain and perform the concept of Ohm' Law, Series and Parallel Circuits, and Circuit Theorems for any RLC Circuits.
3. Calculates and reproduce any RLC Circuits related to electric circuits applications.

Syllabus

INTRODUCTION TO ELECTRICAL MEASUREMENTS
- Quantities and Units
- Voltage, Current and Resistance

OHM'S LAW, ENERGY AND POWER
- The relationship of Current, Voltage and Resistance
- Energy and Power

SERIES AND PARALLEL CIRCUITS
- Resistors in Series and Parallel
- Application of Ohm's Law
- Kirchhoff's Voltage and Current Law
- Branch, Loop and Node Analysis
- Series and Parallel Circuit Applications

CIRCUIT THEOREMS AND CONVERSION
- The DC Voltage and Current Source
- The Superposition Theorem
- Thevenin's and Norton Theorem
- Delta to Wye and Wye to Delta Conversions

INTRODUCTION TO CAPACITORS AND INDUCTORS
- Basic concepts of Capacitors and Inductors Circuits
- Series and Parallel Capacitors and Inductors Circuits
- Capacitors and Inductors Applications

Practical

1. Lab 1: Introduction to Lab Equipments, Tools and Measurements
2. Lab 2: Ohm's Law
3. Lab 3: Series and Parallel Circuits
4. Lab 4: Capacitors and Inductors Circuits

References

1. Thomas L. Floyd. Principles of Electric Circuits, Pearson Prentice Hall, 2007
2. Alenxander and Sadiku. Fundamentals Of Electric Circuits, McGraw-Hill, 2007
3. Nilsson and Riedel, Electric Circuits, Pearson Prentice Hall, 2008

DKT 113/3
ENGINEERING PHYSICS

Course Outcomes

By the end of the course, the students should be able to:
1. Describes and explain standard unit, apply the concept of force and motion and analyze work, energy and power principles.
2. Apply circular motion principles in oscillation and wave.
3. Define and apply the basics of electrostatic and electromagnetism.
4. Explain and calculate electric current and resistivity.

Syllabus

UNITS AND DIMENSION
- Basic unit in SI
- Physical quantity of dimension
- Homogenety principles
- Dimension equation
- Dimension analysis application

FORCE AND MOTION
- Scalars and vectors
- Speed and velocity
- Motion Equation
- Newton's Law
- Force from Newton's Law

CIRCULAR MOTION
- Angular Measure
- Angular Speed and Velocity
- Frequency and Period
- Uniform Circular Motion

WORK, POWER AND ENERGY
- Work and standard units
- Power concept

- Power calculation
- Kinetic energy concept and potential energy
- The law of conservation of energy

VIBRATION AND WAVE
- Concept of Vibration
- Types of Vibration
- Concept of Wave
- Types of Wave
- Wave Properties

ELECTROSTATIC
- Coulomb's Law
- Charge units
- Electric field
- Electric force line
- Capacitance and unit
- Parallel plate capacitor
- Dielectric constant and it's function

MAGNETISM
- Magnets, magnetic poles and magnetic field direction
- Magnetic field strength and magnetic force
- Force and current-carrying conductor

ELECTRIC CURRENT AND RESISTANCE
- Electric current
- Resistance, Resistivity and Ohm's Law
- Temperature variation of resistance
- Electrical Energy and Power

References

1. Jerry Wilson, Anthony Buffa. "College Physics", 6th ed., Pearson Education,2007
2. Giambattista, Richardson, Richardson, "College Physics", McGraw Hill Internationatial Ed., 2007.
3. Stephen T.Thornton, Andrew Rex. "Modern Physics for Scientists & Engineers", 2nd ed, Brooks Cole, 1999
4. W. Bolton. "Engineering Science". Fourth Edition. Newnes. 2001.

DKT 114/2
COMPUTER SYSTEMS PRINCIPLES

Course Outcomes

By the end of the course, the students should be able to:
1. Describe the fundamental theory, principles of hardware, and pheriperals of a computer systems
2. Explain and apply the interfacing and networking principles of a computer sytems
3. Relate and follow the major concepts of an operating system.
4. Apply and display the basic computer language programming and its principles with regards to computer systems.
5. Demonstrate and analyze the basic concepts of computer and data communication systems

Syllabus

INTRODUCTION TO COMPUTER HARDWARE
- Types of motherboard and their details, types of microprocessors and their compatibility with motherboards, serial and parallel ports, PS/2, USB Ports, Electrical requirements, Interconnection between units, connectors and cables.

COMPUTER HARDWARE
- Storage Device, Input and Output Devices, Display and Power Supplies, BIOS and DOS services.

INTRODUCTION TO OPERATING SYSTEM (WINDOWS & LINUX)
- Definition of Operating Systems, Types of Operating Systems, Importance of Operating Systems, Memory organization, Linking, loading and executing control program. Introduction, history of Linux and Unix, Linux Overview, Structure of Linux, Linux releases, open linux, system requirements, file structures, processor scheduling and memory management in Unix. Linux Commands

INTRODUCTION TO COMPUTER PROGRAMMING
- Algorithm, Pseudo-code, Flow chart, Identifiers and Reserved words, Preprocessor directives, Data types and type declarations.
- Sample C program, Operators, Formatted input and formatted output, Program debugging.

COMPUTER INTERFACING AND NETWORKING
- Introduction to data communications, components, data representation, dataflow. Networks, Distributed Processing, Network Criteria, Physical Structure, Network Models, Categories of Networks,

Interconnection of Networks: Internetwork. Networks, Distributed Processing, Network Criteria, Physical Structure, Network Models, Categories of Networks, Interconnection of Networks: Internetwork. Introduction to internet, brief history, ISPs, elements, architecture, protocols

Practical

1. Lab 1: Introduction to computer hardware
2. Lab 2: Introduction to operating system
3. Lab 3: Computer programming
4. Lab 4: Computer interfacing and networking (1)
5. Lab 5: Computer interfacing and networking (2)

References

1. Computer Peripherals and Interfacing by Jyoti Snehi, Laxmi, 2006
2. Hardware and Software of Personal Computers by SK Bose; Wiley Eastern Limited, New Delhi.
3. Fundamentals of Computers by Sukhvir Singh; Khanna Publishers, New Delhi
4. Computer Peripherals & Interfacing by Deepak Arora; Eagle Parkashan Jalandhar.
5. Behrouz A. Forouzan, Data Communications and Networking, 4th Edition, McGraw Hill, 2007
6. William Stalling, Data and Computer Communications, 7th Edition, Prentice Hall, 2005
7. *"C How To Program 4th edition"*, Deitel and Deitel, Pearson-Prentice Hall, 2004
8. Stallings, W. 2007. Operating Systems: Internals and Design Principles, 6thEdition. Prentice-Hall.

DKT 121/3
FUNDAMENTAL OF COMPUTER PROGRAMMING

Course Outcomes

By the end of the course, the students should be able to:
1. Define and describe programming concepts and principles.
2. Apply programming techniques and tools such as flowchart and pseudo code to design computer programs.
3. Apply GNU/Linux for coding, compiling, executing and debugging computer programs.
4. Solve engineering related problems using computer programming techniques.

Syllabus

CHAPTER 1
- Introduction to Computers
- Introduction to C
- Algorithm
- Pseudo-code
- Flow chart
- C Program Structure
- Variables
- Operators

CHAPTER 2
- Conditional statements (if-else; switch)
- Nested If

CHAPTER 3
- Loops (while; do-while; for)
- Nested Loop

CHAPTER 4
- Functions – Library (Math & String)
- Functions – User-defined
- Functions – Scope (global & local)
- Functions – Passing arguments (by value)

CHAPTER 5
- Pointers

CHAPTER 6
- Files operation

CHAPTER 7
- Array & multi-dimensional array

Practical

1. Lab 1: Introduction to C programming and Linux
2. Lab 2: Writing basic C program
3. Lab 3: if..else; switch
4. Lab 4: Loop
5. Lab 5: Functions
6. Lab 6: Pointers & Files
7. Lab 7: Array & Structures

References

1. Deitel & Deitel, Suhizaz Sudin, R. Badlishah, Yasmin Yacob (2006). *C How To Program*, 1st Edition. Pearson-Prentice Hall.

2. H.M. Deitel & P.J. Deitel. (2004). *C How to program*. 4th Edition. Person Prentice Hall.
3. Stephen Kochan. (2004). *Programming in C*. 3rd Edition. New York. Sams.
4. H.H. Tan & T.B. D'Orazio. (1999). *C Programming for Engineering & Science*. 2nd Edition. McGraw-Hill International.

DKT 122/3
DIGITAL SYSTEM I

Course Outcomes

By the end of the course, the students should be able to:
1. Define, describe the basic principles in numbering system and basic theory of binary system.
2. Define, describe the basic logic for simple digital systems.
3. Demonstrate digital circuits.
4. Build combinational logic circuit.
5. Demonstrate creative thinking in completing design project.

Syllabus

DIGITAL CONCEPTS
- Digital and Analogue Quantities; Binary Digits; Logic Level and Digital Waveforms; Basic Logic Operation; Overview of Basic Logic Fuctions; Fixed-Function Intergrated Circuits.

NUMBER SYSTEMS,OPERATION AND CODES
- Decimal Numbers; Binary Numbers; Decimal to Binary Conversion; Binary Arithmethic; 1's and 2's Complement of Binary Numbers; Signed Numbers; Arithmtic Operation with Signed Numbers; Hexadecimal and Octal Numbers; Binar Coded Decimals; Digital Codes

LOGIC GATES
- The Inverter, AND, OR, NAND, NOR, EX-OR, and EX-NOR Gates

BOOLEAN ALGEBRA AND LOGIC SIMPLIFICATION
- Boolean Operations and Expression; Laws and Rules of Boolean Algebra; DeMorgan's Theorem; Boolean Analysis of Logic Gates; Simplifications using Boolean Algebra; Standard Form of Boolean Expression; Truth Table; Karnaugh Map and POS Minimization

COMBINATION LOGIC ANALYSIS
- Basic Combinational Logic Curcuits; Implemening Combinational Logic; The Universal Property of NAND and NOR Gates; Logic Curcuit Operation with Pulse Waveform Inputs.

FUNCTIONS OF COMBINATIONAL LOGICS
- Basic Adders; Parellel Binary Adders; Comparators; Decoders; Encoders; Code Converters; Multiplexers; Demultiplexers; Parity Generators/Checkers

FLIP-FLOPS
- Adge-Triggered Flip-Flops, Flip-Flop Operating Characteristic and Applications

Practical

1. Lab 1: Introduction to Laboratory Equipments and Simulation Software
2. Lab 2: Introduction to Logic Gates and its Behavior
3. Lab 3: Observing De Morgan's Theorem with Different Equations
4. Lab 4: Decoders- Binary Coded Decimal and Counters
5. Lab 5: Multiplexer and De-multiplexer

References

1. Floyd, T. L. (2006), *Digital Fundamentals*. 9th Edition London. Prentice Hall.
2. Wayne Tomasi. (2004). *Electronic Communication System, Fundamental Through Advanced*. 5th Edition. Pearson Prentice- Hall.
3. Ronald J. Tocci, Neal S.Widmer and Gregory L.Moss. (2006), *Digital Systems: Principles and Applications*, 10th Edition by Prentice Hall.

DKT 123/2
ELECTRICAL TECHNOLOGY

Course Outcomes

By the end of the course, the students should be able to:
1. Describe and explain the concept of magnetism and electromagnetism.
2. Describe and explain the fundamental, follow the operation and apply the application of electrical transformer.

3. Describe and explain the concept of single-phase and three-phase system.
4. Describe and explain the fundamental, analyze the operation and apply the application of dc machines and ac machines.

Syllabus

ELECTRICAL CIRCUIT

- Apply and calculate series and parallel on AC Circuit, Define explain and apply Ohms Law, Kirchhoff Law, Superposition Theorem, Source Transformation and Thevenin and Newton Theorem.

THREE PHASE SYSTEM

- Introduction to Single-phase System and three-phasesystem, Advantages of three-phase compare to singlephase system, Application of Three-Phase-System Application of Star Connection System, Application of Delta Connection System. Calculate Voltage and Current in Star and Delta Connection System, Power calculation in Three-phase with Balanced Load.

MAGNETICALLY COUPLED CIRCUIT

- Self Motor Mutual Inductance, Coupling Co-efficient. DOT Determination.

ELECTROMAGNETISM

- Introduction to Magnetism, Theory of Magnetic Field, Magnetic Flux, Flux Density, Magnetic Circuit, Quantities and Permeability. Introduction to Electromagnetism Theory and Law of Electromagnetic, Induction, Coil, Energy and mutual Induction

ELECTRICAL MACHINERY FUNDAMENTALS

- Introduction to Transformer, Types and construction of Transformer, Transformer principle of operation, The Ideal
- Transformer, Real Single Phase Transformer, Regulation of Transformer. Application of Transformer which consist the Exact and Approximate Equivalent Circuit of Transformer, Transformer Losses and Efficiency, Transformer Voltage Regulation Efficiency, Open Circuit and Short Circuit Test, Three Phase Transformer

INTRODUCTION TO DC MACHINE AND AC MACHINE

- General Theory of DC and AC Machines, Types of DC and AC Machines, Introduction to Separately Excited and DC series Machine Introduction to Induction Machine and Synchronous Machine, Construction of DC and AC Machines, Operation Of DC and AC Machines.

Practical

1. Capacitor and Inductor in AC circuit
2. Measurement of Phase Shift
3. Introduction to LVVL (Lab Volt Virtual Laboratory) software
4. Three phase power measurement using LVVL (Lab software).
5. Single-phase transformer – transformer regulation

References

1. Chapman S.J., "Electric Machinery Fundamentals", Fourth Edition, 2005, McGraw Hill, Singapore.
2. Alenxander and Sadiku. Fundamentals Of Electric Circuits, McGraw-Hill, 2007
3. A. E. Fitzgerald , "Electrical Machinery", International Edition, McGraw-Hill, 2003
4. Charles K. Alexander and Metthew N. O. Sadiku (2004). "Fundamentals of Electrical Circuits. 2nd Ed,

DKT 124/2
ELECTRONIC DEVICES

Course Outcomes

By the end of the course, the students should be able to:

1. Identify, define and solve theory of semiconductor materials and diode operation.
2. Define, illustrate and calculate diode applications.
3. Describe, explain and solve Bipolar Junction Transistor (BJT) operation and biasing.

- Describe, explain and solve Field Effect Transistor (FET) operation and biasing.

Syllabus

INTRODUCTION TO SEMICONDUCTOR.

- Introduction on atomic structure, conductor, insulator covalent bands, conduction, N-type and P-type semiconductor. Introduction to diode, diode models and diode biasing. Describe voltage characteristic of a diode and testing a diode.

DIODE APPLICATIONS

- Describe the diode application as a half-wave rectifier, full-wave rectifier, power supply filters and regulator.
- Describe the Clamping circuit, Diode Limiting, voltage multiplier and voltage regulator. Review diode data sheet and troubleshooting methods.

BIPOLAR JUNCTION TRANSISTORS (BJTS)

- Introduction to Transistor structure, Basic Transistor Operation, Transistor characteristic and amplifier. Describe the transistor as an amplifier, switch, terminal identification, packages and troubleshooting.

DC BJT Biasing

- Review the DC Operating Point, Voltage Divider Bias and Other Bias Methods.

FIELD-EFFECT TRANSISTOR(FETS)

- Introduction to JFET and MOSFET. Describe the JFET & MOSFET characteristic and Parameters, JFET & MOSFET Biasing and Troubleshooting.

Practical

1. Introduction to Basic Laboratory Equipment
2. Introduction to Diode
3. Diode as Rectifiers
4. Limiter Circuits & Clamper Circuits
5. Current and Voltage Characteristic of BJT
6. Voltage Divider Biasing

References

1. Floyd, T.L., "Electronic Devices", 8th edition, Prentice Hall 2008.
2. Boystead, R.L. & Nashelsky, L., "Electronic Devices and Circuit Theory", 10th edition, Prentice Hall, 2009.
3. Cathey, J.J., "Schaum's outline of theory and problems of electronic devices and circuits", 4th ed, McGraw-Hill, 2002.
4. Thomas L. Floyd , Electronic Devices (Conventional Current Version), 8/E, Prentice Hall, 2007.
5. Ahmad Radzi Mat Isa, Yaacob Mat Daud, Roslinda Zainal, " Elektronik Asas Peranti Semikonduktor", ISBN 983-52-0419-5, 2007.

DKT 212/3
DIGITAL SYSTEM II

Course Outcomes

By the end of the course, the students should be able to:

1. Use flip-flops to construct digital circuit for specific application.
2. Construct basic shift register and counter circuit.
3. CAD software and download it to the specified hardware.
4. Demonstrate creative thinking in completing design project.

Syllabus

FLIP FLOP

- Define of Flip-flop Characteristic
- Discuss Examples of Applications

INTRODUCTION TO COUNTERS

- Asynchronous Counter Operation
- Synchronous Counter Operation

COUNTERS APPLICATION

- Up / Down Synchronous Counters
- Cascade Counters
- Counter Decoding
- Design Counter Applications

INTRODUCTION TO SHIFT REGISTERS

- Discuss Basic Shift Register Functions
- Define Types of Shift Registers
- Analyze the Types of Shift Registers

SHIFT REGISTERS APPLICATION

- Bidirectional Shift Registers
- Shift Register Counters
- Shift Register Applications

SHIFT REGISTERS APPLICATION

- Define Input Equations, State Table
- Analyze the circuit and Derive Next Table
- Apply State Diagram

SEQUENTIAL CIRCUIT DESIGN

- Procedure, Finding State Diagrams
- Design Procedure, Finding State Diagrams and
- State Tables
- Designing with D Flip-Flop
- Introduction to Memory

Practical

Lab 1: Flip-Flop Operation
Lab 2: Shift Register Operation
Lab 3: Synchronous Counter Design
Lab 4: Introduction to CAD Software
Lab 5: Combinational Logic System

References

1. Floyd, Thomas L., (2006). *Digital Fundamentals*, 9th Edition. Prentice Hall.
2. Ronald J.Tocci, Neal S.Widmer and Gregory L.Moss, (2006). *Digital System: Principles and Applications*, 10th Edition. Prentice Hall.

DKT 214/3
ELECTRONIC CIRCUITS

Course Outcomes

By the end of the course, the students should be able to:

1. Describe the difference of ideal op-amp to practical op-amp.
2. Explain the concept of feedback, its limitations and usage in practical circuitry.
3. Apply, calculates and test any op-amp circuitry related to electronic circuits applications.

Syllabus

INTRODUCTION TO OPERATIONAL AMPLIFIER

- Describe basic op-amp, characteristics, modes, parameters, and negative feedback. Analyze non-inverting, voltage follower and inverting op-amp.

BASIC OP-AMP CIRCUITS

- Analyze the operation of basic comparator, summing amplifier, integrator and differentiator circuits

SPECIAL PURPOSE OP-AMP CIRCUITS

- Analyze and explain the operation of an instrumentation amplifier, isolation amplifier, log and antilog amplifiers

ACTIVE FILTERS

- Describe the three basic filter response characteristics, gain-versus-frequency responses and other filter parameters. Analyze active low-pass, high-pass, band-pass and band-stop filters.

OSCILLATORS

- Describe the basic operating principles of an oscillator. Describe and analyze the basic operation of RC, LC feedback and relaxation oscillators.

VOLTAGE REGULATORS

- Describe the basic concept of voltage regulation. Discuss the principles of series, shunt and switching voltage regulators.

Practical

1. Lab 1 – Introduction to Operational Amplification (Op-amp)
2. Lab 2 – Common Op-amp Circuits
3. Lab 3 – Active Filters
4. Lab 4 – Oscillating Op-amp
5. Lab 5 – Voltage Regulating Op-amp

References

1. Thomas L. Floyd, (2008). *Electronic Devices: Conventional Current Version.* 8th Edition: Prentice Hall
2. Boylestad, R.L, and Nashelsky, L. (2009). *Electronic Devices and Circuit Theory.* 8th Edition: Prentice Hall

DKT 215/3
SIGNALS AND SYSTEM PRINCIPLES

Course Outcomes

By the end of the course, the students should be able to:

1. Identify types, characteristics and waveforms of the signals, perform operations of signals and the properties of a system.
2. Identify the properties of an LTI system, analyze the time-domain signals and the frequency domain representation of signals.
3. Perform transformation from time domain to s-domain and analyze system transfer function.
4. Analyze signals, perform signal transformations and analyze system transfer functions using related software.

Syllabus

INTRODUCTION TO SIGNALS AND SYSTEMS
- Classification of Signals and System
- Basic Operation on signals
- Properties of the systems

TIME DOMAIN REPRESENTATION OF LINEAR TIME INVARIANT (LTI) SYSTEMS
- Convolution Sum
- Convolution Integral
- Relation between LTI system properties
- The impulse Response
- The Step Response
- Differential equation Representation
- Difference equation representation
- Characteristics of system natural and forced response.
- State variable description of LTI systems

FOURIER REPRESENTATION OF SIGNALS AND LTI SYSTEMS
- Complex sinusoids
- Frequency response
- Fourier representation for four classes of signal
- Properties of Fourier representations
- Linearity and symmetry properties
- Convolution properties
- Differentiation and Integration properties
- Time and Frequency shift properties

LAPLACE TRANSFORM
- Eigen Function property of test Laplace Transform representation
- Convergence
- S-plane
- Poles and zeros
- The unilateral transform and properties
- Inversion of the unilateral
- Solving differential equation with initial condition
- LT methods in circuit analysis
- Properties of the bilateral LT
- Properties of region of convergence
- Inversion of the bilateral LT
- Transfer Function
- Casualty and stability
- Determining the Function Response from poles and zeros

Practical

1. Lab1: Introduction to signals
2. Lab2: Convolution
3. Lab3: Fourier Series and Fourier Transform
4. Lab4: Transform

References

1. Simon Haykin, Barry Van Veen "*Signals and Systems*", 2nd. Ed., Wiley, 2005.
2. Fred J. Taylor, "*Principles of Signals and Systems*", McGraw Hill International Ed. 1994.
3. Charles L. Philips, John M. Parr, Eve A. Riskin, "*Signals, Systems and Transforms*", 3rd Ed., Prentice Hall International Edition, 2003.

DKT 216/3
OBJECT-ORIENTED PROGRAMMING

Course Outcomes

By the end of the course, the students should be able to:
1. Describe and explain object oriented programming concept.
2. Apply object oriented programming concept in developing programs.
3. Develop Graphical User Interface to implement object oriented application.

Syllabus

INTRODUCTION TO OBJECTS

METHOD WITH PARAMETERS

INHERITANCE

INTERFACES

POLYMORPHISM

GRAPHICAL USER INTERFACE AND

EVENT HANDLING

LOOPS AND RECURSION

STRINGS AND TEXT I/O

CONSOLE I/O, FILE I/O AND EXCEPTIONS

Practical

1. Lab 1: Introduction to Objects
2. Lab 2: Writing and implementing methods
3. Lab 3: Inheritance
5. Lab 4: Interfaces
6. Lab 5: Graphical User Interface
7. Lab 6: Loops and Recursion
8. Lab 7: Console I/O. File I/O

References

1. Kathryn Sanders and Andy Van Dam (2005). *Object Oriented Programming in Java*, Pearson-Prentice Hall.
2. Ralph Morelli, Ralph Walde. (2006). *Java Java Java, Object Oriented Problem Solving*. 3rd Edition. Person Prentice Hall.

DKT217/3
COMPUTER SYSTEM

Course Outcomes

By the end of the course, the students should be able to:

1. Explain the history and development of modern day computer.
2. Illustrate the organization and architecture concepts of a Central Processing Unit .
3. Use the Hardware Description Language approach to develop a Central Processing Unit.
4. Develop and reproduce an FPGA based Central Processing Unit.

Syllabus

INTRODUCTION TO COMPUTER ARCHITECTURE
- Definition of Organization and architecture
- Definition of Structure and function
- Computer evolution and performance

COMPUTER FUNCTION AND INTERCONNECTION
- Computer components
- Computer function
- Interconnection structure
- Bus interconnection

CACHE MEMORY
- Computer memory system overview
- Cache memory principles
- Elements of Cache Design

INTERNAL MEMORY
- Semiconductor main memory
- Error correction
- Advance DRAM design

INPUT AND OUTPUT
- External device
- I/O modules
- I/O channels and processors
- External interface

OPERATING SYSTEM
- Operating system overview
- Scheduling
- Memory management

INSTRUCTION SETS: CHARACTERISTICS AND FUNCTIONS
- Machine Instruction Characteristics
- Types of Operands
- Types of operations
- Assembly language

INSTRUCTION SETS: ADDRESSING MODES AND FORMATS
- Immediate addressing mode
- Direct addressing mode
- Indirect addressing mode
- Instruction formats

PROCESSOR STRUCTURE AND FUNCTION
- Processor organization
- Register organization
- Instruction Cycle
- Instruction pipelining

Practical

1. Lab 1: Introduction to Very High Speed Hardware Description Language (VHDL) and FPGA design concept

2. Lab 2: 8 bit Register and Program Counter module
3. Lab 3: Arithmetic Logic Unit (ALU) module
4. Lab 4: Memory module (RAM and ROM)
5. Lab 5: FSM for a Simple Control Unit
6. Lab 6: Datapath unit for a Simple CPU and port mapping design technique
7. Lab 7: Control Unit for a Simple CPU
8. Lab 8: Combination of Datapath and Control unit for a Simple 8 bit CPU

References

1. William Stallings. (2006). *Computer Organization and Architecture*, 7th Edition, Prentice-Hall
2. M. Morris Mano. (2002), *Computer System Architecture*, 3rd Edition, Prentice-Hall
3. Carl Hamacher, Zvonko Vranesic, Safwat Zaky. (2001). *Computer Organization*, 5th Edition, McGraw Hill.
4. Stepehn Brown, Zvonko Vranesic. (2005). *Fundamentals of Digital Logic with VHDL Design*, McGraw-Hill

DKT221/3
OPERATING SYSTEM PRINCIPLE

Course Outcomes

By the end of the course, the students should be able to:
1. Define and explain the major concepts which builds up an operating system Akademik.
2. Use GNU/Linux operating system for coding, compile, execute and test C programming in simulating issues in Operating System.
3. Describe the processes, file management, processor scheduler and memory management.
4. Develop life long learning attitude within oneself.

Syllabus

OPERATING SYSTEM OVERVIEW
- Operating System (OS) Objectives and Function
- The Evolution of OS
- Major Achievements
- Development Leading to Modern OS

PROCESS DESCRIPTION AND CONTROL
- What is Process?
- Process States
- Process Description
- Process Control

THREADS, SMP AND MICROKERNELS
- Process and Threads
- Symmetric Multiprocessing
- Microkernels

CONCURRENCY: MUTUAL EXCLUSION AND SYNCHRONIZATION
- Principles of Concurrency
- Mutual Exclusion: Hardware Support
- Semaphores
- Monitors
- Message Passing
- Read/Write Problem

CONCURRENCY: DEADLOCK AND STARVATION
- Principles of Deadlock
- Deadlock Prevention
- Deadlock Avoidance
- Deadlock Detection

MEMORY MANAGEMENT
- Memory Management Requirements
- Memory Partitioning
- Paging
- Segmentation

VIRTUAL MEMORY
- Hardware and Control Structures
- Operating System Software

UNIPROCESSOR SCHEDULING
- Types of Processor Scheduling
- Scheduling Algorithms

I/O MANAGEMENT AND DISK SCHEDULING
- I/O Devices
- Organization of the I/O Function
- Operating System Design Issues
- I/O Buffering
- Disk Scheduling
- RAID

FILE MANAGEMENT
- Overview
- File Organization and Access

- File Directories
- File Sharing
- Record Blocking

Practical

1. Lab 1: Introduction to GNU/Linux operating system.
2. Lab 2: Overview of processes and mutithreading.
3. Lab 3: Memory management and file management
4. Lab 4: OS installation/setup

References

1. Silberchatz, A., Galvin & Gagne. (2009). *Operating System Principles*, 8th Edition. John Wiley.
2. Stallings, W. (2007). *Operating Systems: Internals and Design Principles,* 6th Edition. Prentice-Hall.
3. Stallings, W. (1993). An Introduction to operating systems. 2nd Edition. Prentice Hall.

DKT223/3
DATABASE SYSTEM

Course Outcomes

By the end of the course, the students should be able to:
1. Explain the concept of database system and the purpose and use of database management system.
2. Obtain the capability to write SQL program and recognize types of SQL statement.
3. Normalize and administrate a relational database.
4. Design conceptual models of an application domain for database applications.

Syllabus

INTRODUCTION
- Types of Databases and Database Applications
- Typical DBMS Functionality
- Example of a Database
- Main Characteristics of the Database Approach
- Database Users

DATABASE SYSTEM CONCEPTS AND ARCHITECTURE
- Data Models and Their Categories
- Schemas, Instances, and States
- ThreeSchema Architecture
- Data Independence
- DBMS Languages and Interfaces
- Database System Utilities and Tools
- Centralized and ClientServer Architectures
- Classification of DBMSs

SQL
- Schema, Definition, Basic Constraints and Queries

THE RELATIONAL DATA MODEL AND RELATIONAL DATABASE CONSTRAINTS
- Relational Model Concepts
- Relational Model Constraints and Relational Database Schemas
- Update Operations and Constraint Violations

RELATIONAL DATABASE DESIGN BY ER AND EERR-TORELATIONAL MAPPING
- ER-to-Relational Mapping Algorithm
- Mapping EER Model Constructs to Relations

DATA MODELING USING THE ENTITY RELATIONSHIP (ER) MODEL
- Database Design Process
- Database Application
- ER Model Concepts
- ER Diagrams Notations – UML class diagrams

FUNCTIONAL DEPENDENCIES AND NORMALIZATION FOR RELATIONAL DATABASES
- Design Guidelines for Relational Databases
- Functional Dependencies
- Normal Forms Based on Primary Keys
- General Form Definitions(For Multiple Keys)
- Boyce-Codd Normal Form(BCNF)

Practical

1. Lab 1: Introduction to database.
2. Lab 2: Introduction to SQL Queries.
3. Lab 3: Introduction to database design.
4. Lab 4: Simple project implementation.

References

1. Elmasri & Narathe (2007). *Fundamentals of Database Systems.* 5th Ed. Pearson Addison Wesley

2. Thomas Connolly, Carolyn Begg and Anne Strachan (2005). *Database Systems.* 4th Ed. AddisonWesley
3. James Perry & Gerald Post (2007). *Introduction to ORACLE 10g.* 1st Ed. Pearson Prentice Hall

DKT224/3
DATA COMMUNICATION AND NETWORK

Course Outcomes

By the end of the course, the students should be able to:
1. Explain the theory and basic of data communication and network.
2. Describe and explain the industrial application of network connection concept and protocol used.
3. Explain and analyze the data communication network equipments and instruments.
4. Construct and demonstrate the network setup and perform troubleshooting in group .

Syllabus

INTRODUCTION TO DATA COMMUNICATIONS
- Introduce the concepts of data communication and networking. Discuss data communications components, data representation and data flow.

INTRODUCTION TO DATA COMMUNICATION NETWORKS
- Define and explain network criteria, physical structures, network models, categories of networks and Internet works, protocols and standards. Discuss the OSI model and the Internet model.

PHYSICAL LAYER AND MEDIA
- Relationship between data and signals. Discuss & explain Digital transmission and analog transmission.

BANDWIDTH UTILIZATION & TRANSMISSION MEDIA

DATA LINK LAYER
- Error Detection and Correction

DATA LINK CONTROL
- Data link control which involves flow and error control. Discuss some protocols that are designed to handle the services required from DLL in relation to the network layer.

MULTIPLE ACCESS PROTOCOL WIRED AND WIRELESS LANS

CONNECTING DEVICES AND ILLUSTRATES HOW THE WIRED AND WIRELESS LANS CAN BE CONNECTED SECURITY
- Cryptography.

Practical

1. Lab 1: Introduction to network.
2. Lab 2: Network protocol analyzer.
3. Lab 3: Network setup part1.
4. Lab 4: Network setup part2.
5. Lab 5: Network application.

References

1. Behrouz A. Forouzan. (2007). *Data Communications and Networking*, 4tth Edition,McGraw Hill.
2. William Stalling, (2005). *Data and Computer Communications* ,7th Edition, Prentice Hall.
3. Wayne Tomasi,(2004). *Introduction to Data Communications and Networking*, Prentice Hall.
4. Andrew S. Tanenbaum, (2003). *Computer Networks*, PH PTR.

DKT 225/3
MICROCONTROLLER 1

Course Outcomes

By the end of the course, the students should be able to:
1. Explain the theory and basic architecture of microcontroller.
2. Rewrite program using assembly language.
3. Demonstrate and reproduce interface between microcontroller and I/O devices.
4. Produce simple application based on microcontroller system.

Syllabus

INTRODUCTION TO MICROCONTROLLERS
- Basic architecture of a digital computer, memory system, input/output devices, microprocessor and microcontroller interface, busses, typical control signals.

ASSEMBLY LANGUAGE PROGRAMMING

- Introduction to assembly language programming, 8051 instruction set, programming model, and data transfer instruction, arithmetic instruction, logic instruction, branch instruction, stack, I/O and machine control instructions.

INTRODUCTION TO I/O INTERFACING

- Introduction to 8051 Input and Output Port
- Interfacing 8051 with LEDs and Switch, Seven Segment and LCD
- Introduction to Keypad, ADC, DAC and Motor Control

INTRODUCTION TO TIMER AND INTERRUPT OPERATION

- Introduction to Timer Mode Register, Timer Control Register, Timer Modes, and Clocking Sources
- Introduction to Interrupt Vector and Interrupt Services Routing

INTRODUCTION TO SERIAL PORT OPERATION

- Introduction to serial communication full duplex operation, Serial Port Buffer, Serial Port Control and Serial Port Modes

Practical

1. Lab 1: Introduction to 8051 microcontroller development system.
2. Lab 2: Introduction to assembly language programming and cross assembler.
3. Lab 3: Introduction to input/output (I/O) port.
4. Lab 4: Introduction to timer operation.
5. Lab 5: Introduction to interrupt operation.
6. Lab 6: Introduction to serial port operation.

References

1. Muhammad Ali Mazidi, Janice Gillispie Mazidi, Rolin D. McKinlay,(2006). *The 8051 Microcontroller and Embedded Systems Using Assembly and C*, 2nd Edition,Prentice Hall.
2. I. Scott MacKenzie, Raphael C. W. Phan, (2007). *The 8051 Microcontroller*, 4th Edition, Prentice Hall.

DKT226/3
BASIC COMMUNICATION ENGINEERING

Course Outcomes

By the end of the course, the students should be able to:

1. Students will be able to define and explain the principles of basic communication systems.
2. Students will be able to describe the analog & digital modulation and the effect of SNR parameter.
3. Students will be able to perform and reproduce basic filters and sketch their outputs.
4. Students will be able to solve AM & FM calculations. Reproduce circuits and trace their outputs.
5. Students will be able to describe the digital communications technology.

Syllabus

BASIC ELEMENTS IN COMMUNICATION SYSTEM

- Introduction to Communication System
- Noise in Communication System
- Transmission Media and EM Propagation
- Introduction to Basic Filters

AMPLITUDE MODULATION

- Principles of Amplitude modulation(AM)
- AM Single Side Band (SSB) Communications
- AM Receiver

ANGLE MODULATION

- Principles of Frequency Modulation (FM) and Phase Modulation (PM)
- Generation and detection of FM
- Application of FM

DIGITAL MODULATIONS

- Introduction to Digital Modulation
- Digital Transmission
- Multiplexing

Practical

1. Lab 1: Introduction to laboratory equipments and simulation software
2. Lab 2: Basic Filters
3. Lab 3: Amplitude Modulation
4. Lab 4: Frequency Modulation
5. Lab 5: Digital Modulation

References

1. Wayne Tomasi," Electronic Communication System, Fundamental Through Advanced", 5th Ed. Pearson Prentice Hall, 2004.
2. Paul Young, Electronics Communications Techniques, 5th Edition, Prentice Hall, 2004
3. Mullet, "Basic Telecommunications: The Physical Layer", Thomson Learning, 2003.

DKT311/3
SOFTWARE ENGINEERING

Course Outcomes

By the end of the course, the students should be able to:
1. Define and describe the software engineering termd and concepts.
2. Explain the software process, management, validation and verification.
3. Analyze the problem based on software process models and specification document.
4. Apply the software engineering techniques for engineering problems.

Syllabus

INTRODUCTION TO SOFTWARE ENGINEERING
- Software Engineering definition
- Difference between computer science and
- Software engineering
- Classification of software quality
- Attributes of good software

SOFTWARE PROCESSES
- Process Activities
- Software Process Models
- Process Iteration
- The Rational Unified Process
- Computer-aided software engineering

PROJECT MANAGEMENT
- Management Activities
- Project Planning
- Project Scheduling
- Risk Management

REQUIREMENTS ENGINEERING
- Software requirement
- Requirement engineering processes
- System Models
- Critical Systems Spesification

ARCHITECTURAL DESIGN
- Architectural design decisions
- System organization
- Control Styles
- Reference Architectures

OBJECT ORIENTED DESIGN
- Objects and object classes
- An object-oriented design process
- Design evolution

VERIFICATION AND VALIDATION
- Planning verification and validation
- Software inspections
- Verification and formal methods

CRITICAL SYSTEMS VALIDATION
- Reliability validation
- Safety assurance
- Security assessment
- Safety and dependability cases

Practical

1. Lab 1: Case Study on User Requirement
2. Lab 2: Case Study on Software Design
3. Lab 3: Case Study on Software Testing
4. Lab 4: UML Use Case Diagram
5. Lab 5: UML Sequence Diagram
6. Lab 6: UML Class Diagram
7. Lab 7: Software Architecture Diagram
8. Lab 8: Database Architecture Diagram

References

1. Ian Sommerville. (2007). *Software Engineering*, 8th Edition, Addison Wesley.

2. Carlo Ghezzi, Mehdi Jayazeri, Din Mandrioli. (2002). *Fundamental of Software Engineering*, 2nd Edition, Prentice-Hall.
3. Roger S. Pressman. (2005). *Software Engineering: A Practitioner's Approach* , 6th edition, McGraw-Hill.

DKT312/3
MICROCONTROLLER II

Course Outcomes

By the end of the course, the students should be able to:
1. Describe the theory and basic architecture of microcontroller.
2. Write program using C language for embedded system.

3. Perform interfacing between microcontroller and external devices.
4. Reproduce a simple microcontroller based applications.

Syllabus

MICROCONTROLLER PROGRAMMING IN C
- Introduction to C
- Data and Memory types
- Arrays, Structures, Functions and Pointers
- 8051 C Compilers
- Program Structure and Design

INTERFACING TO EXTERNAL MEMORY AND EXTERNAL PERIPHERAL DEVICE PIA
- Memory address decoding
- Interfacing with external ROM
- Data memory space and accessing external data memory
- Programming and interfacing with PIA 8255

TIMER, INTERRUPT AND SERIAL PROGRAMMING IN C

SIMPLE DESIGN AND INTERFACING THROUGH INPUT AND OUTPUT DEVICES
- ADC, DAC and Sensor Interfacing
- Motor Control Interfacing

DISTRIBUTED SYSTEM
- Direct Parallel and Handshaking
- Serial Interconnection and I^2C Bus

Practical

1. Lab 1: C Language Programming and Cross C Compiler
2. Lab 2: Interfacing Input/Output (I/O) port [LED, Switch and Keypad]
3. Lab 3: Interfacing to 7-segment and LCD Display
4. Lab 4: Introduction to other External Devices (ADC, DAC and External I/O and External Memory)
6. Lab 5: Enhanced Timer Operation
7. Lab 6: Enhanced Interrupt Operation
8. Lab 7: Enhanced Serial Port Operation

References

1. Muhammad Ali Mazidi, Janice Gillispie Mazidi, Rolin D. McKinlay. (2006). *The 8051 Microcontroller and Embedded Systems Using Assembly and C*, 2nd Edition,Prentice Hall.
2. I. Scott MacKenzie, Raphael C. W. Phan. (2007). *The 8051 Microcontroller*, 4th Edition, Prentice Hall.
3. James W. Stewart, Kai X. Miao. (1999). *"The 8051 Microcontroller – Hardware, Software and Interfacing"*, 2nd Edition, Prentice Hall.

DKT315/3
COMPUTER SECURITY

Course Outcomes

By the end of the course, the students should be able to:
1. Ability to explain basic issues, concepts, principles and mechanism in modern network security technology.
2. Ability to describe how network security concepts are applied in the global network.
3. Ability to analyze network security threats and related current issues.
4. Ability to identify and investigate solutions to network security threats.

Syllabus

INTRODUCTION
- Attacks, Services and Mechanisms, Security Attack, Attack Services, Network Security Services, Internet Standards.

ENCRYPTION
- Conventional Encryption and Message Hiding:
- Conventional Encryption Principles, Conventional Encryption Algorithms, Block Cipher Operation

ENCRYPTION – PUBLIC KEY ENRYPTION AND MESSAGE AUTHENTICATION
- Message Authentication Approach, Secure Hash Code and HMAC, Public Key Cryptography, Public Key Algorithm, Digital Signatures, Key Management

NETWORK SECURITY APPLICATION – AUTHENTICATION APPLICATION:
- Authentication Service

NETWORK SECURITY APPLICATION – E-MAIL SECURITY:
- PGP

NETWORK SECURITY APPLICATION – IP SECURITY:
- Introduction to IP Security, IP Security Infrastructure, Authentication Header (AH), Encapsulated Packet, Security Combination, Key Management.

SYSTEM SECURITY:
- Intruders, Virus and Related Threat, Firewall Design Principles, Trusted Systems.

Practical

1. Conventional Encryption and decryption
2. Network Security Technology
3. Network Security Application
4. Firewall Configuration

References

1. Cryptography and Network Security, Principles and Practices; William Stallings; Prentice Hall 5th Edition 2010.
2. Network Security Essentials: Applications and Standards; William Stallings; Prentice Hall 4th Edition 2010.
3. Introduction to Cryptography with Coding Theory Wade Trappe, Lawrence C. Washington; Prentice Hall 2nd Edition 2005

DKT316/3
ELECTRONIC INSTRUMENTATION AND PROCESS CONTROL

Course Outcomes

By the end of the course, the students should be able to:
1. Explain the basic concept of electronic instrumentation
2. Applied and test related to electronic circuits
3. Use PLC and interface it with external circuits and devices
4. Analyze problem using electronic instrumentation and process control

Syllabus

INTRODUCTION TO ELECTRONIC INSTRUMENTATION
- Instrumentation; characteristics and types of instrumentation. Standard units, error measurements, precision, types of error and error limits

TRANSDUCERS
- Terminology, types of transducers, electrical transducers, selections and the use of transducers timer, Interrupt and Serial Programming in C

SENSORS
- Temperature, heat, humidity, density and viscosity

SIGNAL CONDITIONING CIRCUITS
- Introduction to signal conditioning, data transmission and interface circuits. Discussion on signal amplification and amplifiers, filtering and filters

DATA ACQUISITION AND CONVERSION
- Basic concepts of data acquisition and its important elements. ADC and DAC, type of connections and implementation of data acquisition system

INTRODUCTION TO PLC CONTROL
- Basic concepts of PLC interfacing through DAQ system

PROCESS CONTROL
- Basic concepts of process control

Practical

1. Lab 1 – Introduction to Lab Equipments, Tools and Measurements
2. Lab 2 – Sensors
3. Lab 3 – Sensor Circuits
4. Lab 4 – Signal Conditioning Circuits
5. Lab 5 – Signal Conditioning Circuits
6. Lab 6 – Introduction to PLC Programming
7. Lab 7 – PLC and Interfacing

References

1. Fundamental of Industrial Instrumentation and Process Control, McGraw-Hill, 2005.
2. H.S. Kalsi. *Electronic Instrumentation*, Tata McGraw-Hill Publishing Company Limited, 2005.
3. C.S. Rangan, G.R. Sarma and V.S. Mani. Instrumentation Devices & Systems, Tata McGraw-Hill Publishing Company Limited, 2004.

4. James A. Rehg, Glenn J. Sartori, *"Programmable Logic Controllers"*, Prentice Hall, 2006.
5. Kevin James, *"PC Interfacing and Data Acquisition: Techniques for Measurement, Instrumentation and Control"*, Newnes, 2000.

DKT317/3
NETWORK COMPUTING

Course Outcomes

By the end of the course, the students should be able to:
1. Identify the recent achievements of theories, technologies and applications in distributed computing areas
2. Explore the client/server communication using socket programming
3. Develop the web services which enhances the communication over the Internet network.

Syllabus

NETWORK OVERVIEW
- Networked applications

DISTRIBUTED COMPUTING
- Sistributed object computing

SOCKET PROGRAMMING
- Client/server computing
- Applets
- Threads Java sockets
- Uniform Resource Locators (URLs)
- Java RMI
- Hypertext Markup Language (HTML)
- Servlets, Java Server Pages (JSPs)
- Java Interface Definition Language (IDL)
- Enterprise Java Beans (EJBs)
- EJB application servers
- Java Database Connectivity (JDBC)

WEB SERVICES
- eXtensible Markup Language (XML)
- Simple Object Access Protocol (SOAP)
- Web Services Description Language (WSDL)
- Universal Description
- Discovery and Integration (UDDI)

Practical

1. Lab 1: Network Overview and application
2. Lab 2: Distributed computing
3. Lab 3: Socket programming.
4. Lab 4: URLs HTML JSPs IDL EJBs JDBC
5. Lab 5: Web services

References

1. J. Kurose and K. Ross, Computer Networking: A Top-Down Approach Featuring the Internet", Addison-Wesley, 5th edition, 2010.
2. Andrew S. Tanenbaum, Computer Networks, Prentice Hall, 4th Edition, January 2008.
3. Unix Network Programming: Networking APIs: Sockets and XTI (Volume 1) by W. Richard Stevens.

DKT351/3
SEMESTRAL PROJECT

Course Outcomes

By the end of the course, the students should be able to:
1. Identify problem/project, managing and implementing the project, report writing and perform presentation.
2. Demonstrate skills acquired in practical work.
3. Think logically, decide the right and effective approach to solve problems.
4. Work independently and/or in team.
5. Apply theory into practice.

Syllabus

PROPOSAL SUBMISSION
- Students are required to submit proposal for their semestral project once the project has been approved by their appointed supervisor. The report should briefly describe the problem statement, objectives of the project, methodology and projection of the cost incurred to implement the project

PROJECT IMPLEMENTATION
- Plan, conduct and perform the experiments/projects.
- Students are to record all activities/experiments conducted in their logbook.
- Progress report submission in week 9

PROJECT COMPLETION

- Perform the experiments.
- Progress report writing.
- Writing report.

DRAFT REPORT AND LOGBOOK SUBMISSION

PRESENTATION PREPARATION

- Semestral project presentation
- Final report submission

References

1. Semestral Project's Guideline for Diploma Engineering Programmes, UniMAP, 2008
2. Any publish material such as writing, multimedia or personal communication that related to the project topics

18.0

Pusat Pengajian Kejuruteraan

Mekatronik

PUSAT KEJURUTERAAN MEKATRONIK

Kejuruteraan Mekatronik adalah merupakan satu bidang pelbagai disiplin yang merupakan sinergi kejuruteraan elektronik, mekanikal, sistem kawalan, sains komputer dan teknologi maklumat. Ia memberi penekanan kepada automasi dan robotik. Ia ditubuhkan bagi memenuhi keperluan tenaga profesional yang semakin meningkat terutamanya dalam bidang kejuruteraan elektronik, mekanikal dan elektronik bioperubatan.

Program Diploma Kejuruteraan Mekatronik bermatlamat untuk menghasilkan graduan kejuruteraan separa profesional dan berketrampilan dalam bidang kejututeraan mekatronik yang diperlukan oleh sektor industri.

Program diploma yang ditawar menitikberatkan pendekatan *lab-intensive* atau *practical-oriented.* Pelajar-pelajar didedahkan kepada kaedah amali dalam tempoh yang panjang. Walaubagaimanapun, komponen teori juga diterapkan semasa pelajar menjalani pembelajaran amali.

Semasa mengikuti program ini, pelajar-pelajar dibekalkan dengan kemahiran komunikasi & IT, budaya perkembangan etnik, dan keusahawan kejuruteraan. Ini bertujuan untuk melahirkan graduan diploma yang bukan sahaja mahir dalam bidang kejuruteraan tetapi berkemahiran insaniah.

Hasil pembelajaran (*overall outcome*) bagi program Diploma Kejuruteraan Mekatronik adalah untuk melahirkan graduan sebagai pembantu jurutera yang mempunyai pengetahuan luas dalam bidang kejuruteraan mekatronik dari segi teori dan praktikal. Oleh itu, graduan yang akan dilahirkan berkemampuan untuk :

- Memantapkan kerjaya sebagai pembantu jurutera yang berjaya, berfikiran kritikal, berintelek dan berakhlak mulia.
- Mengaplikasikan pengetahuan dan kemahiran untuk menyelesaikan masalah kejuruteraan serta dapat membuat keputusan secara kreatif dan inovatif.
- Membudayakan kerja dengan berkesan dan profesional samada secara individu atau berkumpulan.
- Memenuhi kehendak badan-badan profesional dan industri.

PROGRAM YANG DITAWARKAN

- Diploma Kejuruteraan (Kejuruteraan Mekatronik)
- Sarjana Muda Kejuruteraan (Kejuruteraan Mekatronik)
- Sarjana Muda Kejuruteraan (Kejuruteraan Mekanikal)
- Sarjana Muda Kejuruteraan (Kejuruteraan Elektronik Bioperubatan)
- M.Sc. (Kejuruteraan Mekatronik)
- M.Sc. (Kejuruteraan Mekanikal)
- M.Sc. (Kejuruteraan Elektronik Bioperubatan)
- Doktor Falsafah (Ph.D)

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PELUANG KERJAYA

Graduan lulusan Diploma Kejuruteraan Mekatronik mempunyai prospek pekerjaan yang luas. Skop kerjaya sebagai juruteknik dan pembantu jurutera mempunyai permintaan yang tinggi di sektor swasta mahupun kerajaan. Bidang kerjaya untuk graduan diploma Mekatronik terdiri daripada bidang mekatronik secara khususnya dan bidang elektronik dan mekanikal secara amnya. Bidang-bidang ini merangkumi perkhidmatan seperti berikut:

- Industri perkilangan dan pembuatan (proses, penyelenggaraan dan kumpulan sokongan teknikal).
- Firma perundingan kejuruteraan.
- Firma perkhidmatan kejuruteraan.
- Firma penyelidikan dan pembangunan di dalam sektor swasta dan kerajaan.
- Institusi pengajian tinggi dan institusi kemahiran.

Antara kerjaya berkaitan bagi graduan Diploma Kejuruteraan Mekatronik:

- Juruteknik.
- Pembantu Jurutera.
- Penolong Pegawai Latihan Vokasional.

KURSUS YANG DITAWARKAN

1.	DNT111/2	Engineering Drawing
2.	DNT112/2	Basic Engineering Science
3.	DNT113/3	Electrical Circuit
4.	DNT122/3	Applied Mechanics
5.	DNT123/2	Computer Aided Drafting (Cad)
6.	DNT125/3	Analog Electronic
7.	DNT126/3	Basic Computer Programming
8.	DNT231/3	Digital Systems
9.	DNT233/3	Thermofluids
10.	DNT234/2	Mechatronic Workshop Practice I
11.	DNT235/3	Basic Electrical Technology
12.	DNT236/3	Materials Engineering
13.	DNT241/3	Electro-Pneumatics And Hydraulics
14.	DNT242/3	Machine Mechanism Elements
15.	DNT243/2	Mechatronics Workshop Practice Ii
16.	DNT245/3	Sensors And Measurements
17.	DNT246/3	Microcontroller And Interfaces
18.	DNT253/3	Programmable Logic Control (Plc)
19.	DNT351/3	Semestral Project
20.	DNT352/3	Industrial Automation And Robotics
21.	DNT354/3	Control Principles
22.	DNT355/3	Manufacturing Process

DIPLOMA IN MECHATRONICS ENGINEERING CURRICULUM						
YEAR	**FIRST**		**SECOND**		**THIRD**	
SEMESTER	**FIRST**	**SECOND**	**FIRST**	**SECOND**	**FIRST**	**SECOND**
ENGINEERING CORE COURSES (83)	DCT100/2 Basic Engineering Skills	DNT126/3 Basic Computer Programming	DNT231/3 Digital Systems	DNT241/3 Electro-Pneumatics and Hydraulics	DNT351/3 Semestral Project	DIT361/6 Industrial Training
	DNT111/2 Engineering Drawing	DNT122/3 Applied Mechanics	DNT233/3 Thermo Fluids	DNT242/3 Machine Mechanism Elements	DNT352/3 Industrial Automation and Robotics	
	DNT112/2 Basic Engineering Science	DNT123/2 Computer Aided Design (CAD)	DNT234/2 Mechatronic Workshop Practice I	DNT243/2 Mechatronic Workshop Practice II	DNT354/3 Control Principles	
	DNT113/3 Electrical Circuit	DNT125/3 Analog Electronics	DNT235/3 Basic Electrical Technology	DNT245/3 Sensors and Measurements	DNT355/3 Manufacturing Process	
	DQT101/3 Mathematics I	DQT102/3 Mathematics II	DNT236/3 Materials Engineering	DNT246/3 Microcontroller and Interfaces	DPT333/3 Industrial Safety and Quality Management	
		DUT122/2 Information Technology Skills	DQT203/3 Mathematics III	DNT253/3 Programmable Logic Controller (PLC)		
83	**12**	**16**	**17**	**17**	**15**	**6**
UNIVERSITY REQUIREMENT COURSES (19)	DUW123/2 Communication Skills		DUW235/2 Ethnic Relationship	DUW233/2 Islamic & Asian Civilization		
	DVW410/2 Malay Language	DVW212/2 English 2	DZWXXX/1 Badan Beruniform 3	DZWXXX/1 Badan Beruniform 4	DUW224/2 Engineering Entrepreneurship	
	DVW112/2 English 1	DZWXXX/1 Badan Beruniform 2			DZWXXX/1 Badan Beruniform 5	
	DZWXXX/1 Badan Beruniform 1					
19	**7**	**3**	**3**	**3**	**3**	
102	**19**	**19**	**20**	**20**	**18**	**6**

Course Code
Ex: ABC123/4
(**A**: Degree/Diploma Programme) ; (**B**: School) ; (**C**: Types of Courses) : (**1**: Stage (Stage 1, 2, 3 & 4)) ; (**2 & 3**: Course number) ; (/**4**: unit)

DNT 111/2
ENGINEERING DRAWING

Course Outcomes

By the end of the course, the students should be able to:
1. Apply basic skills of engineering drawing in Mechatronic Engineering related problems.
2. Identify the types of angles and sketches used in engineering.
3. Dimensioning and tolerancing properly and to extract the information effectively from goods engineering drawing.
4. Use engineering drawing knowledge and applied it to engineering field.

Syllabus

INTRODUCTION TO ENGINEERING DRAWING
- Importance of engineering drawing, engineering drawing kits, universal standard of engineering drawing, Title block and texts, measurement and scaling. Drawing standard lines, wording and numbering, bordering and text block.

GEOMETRICAL DRAWING
- Methods of drawing lines, to draw simple geometrical shape, drawing tangent lines.

PROJECTION SYSTEM
- Orthography Projection, First Angle Projection, Third Angle Projection, Isometric Projection.

DRAFT STRUCTURE
- Ordinary Lines, Letter, Dimension, Tolerance, Cross Section, Symbol. Orthography, Isometric and Oblique Sketch. Sketch Types, Isometric Sketch, Oblique Sketch and Orthography.

CROSS SECTION VIEW
- Types of Cross Section Views, Standard Practice.

GEOMETRICAL TOLERANCE AND DIMENSIONING
- Symbols, Maximum Material Condition, Datum, Geometrical Control, Tolerance Limit Calculation.

ACCURACIES AND DRAWING TASK
- Basic Concept, Working Drawing, Assembly Drawing, Explode Drawing, Reprographic. Electronic Drawing
- Block Diagram, Schematic Drawing, Cable And Wiring Diagram, Printed Circuit Board.

Practical

1. Introductions to basics engineering drawing
2. Geometrical construction
3. Projection systems
4. Isometric and oblique sketches
5. Cross-sectioned views
6. Dimensioning and geometrical tolerance
7. Working drawing and detailing
8. Electric electronics drawing

Reference

1. Gary R Bertoline., Eric N Wiebe. (2003). Technical Graphics Communication. 3rd ed. McGraw-Hill.(teks).
2. James H. Earle. (2004). Engineering Design Graphic. IIth ed. Pearson Prentice-Hall.
3. R.K Dhawan. (2002). Lukisan Mesin: Dalam Unjuran Sudut Pertama. Cetakan Pertama. Golden Books Centre Sdn. Bhd.
4. Frederick E. Giesecke, Henry Cecil Spencer, John Thomas Dygdon, Alva Mitchell, Ivan Leroy Hill, James E Novak. (2002). Technical Drawing 10th ed. Prentice Hall.

DNT 112/2
BASIC ENGINEERING SCIENCE

Course Outcomes

By the end of the course, the students should be able to:
1. Describe and apply standard unit.
2. Describe and apply force and motion and their applications.
3. Explain and apply the concept of work, power, energy and momentum.
4. Explain and analyze the waveform principles, electrostatic and electromagnetic.

Syllabus

UNITS AND DIMENSION
- Basic units in SI, physical quantity of dimension, homogeneity principles, dimension equation, dimension analysis application.

FORCE AND MOTION
- Scalars and vectors, speed and velocity, motion equation, Newton's Law, Force from Newton's Law

FORCE ON MATERIAL
- Strain, Stress, Fracture, Elasticity and Hooke's Law

WORK, POWER, ENERGY AND MOMENTUM
- Work and standard units, power concept, power calculation, kinetic energy concept and potential energy, the law of conservation of energy.

ELECTROSTATIC
- Coulomb's Law, charge units, electric field, electric force line, capacitance and unit, parallel plate capacitor, capacitor in parallel and series, dielectric constant and it's functions.

ELECTROMAGNETIC
- Magnetic field and unit, electric field around conductor, solenoid, force at motion charges and current in magnetic field

WAVE
- Wave generation from vibrating object, wave motion and it's parameters, energy transported by waves, sine wave analysis.

References

1. Jerry Wilson, Anthony Buffa. (2002). *College Physics*. 5th ed : Pearson Education.
2. Stephen T.Thornton, Andrew Rex. (1999). *Modern Physics for Scientists & Engineers*. 2nd Edition: Brooks Cole.
3. W. Bolton. (2001). Engineering *Science*. 4th Edition : Newnes.
4. John Hannah, M J. Hillier. (1999). *Mechanical Engineering Science*. 3rd Edition : Longman Publishing Group.

DNT 113/3
ELECTRICAL CIRCUIT

Course Outcomes

By the end of the course, the students should be able to:
1. Apply and explain the concepts of charge, current, voltage and power in electrical circuits.
2. Analyze linear circuits using various voltage and current laws and theorems.
3. Explain three phase current and voltages and analyze basic concept of sinusoidal steady state analysis.
4. Perform in group/teams to construct electrical circuit, apply and demonstrate the knowledge in electrical circuit application.

Syllabus

VARIABLES AND CIRCUIT ELEMENT
- Current and voltage conversions, Ideal basic circuit elements, Passive and active elements, Ideal voltage source and current source, Power and energy (in joules & kWhr), Basic circuit connections, Application of Ohm's Law and power calculation

RESISTIVE CIRCUITS
- Series and parallel equivalent resistances, Voltage Divider Rule & Current Divider Rule,

CIRCUIT THEOREMS AND CIRCUIT ANALYSIS
- Kirchhoff's Laws (Voltage & Current), voltage and current divider, star/delta transformation, Mesh and Nodal analysis, Superposition theorem, source transformation, Thevenin and Norton theorem, and maximum power transfer.

INDUCTANCE AND CAPACITANCE
- Natural response of RL circuit, natural response of RC circuit, step response of RL circuit, step response of RC circuit.

ALTERNATING CURRENT (AC) CIRCUIT
- Introduction to periodic function (steady state sinusoidal waveform): peak, average and rms values, Response of resistive and reactive elements to sinusoidal excitation: circuit element in phase domain – impedance and admittance,

STEADY STATE SINUSOIDAL ANALYSIS
- Circuit analysis under sinusoidal steady state excitation, Kirchoff's Laws in the phasor domain, the phasor concept and j-notation, current and voltage phasor

relationship in RL, RC and RLC series and parallel circuits, series/ parallel voltage & current divider in the frequency domain.

STEADY STATE SINUSOIDAL POWER CALCULATION

- Average power, Power factor, Complex power, Power factor correction

References

1. Charles K. Alexander & Matthew Sadiku. (2001). *Fundamentals of Electric Circuits*. International ed. McGraw-Hill.
2. J. David Irwin & Chwan-Hwa Wu. (2001). *Basic Engineering Circuit Analysis*. 6th ed. John Wiley & Sons.
3. Clayton R. Paul, Charles Paul. (2000). *Fundamentals of Electric Circuit Analysis*. Wiley.
4. Charles K. Alexander & Matthew Sadiku. (1999). *Fundamentals of Electric Circuits*.

DNT 122/3
APPLIED MECHANICS

Course Outcomes

By the end of the course, the students should be able to:

1. Solve force and moment problems in two and three-dimensions.
2. Determine resultant of force from a given system of force. Understand the equilibrium of static and dynamics of a Particle and Rigid Body.
3. Understand the relationship of kinematics and kinetics: Force, position, velocity andV acceleration for particles and rigid bodies

Syllabus

INTRODUCE

- Applied mechanic concepts, unit and numerical accuracy, trigonometry.

VECTOR AND FORCE

- Operation vector, addition for force system in plane, position vector, unidirectional force vector in line, dot multiplication.

MOMENT, COUPLE AND EQUILIBRIUM

- Moment, couple, free body diagram, force system in plane. Structure Analysis. Joint method, zero force members, sectioned method, frame and machine.

FRICTION

- Type of dry friction, coefficient friction, angle of friction, friction on belting. Centre of gravity, centroid and moment of inertia. Centroid of simple area, composite and line, moment of inertia of an area, parallel axis theorem and radius of gyration. Moment of inertia of a composite area and body.

KINEMATICS OF PARTICLES

- Rectilinear Motion, Curvilinear Motion, Relative Motion

KINETICS OF PARTICLES

- Force and Acceleration in Rectilinear and Curvilinear Motion, Work and Energy, and Impulse and Momentum.

KINEMATICS OF RIGID BODIES

- Rotation about a Fixed Axis, General Motion, Relative Motion.

KINETICS OF RIGID BODIES

- Forces and Acceleration, Work and Energy.

Practical

1. Resolution of Forces
2. Equilibrium of Beam with 2 & 3 Forces
3. Friction on Inclined Plane
4. Work Done by a Variable Force
5. Mechanical Conservation of Energy
6. Projectile Motion

Reference

1. Beer, F. B. and Johnston, E. R. Jr. (2004). Vector Mechanics for Engineers: Statics and Dynamics. 7th ed., Canada. McGraw-Hill. (Teks).
2. Hibbeler, R. C. (2005). Principle of Statics and Dynamics.10th ed. Prentice Hall.
3. Beer and E.R. Johnson Jr. (2004). ëVector Mechanics tor Engineer: Statics 7th ed. In SI Unitsí. McGraw Hill.
4. Beer and E.R. Johnson Jr. (2004). ëVector Mechanics tor Engineer: Dynamics 7th ed. In SI Unitsí. McGraw Hill.

5. Meriam, J. L. and Kraige, L. G. (2003). Engineering Mechanics: Static. 5th ed., USA, SI ver. Wiley.

DNT 123/2
COMPUTER AIDED DRAFTING (CAD)

Course Outcomes

By the end of the course, the students should be able to:
1. Apply fundamental concepts of Computer Aided Drafting in Mechatronic Engineering related problems.
2. Construct a simple product design, by using AutoCAD software.
3. Produce engineering drawing by using proper techniques.
4. Make use of Computer Aided Drafting and apply it into engineering areas.
5. Work and solve problems in groups.

Syllabus

INTRODUCTION TO COMPUTER AIDED DRAFTING
- The AutoCAD screen, typing commands, starting a new drawing, using limits, using grid, using snap, using zoom, using line, using absolute coordinates, using erase, using offset, using undo, adding text, inserting a block, method to print.

BASIC CONSTRUCTION TECHNIQUES
- Using relative X and Y coordinates, using polar coordinates, using layers, using object snap, using arc, using circle, using ellipse, using pan real time.

BASIC EDITING
- Using trim, using fillet, using chamfer, view port, editing text, explode.

DIMENSIONING 2D DRAWING
- Using dimension styles, creating a named dimension style, adding linear dimensions, creating a diameter dimension, baseline dimensioning, using continue dimension, adding the angular dimension.

CREATING 2D DRAWING
- Geometric constructions using polygon, using polar tracking, using extend, using rotate, using move, using mirror, using array.

CREATING 2D SECTION VIEWS
- Cutting planes lines, using boundary hatch.

INTRODUCTION TO 3D SOLID MODELING
- 3D coordinate systems, user coordinates system, showing the solids toolbar, using the view toolbar, using view point, creating solid models with extrude and revolve, extruding a shape, using Boolean operations, creating solid models revolution.

TO PRODUCE 2D DRAWING FROM 3D SOLID MODELING
- Convert a solid model to a multiview drawing using solview and soldraw.

CREATING SECTION VIEWS FROM 3D SOLID MODELING
- Creating sections from a solid model using section and slice.

CREATING ASSEMBLY DRAWING FROM 3D SOLID MODELING
- Attaching solid models, inserting the solid part drawings, creating the parts list.

3D PHOTOREALISTIC MODELING
- Using render dialog box, choosing materials, adding background.

PRODUCING ELECTRONIC DRAWING
- Circuit and schematic drawing.

Practical

1. Introduction to Computer Aided Drafting
2. Basic construction techniques
3. Basic editing
4. Dimensioning 2D drawing
5. Creating 2D drawing (geometric constructions)
6. Creating 2D section views
7. Introduction to 3D solid modeling
8. To produce 2D drawing from 3D solid modeling
9. Creating section views from 3D solid modeling
10. Creating assembly drawing from 3D solid modeling
11. 3D photorealistic modeling
12. Producing electronic drawing

Reference

1. Shawna Lockhart. (2005). A Tutorial Guide to AutoCad 2005. Prentice Hall.

2. Mark Dix & Paul Riley. (2006). Discovering AutoCad 2005. Prentice Hall.
3. Timothy Sean Sykes. (2002). AutoCAD 2002 One Step at a Time. Prentice Hall.
4. Ralph Grabowski. (2002). Using AutoCAD 2002. Thompson Learning.

DNT 125/3
ANALOG ELECTRONIC

Course Outcomes

By the end of the course, the students should be able to:
1. Explain and analyze diode applications in analogue electronic circuit.
2. Explain and analyze transistor circuit and applications as amplifier.
3. Explain and analyze operations and applications of Operational Amplifiers (Op-Amp)
4. Perform in group/teams to construct analog electronic circuit, apply and demonstrate the knowledge in analogue electronic application.

Syllabus

INTRODUCTION TO SEMICONDUCTOR
- Atomic Structures, Semiconductors, Conductors and Insulators, Covalent Bonds, Conduction in N-Type and P-Type Semiconductor, The Diode, Biasing the Diode, Voltage Current Characteristic of a Diode, Diode Models, Testing a Diode.

DIODE APPLICATIONS
- Diode Applications: Half-Wave Rectifiers, Full-Wave Rectifiers, Power Supply Filters and Regulations, Diode Limiting and Clamping Circuits, Voltage Multipliers, The Diode Data Sheet, Troubleshooting, Zener Diode as Voltage Regulator.

BIPOLAR JUNCTION TRANSISTOR (BJTS)
- Transistor Structure, Basic Transistor Operation, Transistor Characteristic and Parameters, Replication the DC Operating Points, Voltage Divider Bias, Other Bias Methods. The Transistor as a switch, Transistor Packages and Terminal Identification, Troubleshooting.

BJT Transistor Amplifiers
- Amplifier operation, Transistor AC equivalent circuits, Common-Emitter Amplifier, Common-Collector Amplifier, Common-Base Amplifier, Multistage Amplifier, Differential Amplifier.

FIELD-EFFECT TRANSISTOR (FETS)
- Construction and Characteristics of JFETs, Transfer Characteristics, Important Relationships, Depletion-
- Type MOSFETs, Enchancement-Type MOSFETs

FET AMPLIFIERS
- FET Amplification, Common-Source Amplifiers, Common-Drain Amplifiers, Common-Gate Amplifiers.

OPERATIONAL AMPLIFIER (OP-AMP)
- Operational amplifier, characteristics, types, and applications.

References

1. Floyd, T. (2005). *Electronic Devices*. 7th Edition Englewood Cliffs, New Jersey : Prentice Hall.
2. Boylestead, R.L, and Nashelsky, L. (2006). *Electronic Devices and Circuit Theory*. 9th Ed.: Prentice Hall
3. Robert T. Paynter, (2005). *Introductory Electronic Devices and Circuits*. 9th Ed.: Prentice Hall.

DNT 126/3
BASIC COMPUTER PROGRAMMING

Course Outcomes

By the end of the course, the students should be able to:
1. Define and describe programming concepts and principles.
2. Apply programming techniques and tools to reproduce and design computer programs.
3. Solve problems using computer programming techniques.

Syllabus

INTRODUCTION TO C

ALGORITHM

PSEUDO-CODE

FLOW CHART

C PROGRAM STRUCTURE

VARIABLES

OPERATORS

CONDITIONAL STATEMENTS (IF-ELSE; SWITCH)

NESTED IF

LOOPS (WHILE; DO-WHILE; FOR)

NESTED LOOP

FUNCTIONS – LIBRARY (MATH & STRING)

FUNCTIONS – USER-DEFINE

FUNCTIONS – SCOPE (GLOBAL & LOCAL)

FUNCTIONS – PASSING ARGUMENTS (BY VALUE & BY REFERENCE

POINTERS

FILES OPERATION

ARRAY & MULTI-DIMENSIONAL ARRAY

STRINGS

STRUCTURE

Practical

1. Flowchart and Pseudo codes
2. Introduction to C programming
3. Selection and loop structure
4. Function 1
5. Function 2
6. Pointer
7. File processing
8. Arrays

Reference

1. Deitel & Deitel, Suhizaz Sudin, R. Badlishah, Yasmin Yacob "C How To Program", Pearson-Prentice Hall, 2006
2. Forouzan, B. A. & Gilberg R. F., "Computer Science: A Structured Programming Approach Using C" Brooks/Cole, 2001
3. Al Kelley, Ira Pohl, "C by Dissection: The Essentials of C Programming" 4th ed., Addison-Wesley, 2000

DNT 231/3
DIGITAL SYSTEMS

Course Outcomes

By the end of the course, the students should be able to:
1. Describe and analyze the concept of digital systems
2. Apply Boolean expressions to solve digital circuit configuration
3. Explain and implement basic logic in difference combinational logic circuit
4. Perform in group/teams to construct digital circuit and demonstrate its function and applications.

Syllabus

INTRODUCTION
- Overview of Digital and Analog Signals; Logic Level and Digital Waveform.

NUMBER SYSTEMS
- Number systems, Number representation, Number conversion; arithmetic operations and code systems.

LOGIC GATES
- The Inverter, AND, OR, NAND, NOR, EX-OR and EX-NOR Gates.

BOOLEAN ALGEBRA AND LOGIC SIMPLIFICATION
- Boolean Operations and Expression; Laws and Rules of Boolean Algebra; DeMorgan`s Theorem; Boolean Analysis of Logic Gates; Simplification using Boolean Algebra; Standard Form of Boolean Expression; Truth Table, Karnaugh Map SOP and POS Minimization.

COMBINATIONAL LOGIC ANALYSIS
- Basic Combinational Logic Circuits; Implementing Combinational Logic; The Universal Property of NAND and NOR Gates; Logic Circuit Operation with Pulse Waveform Inputs.

FUNCTIONS OF COMBINATIONAL LOGICS
- Introduction to various type of arithmetic combinational logic circuit (e.g Basic Adders; Comparators; Converters - DAC & ADC; etc)

LATCH, FLIP-FLOPS AND TIMERS

- Latches; Edge-Triggered Flip-Flops, Flip-Flop Operating Characteristic and Applications; One-Shots; The 555 Timer

COUNTERS

- Introduction to various type of counter (e.g Asynchronous and sychronous counter)

PLD

- Overview of PLD: PLD architecture and types; Applications of PLD.

Practical

1. Introduction to Logic Gates and its Behaviour
2. Observing De Morganís Theorem with Different Equations
3. Decoders- Binary Coded Decimal and Counters
4. Multiplexer and Demultiplexer
5. Flip-flops - RS and JK Flip-flop
6. Counter Application
7. Programming the PLD

Reference

1. Floyd, Thomas L. (2006). Digital Fundamentals, 9th Edition by Prentice Hall 2006.
2. Ronald J.Tocci, Neal S.Widmer and Gregory L.Moss. (2006). Digital Systems: Principles and Applications, 10th Edition by Prentice Hall 2006.

DNT 233/3
THERMOFLUIDS

Course Outcomes

By the end of the course, the students should be able to:

1. Describe the principles of thermodynamics, heat transfer and fluid mechanics.
2. Explain and compute the properties of fluid, fluid static and fluid dynamics
3. Explain and compute the properties of pure substance, 1st law of thermodynamics and 2nd law of thermodynamics.
4. Explain the mechanisms of heat transfer and compute for heat transfer
5. Perform in group/teams to construct and demonstrate the fluid mechanics, thermodynamics and heat transfer.

Syllabus

FUNDAMENTAL CONCEPT OF THERMOFLUID

- Thermofluid, thermodynamics and fluid mechanics. Discuss various applications of thermofluid.

FLUID AND THEIR PROPERTIES

- Nature of fluid and fluid properties. Solve fluid properties problems.

FLUID STATIC

- Pressure measurement using manometers. Define and explain the hydrostatic forces on submerged plane surface. Solve the problem of manometery and hydrostatic forces on submerged plane surfaces.

FLUID DYNAMICS

- Types of flow, Continuity equation and Bernoulli's equation. Solve problems by applying Continuity and Bernoulli's equations for fluid flow in pipes.

BASIC CONCEPT OF THERMODYNAMIC

- Thermodynamics, various form of energy, closed and open systems, their properties, processes and cycle. Define and explain zeroth law of thermodynamics.

PROPERTIES OF PURE SUBSTANCES

- Discuss pure substance and phase-change processes of pure substances. Show property diagrams for phase-change processes. Apply property table of thermodynamics to determine properties of pure substances.

1st LAW OF THERMODYNAMICS-CLOSED SYSTEM

- Energy transfer by heat and work. Explain 1st Law of Thermodynamic for closed system. Solve problems for 1st Law of Thermodynamic for Closed System.

1st LAW OF THERMODYNAMIC-OPEN SYSTEM

- 1st Law of Thermodynamic for Open System. Apply 1st Law of Thermodynamic for Open systems. Solve problems for 1st Law of Thermodynamic for Open System

2nd LAW OF THERMODYNAMIC

- Second Law of Thermodynamic and its relationship with daily life. Explain concept of heat engine, refrigerator and heat pump. Solve problem related to 2nd Law of Thermodynamics.

HEAT TRANSFER

- Heat transfer by conduction, convection and radiation. Solve simple problems for different modes of heat transfer.

Practical

1. Hydrostatic Pressure
2. Bernoulli Theorem Demonstration
3. Temperature Measurement Method
4. 1st Law Thermodynamic Opened System
5. Conduction Heat Transfer

Reference

1. Bruce, R. Manson, Donald, F. Young, Theodore H. Okishi. (2005). Fundamentals Of Fluids Mechanics. 5th ed. John Wiley and Sons.
2. Holman, J.P. (1991). Heat Transfer. McGraw Hill.
3. Douglas, J.F. Gasiorek. J.M. & Swaffield, J.A. (1985) Fluids Mechanics. 2nd ed. London: Pitman.

DNT 234/2
MECHATRONIC WORKSHOP PRACTICE I

Course Outcomes

By the end of the course, the students should be able to:

1. Define and explain the safety precaution or procedure in handling mechanical, electrical and electronic equipment.
2. Apply design and hands-on mechanical skills to complete tasks and problems given.
3. Apply design and hands-on electrical and electronic skills to complete tasks and problems given.
4. Perform in group/teams to construct, demonstrate and complete the tasks and problems given.

Syllabus

MACHINING WORKSHOP PRACTICE

- Introduction to the tooling and raw material cutting method by using hand tooling such as file, saw, metal scissor, banding machine, vice, vernier caliper and etc.

WELDING AND SOLDERING

- Introduction to the welding and soldering process. Welding and soldering proves type. Arc welding process, arc shield, electrode, gas metal arc welding, gas tungsten arc welding, deep arc welding, flux core arc welding.

ELECTRONIC

- Soldering technique, prototype technique: breadboard, veroboard, wire-wrape, PCB, Component and circuit connection, instrumentation and testing.

ELECTRICAL

- Domestic electrical wiring technique.

Reference

1. Pethebridge Nesson. (2002). Electrical Wiring Practice. Vol. 1 6th ed. McGraw Hill.
2. W.E. Steward, T.A. Stubbs, Trevor Mark. (1996). Modern Wiring Practice. 12th ed. BH Newnes.
3. Groover, M. P. (1996). Fundamentals of Modern Manufacturing. Prentice Hall.
4. Kalpakjian, S. (1995). Manufacturing Engineering & Technology. 3rd ed. Addison-Wesley Publishing Company.

DNT 235/3
BASIC ELECTRICAL TECHNOLOGY

Course Outcomes

By the end of the course, the students should be able to:

1. Explain and analyze the basic concepts of electrical and magnetic circuits.
2. Explain and analyze the basic principles of transformers, direct current and alternating current.
3. Determine parameters and applications for various general purpose electrical machines.

4. Perform in group/teams to construct, troubleshoot and demonstrate simple applications of electrical circuit and electrical machine.

Syllabus

INTRODUCTION TO ELECTRIC CIRCUIT
- Electron theory, electrical sources, resistance and factors which influence the resistance, study the types of electrical circuits, study the voltage, current and resistor relationship, electrical power, electrical energy, characteristics of serial and parallel circuits, Ohm's Law, Kirchhoff's Law, Thevenin's Theorem and Northon's Theorem.

INDUCTOR AND CAPACITOR
- Basic principle of inductor and basic principle of capacitor

MAGNETIC AND ELECTROMAGNETIC
- Basic principle of magnetic and characteristics, basic principle of electromagnetic, factors influence magnetic field strength, electromagnetic induction, magnetic circuits for electrical machines, electrical and permanent magnetic field excitation

INTRODUCTION TO ALTERNATING CURRENT (AC) CIRCUIT
- Basic principle of AC circuit

TRANSFORMER
- Principles of transformer, construction and design, efficiency of operation, efficiency of three-phase transformer's operation, parallel transformer operation

THREE PHASE SYSTEM
- Basic principle of three phase system, star and delta connection

ELECTRICAL MACHINE
- DC generator, DC construction machines, characteristics of DC motor, loss in DC motor, efficiency of DC motor, AC generator, single phase AC motor, three phase AC motor, types of starter, relation between torque and speed, application, motor's speed control

ELECTRICAL SAFETY
- Disconnector Circuit, current devices residual, contactors, relay, fuses, earthing, insulator, rules of electrical wiring and pairs.

Practical

1. Introduction to Lab Instrument and Basic Measurement
2. Kirchhoff's Law
3. Parallel Circuits and Voltage Divider Rules for Series Circuit
4. Thevenin's and Northon's Theorem
5. Single Phase Transformer
6. Direct Current (DC) Series Motor

References

1. Stephen J. Chapman. (2005). *Electric Machinery Fundamentals*. 4th ed. McGraw Hill.
2. Charles I. Hubert. (2002). *Electric Machines: Theory, Operation, Applications, Adjustment and Control*. 2nd ed. Prentice Hall.
3. K.C. Agrawal. (2001). *Industrial Power Engineering and Applications Handbook*. Newnes.
4. P.C. Sen. (1997). *Principles of Electric Machines and Power Electronics*. 2nd ed. Wiley & Sons.

DNT 236/3
MATERIALS ENGINEERING

Course Outcomes

By the end of the course, the students should be able to:
1. Demonstrate fundamental concepts of material engineering.
2. Ilustrate the relationship between structure and properties of materials.
3. Measure and apply the mechanical properties for engineering applications.

Syllabus

INTRODUCTION TO MATERIAL ENGINEERING
- Define and explain material engineering and basic material engineering.
- Disscuss the general comparison of the properties.

STRUCTURE OF MATERIAL

- Introduction to atom and molecular structure, electron wave, hydrogen structure and electron configuration.
- Periodic table, electron activities and atomic bonding and arrangement.

IMPERFECTIONS IN SOLIDS

- Defects in material impurities in solids and specifications of composition, material basic properties and general comparison.

MECHANICAL PROPERTIES OF MATERIAL AND TESTING

- Effect on material, material deformation, elastic and plastic deformation.
- Slip system and deformation in single crystal, shear stress and relation of dislocation and hardening.

PHASE DIAGRAM

- Define and explain phase diagram for single and multiple materials.
- Explain the Gibbs and phase law.
- Solve cooling curve and phase diagram for other system.

References

1. Callister, W.D.J., Material Science and Engineering: An Introduction, 7th ed. New York, John Willey and Sons, 2007.
2. Callister, W.D.J., Material Science and Engineering: An Introduction, 5th ed. New York, John Willey and Sons, 2000.
3. Smith, W.F., Principle of Material Science and Engineering, 2th ed. Singapore, McGraw Hill, 2000.
4. Donald, B, Askeland & Pradeep, P, Phule, The Science and Engineering of Materials, 4th ed.Ohio, Thomson Book, 2003.

DNT 241/3
ELECTRO PNEUMATICS & HYDRAULICS

Course Outcomes

By the end of the course, the students should be able to:

1. Explain pneumatic system and analyze the compress air fundamental and the relationship between pressure, force and pneumatic cylinder characteristics.
2. Explain hydraulic system and analyze the fundamental of hydraulic power unit and the relationship between pressure, force and speed for hydraulic cylinder.
3. Apply electro-pneumatics/ hydraulics system and construct the electro-pneumatic/hydraulic circuit.
4. Perform in group/teams to construct pneumatics and hydraulic circuit and display the pneumatics and hydraulic application.

Syllabus

INTRODUCTION TO PNEUMATICS.

- Introduction of characteristics and applications of pneumatics. Review and analyse fundamentals principles of pneumatics and compress air.

COMPONENTS OF A PNEUMATIC SYSTEM.

- Describe the principles of compress air and distribution, pneumatics valves and cylinder. Describe the symbols and standard in pneumatics. Describe the pneumatic circuit's development.

PNEUMATIC ACTUATORS AND OUTPUT DEVICES.

- Describe the linear cylinder characteristics and constructions. Analyse the relationship between air pressure, piston forces and stroke length for different size of pneumatics cylinder.

PNEUMATIC DIRECTIONAL CONTROL VALVES.

- Review the valve configurations and constructions. Describe the methods for developments and trouble shooting of pneumatics system.

ELECTRO-PNEUMATICS SYSTEM

- Introduction of electro-pneumatic controls. Describe the electromagnetic contactors, relays and standard graphical symbols.

INTRODUCTIONS OF SOLENOID VALVE.

- Describe the pneumatics connections diagram and electrical wiring diagram for electro-pneumatics applications.

INTRODUCTION TO SEQUENCE CONTROL FOR ELECTRO-PNEUMATIC APPLICATIONS.

- Machine design using sequence control for electro-pneumatic applications. Describe PLC interfaces with electro-pneumatic for sequence control.

INTRODUCTION OF CHARACTERISTICS AND APPLICATIONS OF HYDRAULICS.

- Analyze some fundamentals principles of hydraulic pressure in hydraulic power unit. Analyze the relationship between hydraulics pressure and forces for hydraulics system.

INTRODUCTION OF COMPONENTS OF A HYDRAULICS SYSTEM.

- Describe the principles of hydraulic circuit, valves and cylinder. Review the symbols and standard in hydraulics.

INTRODUCTION OF ELECTRO-HYDRAULIC CONTROLS.

- Describe the hydraulics connections diagram and electrical wiring diagram for electro-hydraulics applications.

Practical

1. Designing Basic Pneumatic System Using Pneumatic Training System
2. Logic Valve and Sequence Control for Multiple Cylinder Operation
3. Introduction to Automation Studio Software and Basic Pneumatics System Design
4. Designing Basic Electro-Pneumatic System Using Electro-Pneumatic Training System
5. Design and simulate electrical control circuit, electro-pneumatic and hydraulic circuit using Automation Studio Software
6. Sequence Control for Electro-Pneumatic System
7. Pressure Built-up in Hydraulic System
8. Control Circuit of Hydraulic Cylinders

Reference

1. Andrew Parr,"Hydraulics & Pneumatics: A Technician and Engineer Guide". Butterworth-Heinemann (2006)
2. P. Crosser and F. Ebel, "Pneumatics." 7th ed. Festo Didactic GmbH & Co. (2000)
3. J.P Hasebrink, "Basic Pneumatics". 1st ed. Bosch Rexroth AG (1991)
4. R. Balla, "Electropneumatics." 1st ed. Mannesmann Rexroth Pneumatics GmbH (1990)
5. Chris Stacey, "Engineering Application of Pneumatics & Hydraulics" Butterworth-Heinemann (1999)

DNT 242/3
MACHINE MECHANISM ELEMENTS

Course Outcomes

By the end of the course, the students should be able to:

1. Explain basic concept of machine elements and describe design philosophies for machine design.
2. Analyze, measure the characteristic of mechanical drive elements and demonstrate knowledge of power transmission system..
3. Analyze mechanism of mechanical elements and measure mobility of mechanical system.
4. Describe other machine elements that use as reference material for general design project and perform analysis related to mechanical drive elements.

Syllabus

INTRODUCTION MACHINE MECHANISM ELEMENT

- Machine mechanism element. Basic concepts and principles of design analysis, mechanical drive and machine element design. The application of machine element in Mechatronic engineering focus on power transmission system

SHAFT AND BEARING

- Introduction to shaft and bearing. Geometries for shaft and reliable transmitting element. Compute force and torque exerted on shaft. Type and design life of bearings. Equivalent load on bearing. Relate force and critical bearing selection factors.

DRIVE GEAR

- Gears in general, types of gears, simple gear system and application. Velocity ratio and number of teeth pertaining to two gears operating together. Gear geometry and gear-tooth features. Power transmision element

FLEXIBLE ELEMENT DRIVE

- Basic features of a flexible element drive. Belt drive system and several types of belt drives, applications, selecting belt and belt friction. Size of sheave and speed ratio. Relate sheave diameter and angular velocity.

CAMSHAFT AND FOLLOWER

- Introduction about basic of camshaft and follower. The configuration and arrangement of camshaft and follower. Base circle, prime circle, pitch curve and other nomenclature. Velocity & acceleration motion. Design of camshaft and follower base on the movement of the mechanism.

LINKAGES MECHANISM

- Ilustrate linkage & mechanism. Function and type of linkage. Degree of freedom and mobility of linkage. Angle of transmission and identify dead point of linkage.

Practical

1. Motorized Gear Train
2. Governor Operation
3. Shaft Whirling
4. Belt Drive and Friction
5. Camshaft and Follower
6. Four Bar Linkages Mechanism

Reference

1. Robert L. Mott, John Tang, Machine Element in Mechanical Design, Fourth Edition, Prentice Hall (2006) (Text)
2. Joseph E. Shigley, Charles R. Mischke, Mechanical; Engineering Design, Sixth Edition, Mc Graw Hill (2001)
3. David H. Myszka, Machines and Mechanism: Applied Kinematic Analysis, 3rd Edition, Prentice Hall (2004)
4. R.C. Hibbeler, Engineering Mechanics Dynamics, 11th Edition, Prentice Hall (2007)

DNT 243/2
MECHATRONIC WORKSHOP PRACTICE II

Course Outcomes

By the end of the course, the students should be able to:

1. Define and explain the safety precaution or procedure in handling mechanical, electrical and electronic equipment.
2. Design and hands-on mechanical skills to complete tasks and problems given.
3. Apply design and hands-on electrical and electronic skills to complete tasks and problems given.
4. Perform in group/teams to construct, demonstrate and complete the tasks and problems given.

Syllabus

MECHANICAL BASED MINI PROJECT

- Introduction to safety procedure, pre-caution in arc welding and conventional machining process. The mechanical based mini project using AutoCAD software. Mechanical based mini project using Welding, Grinding, Metal Sheet Forming, Drilling, Lathing.

ELECTRONIC BASED MINI PROJECT

- Introduction to Safety Procedure, Pre-caution in Soldering and electrical safety. Electrical-Electronic Based Mini Project circuit. Introduction to programming in assembly language using PIC microcontroller / Atmel 8051. Integrates the microcontroller function into electronics based mini project.

Reference

1. MacKenzie F., Engineering Safety Management for Engineers, Prentice Hall (2001)
2. Michael E. Brumbach, Industrial Maintainence, Delmar Thomson Learning (2004) - (Text)
3. Connie Dotson,Fundamentals of dimensional metrology, Delmar Thomson Learning (2006)
4. Robert O'Con, Welding: a management primer & employee training guide, Industrial Press (2000)
5. Leo A. Meyer, Sheet metal, American Technical (1995)

6. Scaddan B., Electric Wiring: Domestic, Newness (2003)

DNT 245/3
SENSORS AND MEASUREMENT

Course Outcomes

By the end of the course, the students should be able to:

1. Define and analyze the concept of sensors, transducer and measurement.
2. Ability to describe and analyze the signal characteristics and conditioning in operational amplifiers and filters.
3. Describe and analyze the basic theories behind physical and electrical quantity measurement.
4. Perform in group/teams to select suitable instrument for measuring various physical and electrical quantity and effectively use the instruments.

Syllabus

INTRODUCTION TO SENSORS AND MEASUREMENT

- Basic terms and elements in measurements. The importance of sensors and transducers. Real life engineering problems with emphasis on the use of sensors to solve them. SI and English unit. Unit conversion between SI and English unit.

BASICS OF MEASUREMENT SYSTEMS

- Describe the functions of components in a measurement system. Analyze and identify elements of a real measurement system. Describe various steps in measurement.

SIGNAL CHARACTERISTICS

- Introduction to types of signal. State the differences and describe formulation.
- Compute the basic terms in formulation.

STATISTICAL MEASUREMENT

- Basic statistical terms. Compute basic quantities of statistics given finite data set.
- Compute uncertainty using basic statistics and pooled statistics. Define and analyze error in applications.

SIGNAL CONDITIONING

- Signal conditioning. Describe components of power supply system. Compute various quantities in power supply system. Operational amplifiers and filters. Analyze amplifiers and design basic filters. Compute various quantities in amplifiers and filters.

DATA ACQUISITION SYSTEMS

- Sampling concepts. Discuss data acquisition components, DAC and ADC, computer interfacing, multiplexer.

TEMPERATURE MEASUREMENTS

- Heat and temperature. Explain the basic concept of temperature measurement.
- Define resistance based sensors. Describe different types of temperature sensors like RTD's, thermistors and thermocouples.

STRESS AND STRAIN MEASUREMENT

- Strain gauge and gauge factor. Discuss different types of strain gauges characteristic.

PRESSURE MEASUREMENT

- Calculate pressure. Discuss static and dynamic pressure. Explain the basic concept of operation of pressure transducer. Describe types of pressure measuring instrument.

LEVEL MEASUREMENT

- Basic concept of level measurement. Describe types of level measurement techniques.
- Propose suitable displacement measuring instrument based on type of application.

FLOW MEASUREMENT

- Types and basic concept of flow measurement. Calculate rate of flow. Describe types of flow measurement methods. Propose suitable flow measuring instrument based on type of application.

References

1. William C. Dunn. (2005). *"Fundamentals of Industrial Instrumentation and Process Control"*, 1st ed., McGraw-Hill.
2. John P. Bentley. (2005). *"Principles of Measurement Systems"*, 4th Edition. Pearson Prentice Hall.
3. Alan S. Morris. (2001). *Measurement and Instrumentation Principles*. Butterworth-Heinemann

DNT 246/3
MICROCONTROLLER AND INTERFACES

Course Outcomes

By the end of the course, the students should be able to:
1. Understand the theory and basic architecture of microcontroller.
2. Program assembly language and utilize the PIC18 microcontroller built-in functions.
3. Interface the microcontroller with I/O devices.
4. Design and develop a simple microcontroller-based application.

Syllabus

INTRODUCTION TO EMBEDDED SYSTEMS
- The microcontrollers and embedded processors. The overview of PIC18 microcontroller family.

PIC ARCHITECTURE
- The WREG register, PIC file register, instruction sets, status register, data format and directives. The MPLAB IDE compiler in the assembly language programming.

ASSEMBLY LANGUAGE PROGRAMMING
- The PIC18 assembly language programming, branch instructions and looping, call instructions and stack, PIC18 time delay and instruction pipeline.

PARALLEL INPUT/OUTPUT PORTS PROGRAMMING
- The hardware connections, PIC18 configuration registers, I/O Ports (LEDs, Switches, 7-Segment Display), I/O port programming in PIC18 and I/O bit manipulation programming

ARITHMETIC, LOGIC INSTRUCTIONS AND PROGRAMS
- The arithmetic instructions, signed number and arithmetic operations, logic and compare instructions, rotate instructions, BCD and ASCII conversion. Bank Switching, Table Processing, Macros and Modules. The addressing modes, look-up table and table processing, bit addressability of data RAM, bank switching, macros and modules in assembly programming.

PIC18 TIMER PROGRAMMING
- The assembly language programming for the timer and counter module.

PIC18 SERIAL PORT INTERFACING
- The overview of hardware interfacing and the serial communication interface. Describe the PIC18 connections to RS232. The serial port programming using assembly language.

PIC18 INTERRUPT PROGRAMMING
- The interrupts, timer interrupts, external hardware interrupts, serial communication interrupts and the interrupts priority.

LCD AND KEYBOARD INTERFACING
- The LCD interfacing and keyboard interfacing.

ADC AND DAC DATA CONVERTERS
- The introduction to ADC, ADC characteristics, Programming ADC using PIC18, Introduction to DAC and DAC interfacing with PIC18.

PIC 18 DESIGN AND APPLICATIONS
- The PIC 18 microcontroller design and the real-world applications.

Practical

1. Introduction PIC18 Hardware System
2. MPLAB Assembler and Simulator
3. Assembly Language Programming 1 (Introduction, Branch instruction)
4. Assembly Language Programming 2 (Looping, Call instructions, Stack, Delay)
5. PIC18 Input and Output Interfacing
6. Arithmetic Operations
7. Data Transfer
8. Timer Programming
9. PIC18 Serial Port Programming
10. Interrupt Programming
11. Interfacing LCD and Keyboard to PIC18
12. Data Converters

DNT 253/3
PROGRAMMABLE LOGIC CONTROLLER (PLC)

Course Outcomes

By the end of the course, the students should be able to:
1. Explain the type of components in an electrical controller.
2. Explain the basic concept of PLC and its applications in industrial control application.
3. Construct logic function, timer/ counter programming, editing and program observation for basic automation system using PLC.
4. Perform in group/teams to construct PLC program and demonstrate the PLC program applications.

Syllabus

ELECTRICAL CONTROLLER EQUIPMENT
- Basic principle of electric switching, toggle, push button, selection switch, solenoid switch, relay electromagnetic and solid state relay, timer and contactor. Describe fundamental aspect of PLC systems and Induction motor controller. Explain PLC design approach.

CONTROLLER TYPES
- Programmable Logic Controller (PLC). Describe Digital logic controller and Fuzzy logic controller. Describe and Explain PLC application.

PLC INTRODUCTION
- PLC operation, series and parallel circuit, numbering system, Boolean algebra and ladder logic

BASIC FUNCTION OF PLC AND APPLICATION
- Introduction to pendant programming. Output with internal relay. Compute ìANDî and ìORî circuit and latching relay. Program editing and program observation.

FUNCTION OF OUTPUT CONTROLLER AND APPLICATION
- Analyse timer, counter and cascading counter. Timer/counter programming and introduction to special PLC function. Analyze master controller relay, sequential output and shift register.

Practical

1. Introduction to PLC
2. Introduction to OMRON CPM1A
3. Ladder diagram & Mnemonic code
4. Ladder diagram & Mnemonic code (Cont.)
5. Relation of digital logic to ladder diagram
6. Programming PLC using CX-programmer

Reference

1. Frank D. Petruzella 'Programmable Logic Controlleri, 3rd ed.,Mcgraw-Hill International., 2005.
2. Jon Stenerson, 'Fundamental of Programmable Logic Controllers, Sensors, and Communication', PEARSON-Prentice Hall, 2005.
3. Gary Dunning 'Introduction to Programmable Logic Controller' 3rd ed., Thomson Delmar Learning, 2006
4. John W. Webb, Ronald A. Reis, 'Programmable Logic Controllers Principles and Applications' 4th ed., Prentice Hall , 1999

DNT 351/3
SEMESTRAL PROJECT

Course Outcomes

By the end of the course, the students should be able to:
1. Identify problem/project, managing and implementing the project, writing the report and presentation.
2. Demonstrate skills acquired in practical work.
3. Think logically, decide the right and effective approaches in finding solutions.
4. Work independently and/or in teams.
5. Apply theory into practical.

Syllabus

This course is a semester-long project for final year diploma students. The project serves to demonstrate the skills and engineering knowledge acquired by the students throughout their diploma studies. It also provides a platform to integrate practical knowledge with theory through group and individual work. The projects will be based on solving engineering problems which include understand and identify the

problems concerned, troubleshooting, fabrication work and report writing practices.

Reference

1. Semestral Project's Guideline for Diploma Engineering Programmes, UniMAP, 2008.
2. Any publish material such as writing, multimedia or personal communication that related to the project topics.

DNT 352/3
INDUSTRIAL AUTOMATION AND ROBOTICS

Course Outcomes

By the end of the course, the students should be able to:
1. Describe the automation system in production and manufacturing systems.
2. Identify and apply different types of actuators, sensors and control systems of robots.
3. Explain the robotics applications, safety and to operate a simple automation system.
4. Perform in group/teams to develop robot programming and demonstrate robot applications in automation systems.

Syllabus

INTRODUCTION TO AUTOMATION
- Automation in production system; Identify type of automated manufacturing system. Apply basic elements of automation and the reason of automation.

FMS AND CIM
- Flexible Manufacturing System (FMS); Describe Computer Integrated Manufacturing (CIM).

INTRODUCTION TO ROBOTICS
- Review robotic history and recent robotics technology; Robot and robotics; The advantages and disadvantages of robots; Identify industrial robots and non-industrial robots; The economics of Robot application.

ROBOT CLASSIFICATION AND MECHANICAL SYSTEM
- Type of robots and characteristics; The principles and concepts; Type of end-effectors and mechanism in robots.

ACTUATORS AND SENSORS FOR ROBOT
- Components for robot; Actuators and sensors; The concepts and applications of the actuators and sensors.

Robotic Control SYSTEM
- Control system; Describe types of robotic control; Describe and Perform path planning; Identify robot controller.

ROBOT PROGRAMMING AND INTERFACE
- Programming language for robot control; PLC and Basic Language as basic programming tools; the assembly operation in a FMS.

INTELLIGENT ROBOTIC SYSTEM
- Intelligent system, Apply a basic intelligent system; several examples of intelligent robot system; vision based robotic system.

ROBOT SAFETY
- Safety standard, procedures and guidelines; Identify safety mechanism and monitoring.

RECENT AND FUTURE DEVELOPMENTS OF ROBOTICS
- Recent development and problems; Describe future developments.

Reference

1. John J Craig, Introduction to Robotics: Mechanics and Control. 3rd ed. Prentice Hall. (2005) (Textbook)
2. Mikell P. Groover, Industrial Robotics-Technology programming and Application. McGraw Hill, 1995
3. Saeed B. Niku, Introduction to Robotics: Analysis, System, Applications, Prentice Hall, 2001
4. Fu K.S. C.S.G. Lee, Robotics: Control,Vision, Sensing and Intelligence. McGraw-Hill, 1989
5. Thomas R. Kufess, Robotics and Automation Handbook, CRC Press, 2004
6. Fuller J.L., Robotics: Introduction, Programming and Projects. 2nd ed. Prentice Hall, 1998

DNT 354/3
CONTROL PRINCIPLES

Course Outcomes

By the end of the course, the students should be able to:
1. Apply various mathematical principles (from calculus and linear algebra) to solve control system problems
2. Obtain mathematical models for such mechanical, electrical and electromechanical systems.
3. Derive equivalent differential equation, transfer function and state space model for a given system.
4. Perform systemís time and frequency-domain analysis with response to test inputs. Analysis includes the determination of the system stability.

Syllabus

INTRODUCTION TO CONTROL SYSTEMS
- Basic concepts of control systems. Discuss control system examples in various applications. Explain control system design process.

MATHEMATICAL MODELS OF SYSTEM
- Differential equation of physical system. The Laplace transform. The transfer function of linear system. State space variable, block diagram and signal-flow graph model.

STATE VARIABLE MODELS
- State variable of a dynamic system, state differential equation, and signal-flow graph state model.

FEEDBACK CONTROL SYSTEM CHARACTERISTICS
- Open-and closed-loop control system characteristics. Sensitivity of control system to parameter variations. Steady-state error.

THE PERFORMANCE OF FEEDBACK CONTROL SYSTEMS
- Apply test input signal. Discuss performance of a second-order system. Analyze and compute the steady-state error of unity and non-unity feedback systems.

THE STABILITY OF LINEAR FEEDBACK SYSTEM
- The concept of stability. Discuss and solve the Routh-Hurwitz stability criterion.

THE ROOT LOCUS METHOD
- Root locus concept. Discuss the root locus procedure. Illustrate root locus sketch.

FREQUENCY RESPONSE METHOD
- Discuss Bode diagram. Calculate phase and gain margin.

Practical

1. Introduction to Matlab Simulink
2. Open-Loop Systems Characteristics
3. Closed-Loop Systems Characteristics
4. Study of Time Response For 1st Order System
5. Study of Open-Loop Systems odel
6. Study of Closed-Loop Systems Model

Reference

1. Norman S. Nise: Control System Engineering-4th ed, John Wiley & Sons, 2004.
2. Richard C. Dorf & Robert H. Bishop: Modern Control Systems-9th ed, Prentice Hall, 2001
3. Ogata, Katsuhito: Modern Control Engineering-4th ed, Prentice Hall, 2002.
4. W. Bolton: Control Engineering-2nd ed, Prentice Hall, 1998.
5. Franklin G. F., Power J. D & Emani-Naeni A.: Feedback Control System-3rd ed, Addision Wesley.

DNT 355/3
MANUFACTURING PROCESS

Course Outcomes

By the end of the course, the students should be able to:
1. Describe and illustrate the manufacturing technology, manufacturing processes and production systems.
2. Define and analyze the mechanical properties of materials for materials selection.
3. Describe heat treatment, casting and forming process for metal.
4. Describe plastic shaping process and joining and assembly process.

Syllabus

INTRODUCTION TO MANUFACTURING TECHNOLOGY

- Illustrate the manufacturing technology. Explain and illustrate manufacturing processes and production systems.

MECHANICAL PROPERTIES OF MATERIALS

- Ilustrate the mechanical properties and testing of materials. Explain tension, compression, torsion, bending, hardness, fatigue, creep and impact test.

MATERIALS SELECTION

- Identify the fundamentals of metals, polymers, ceramics and composite.

HEAT TREATMENT PROCESS

- Describe the fundamentals of heat treatment processes. Explain hardening, annealing, quenching, normalizing, and tempering.

METAL CASTING PROCESS

- Describe and illustrate fundamentals of casting processes. Explain the sand casting, vacuum casting, investment casting, etc.

METAL FORMING PROCESS

- Describe and illustrate fundamentals of forming processes. Explain rolling, forging, extrusion, drawing, etc.

PLASTIC-SHAPING PROCESSES

- Describe and illustrate fundamentals of plastic-shaping and moulding processes. Explain the injection moulding, blow moulding, rotational moulding, thermoforming, rapid prototyping process and etc.

JOINING, ASSEMBLY AND NON CONVENTIONAL MACHINING PROCESS

- Introduce to various types of joining and assembling process such as welding, brazing, soldering, adhesive bonding, and mechanical fastening methods.

FABRICATION OF ELECTRONICS DEVICES

- Introduce to various types of electronics device fabrication and assembly.

References

1. S. Kalpakjian, S.R. Schmid (2001). Manufacturing Engineering and Technology. 4th ed. Prentice Hall International.
2. John A. Schey. (2000). Introduction to Manufacturing Processes. Mc Graw Hill.
3. Philip F. Ostwald, Jairo Munoz (1997). Manufacturing Processes and Systems. 9th ed., John Wiley & Sons.
4. E. Paul DeGarmo, J T. Black, Ronald A. Kohser (1997). Materials and Processes in *Manufacturing*. 8th ed., John Wiley & Sons, Inc.
5. Zainal Abidin Ahmad. (1999). *Proses Pembuatan Jilid II*.

19.0

Pusat Pengajian Kejuruteraan

Bahan

PENGENALAN

Pusat Pengajian Kejuruteraan Bahan, Universiti Malaysia Perlis (UniMAP) menawarkan tiga kursus Sarjana Muda Kejuruteraan (Kepujian) iaitu Sarjana Muda Kejuruteraan Bahan, Sarjana Muda Kejuruteraan Metalurgi dan Sarjana Kejuruteraan Polimer serta satu kursus Sarjana iaitu Sarjana Kejuruteraan Polimer (Mod Campuran). Berpegang kepada falsafah penubuhan UniMAP yang menekankan pentingnya kesepaduan antara pengetahuan, kemahiran dan amalan yang membentuk konsep penghayatan ilmu yang sejati serta keperluan Pelan Dasar Perindustrian Negara dan Wawasan 2020 yang memerlukan keperluan tenaga mahir yang tinggi permintaannya terutama di dalam sektor industri logam maka Program Diploma Metalurgi di bawah naungan Pusat Pengajian Kejuruteraan Bahan ditubuhkan.

Kursus-kursus yang ditawarkan melalui Program Diploma Metalurgi menyatukan teori dengan amali mengikut keperluan industri. Semasa mengikuti program akademik, pelajar juga akan dibekalkan dengan kemahiran komunikasi & IT, budaya perkembangan etnik, dan keusahawan kejuruteraan. Ini bertujuan untuk melahirkan graduan diploma yang bukan sahaja cekap dalam bidang kejuruteraan yang mereka ikuti, tetapi juga berkebolehan untuk mempunyai sikap yang mulia dan terpuji.

Melalui program Diploma Kejuruteraan Metalurgi ini, para pelajar akan didedahkan dengan asas-asas bidang metalurgi terutamanya di dalam pemprosesan logam seperti pengenalan kepada logam-logam, pengekstrakan logam, penggelekan dan penyemperitan logam, peleburan dan penuangan logam, proses rawatan haba dan perlindungan logam. Di samping itu para pelajar akan mempelajari dan mengendali asas-asas kerja-kerja permesinan logam di bengkel antaranya adalah pelarikan logam, pengisaran logam, pemotongan logam dan pencanaian logam. Para pelajar juga akan didedahkan dengan penggunaan serta pengendalian peralatan-peralatan untuk pengujian sifat-sifat dan kelakuan logam seperti Universal Testing Machine (UTM), Mikroskop imbasan Elektron (SEM), Pembelauan Sinar-X (XRD) dan Ujian Tak Musnah (NDT) di samping pengujian kekerasan seperti Brinell, Rockwell, Izod dan Charpy . Selain itu, pelajar juga akan mempelajari dan mempraktikkan pelbagai jenis kimpalan logam seperti kimpalan arka, gas, rintangan, bintik , TIG dan MIG yang biasa digunakan di dalam industri.

Secara keseluruhannya, para pelajar yang mengikuti program ini bukan sahaja memperolehi pendedahan dan pengetahuan dalam bidang Kejuruteraan Metalurgi malahan dibekalkan dengan kemahiran-kemahiran yang diperlukan oleh pihak industri.

PROGRAM YANG DITAWARKAN

- Diploma Kejuruteraan (Kejuruteraan Metalurgi)
- Sarjana Muda Kejuruteraan (Kepujian) (Kejuruteraan Bahan)
- Sarjana Muda Kejuruteraan (Kepujian) (Kejuruteraan Metalurgi)
- Sarjana Muda Kejuruteraan (Kepujian) (Kejuruteraan Polimer)
- Sarjana (Kejuruteraan Polimer) – Mod Campuran
- Doktor Falsafah (Ph.D)

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DIPLOMA IN METALURGICAL ENGINEERING CURRICULUM						
YEAR	FIRST		SECOND		THIRD	
SEMESTER	FIRST	SECOND	FIRST	SECOND	FIRST	SECOND
ENGINEERING CORE COURSES (83)	DQT101/ 3 Mathematic I	DQT102/3 Mathematic II	DQT203/3 Mathematic III	DBT206/3 Foundry Technology	DBT351/3 Semestral Project	DIT361/6 Industrial Training
	DBT110/3 Engineering Science	DKT121/3 Basic Computer Programming	DET 211/3 Basic Electrical Technology	DBT208/3 Metal Welding Technology II	DBT301/3 Powder Metallurgy	
	DBT101/3 Introduction to Materials Engineering	DUT122/2 Information Technology Skills	DBT202/3 Non Ferrous Metals	DBT209/3 Metal Testing	DBT302/3 Heat Treatment	
	DBT105/2 Engineering Drawing	DBT102/3 Ferrous Metals	DBT203/3 Metal Extraction Technology	DBT210/3 Strength of Materials	DBT303/3 Metals Protection	
	DBT107/3 Basic Static and Dynamics	DBT106/2 Basic Computer Aided Drafting	DBT204/3 Metals Welding Technology 1	DBT211/3 Basic of Machining Metals	DPT333/3 Industrial Safety And Quality Management	
	DBT108/2 Basic Metal Workshop	DBT109/3 Chemical Thermodynamics				
83	16	16	15	15	15	6
UNIVERSITY REQUIREMENT COURSES (19)	DUW123/2 Communication Skills		DUW233/2 Islamic & Asian Civilization	DUW235/2 Ethnic Relationship		
	DZWXXX/1 Badan Beruniform 1	DVW112/2 English 1	DVW212/2 English 2	DVW410/2 Malay Language	DUW224/2 Engineering Entrepreneurship	
		DZWXXX/1 Badan Beruniform 2	DZWXXX/1 Badan Beruniform 3	DZWXXX/1 Badan Beruniform 4	DZWXXX/1 Badan Beruniform 5	
19	3	3	5	5	3	
102	19	19	20	20	18	6

Course Code
Ex: ABC123/4
(A: Degree/Diploma Programme); (B: School); (C: Types of Courses): (1: Stage (Stage 1, 2, 3 & 4)) ; (2 & 3: Course number); (/4: unit)

PELUANG KERJAYA

Lulusan Diploma Kejuruteraan Metalurgi mempunyai prospek pekerjaan yang luas sama ada di dalam jabatan kerajaan, sektor swasta/industri, badan-badan berkanun dan institusi-institusi penyelidikan. Antara sektor-sektor yang menawarkan peluang pekerjaan adalah seperti berikut:

- Industri logam
- Industri pembungkusan elektronik.
- Industri pemprosesan logam.
- Industri automotif.
- Industri perkhidmatan dan penyelenggaraan.
- Industri fabrikasi kejuruteraan.
- Jabatan kawalan mutu.
- Jabatan kejuruteraan dan rekabentuk produk.
- Institusi atau jabatan penyelidikan dan pembangunan.
- Institusi Pengajian Tinggi /Politeknik / Kolej Komuniti.

Manakala kerjaya utama yang boleh diceburi adalah seperti:

- Pembantu Jurutera Proses
- Pembantu Jurutera Pengeluaran
- Pembantu Jurutera Pembuatan Kawalan Mutu (QC)
- Pembantu Jurutera Jaminan Mutu (QA)
- Pembantu Jurutera Analisa Kegagalan
- Pembantu Jurutera Pembangunan Produk
- Pembantu Jurutera Pembangunan Proses
- Pembantu Jurutera Pembangunan Bahan
- Pembantu Metalurgist
- Pembantu Penyelidik
- Pembantu Teknik
- Menjalankan perniagaan sendiri.

KURSUS- KURSUS YANG DITAWARKAN

1. DBT101/3 Introduction to Materials Engineering
2. DBT102/3 Ferrous Metals
3. DBT105/2 Engineering Drawing
4. DBT106/2 Basic Computer Aided Drafting
5. DBT107/3 Basic Static and Dynamics
6. DBT108/2 Basic Metal Workshop
7. DBT109/3 Chemical Thermodynamics
8. DBT110/3 Engineering Science
9. DBT201/3 Materials Science
10. DBT202/3 Nonferrous Metals
11. DBT203/3 Metals Extractive Technology
12. DBT204/3 Metals Welding Technology 1
13. DBT206/3 Foundry Technology
14. DBT208/3 Metal Welding Technology 2
15. DBT209/3 Metals Testing
16. DBT210/3 Strength of Materials
17. DBT211/3 Basic Machining of Metals
18. DBT301/3 Powder Metallurgy
19. DBT302/3 Heat Treatment
20. DBT303/3 Metals Protection
21. DBT351/3 Semestral Project

DBT101/3
INTRODUCTION TO MATERIALS ENGINEERING

Course Outcomes

By the end of the course, the students should be able to:
1. Determine types of materials that suitable for engineering application.
2. Interpret crystalline and non-crystalline material structures.
3. Interpret classes, properties and applications of metals, polymers, ceramics, composites, glasses, and advance materials

Syllabus

MATERIALS CLASSIFICATION
- Classification and properties of materials.

ATOMIC AND MOLECULE STRUCTURE
- Elementary quantum properties and wave, hydrogen atomic structure, electron energy level in atom, configuration of electron and periodic table.

ATOMIC ARRANGEMENT
- Crystal and Bravais lattice. Define, describe and illustrate the Miller index, lattice coordinate, direction and plane in unit cell.

CLASSIFICATIONS, PROPERTIES AND APPLICATIONS
- Classification, properties and application of metals, polymers, ceramics,Composite, glasses and advance materials.

Practical

1. Lab 1: Crystal Structure of Metals.
2. Lab 2: Crystal Structure of Ionic Solid.
3. Lab 3: Crystal Systems.
4. Lab 4: Material Selection
5. Lab 5: Material Application

References

1. Higgins R. A., (2006). Materials for Engineers and Technicians.Newnes.
2. Budinski, K.G & Budinski, M.K. (1999). Engineering Materials, Properties and Selection. Prentice Hall International, Inc.
3. Smith, W.F., (1990) Principle of Materials Science and Engineering, McGraw Hill.
4. John, V. (Diterjemahkan oleh Ani Idris & Jasmi Hashim). (1997). Pengenalan Kepada Bahan Kejuruteraan.Universiti Teknologi Malaysia.
5. Lawrence H. Van Vlack, penterjemah, Mohd Razali Muhamad. (1994). Bahan untuk Kejuruteraan: Konsep dan Penggunaannya. Dewan Bahasa Dan Pustaka: Kuala Lumpur.

DBT102/3
FERROUS METAL

Course Outcomes

By the end of the course, the students should be able to:
1. Identify and classify the composition, properties and application of the ferrous metal and know the testing method for this metal.
2. Demonstrate microstructure preparation and observation of various ferrous steels.
3. Describe the metal fabrication processes.

Syllabus

INTRODUCTION
- Introduction to Ferrous Metal, classification and testing for Ferrous Metal and application of Ferrous Metal

STEEL PRODUCTION
- Raw Materials – Iron Ore, Limestone and Coke, steelmaking Process, type of Iron

PROPERTIES OF FERROUS METAL
- Density, magnetic, strength & elongation, hardness

STEEL
- Carbon steel, alloy steel, tool steel, stainless steel

CAST IRON
- Gray, White, Malleable, Ductile (nodular)

THE IRON-CARBON SYSTEM
- Iron-Iron Carbide (Fe-Fe3C) Phase Diagram, Phases in Iron-Carbon (Ferrite, Austenite, Cementite, Martensite), harmful element, alloying Elements

DEVELOPMENT OF MICROSTRUCTURE IN IRON-CARBON ALLOYS
- Types of Alloy – hypoeutectoid, proeutectoid & hypereutectoid, Microstructural Changes (Pearlite,

Bainite, Spheroidite & Martensite), Mechanical Behaviour of Iron-Carbon Alloy, Tempered Martensite

MICROSTRUCTURE OF IRON-CARBON ALLOY

- Microscopic Analysis Technique, Grain, & Grain Boundry, Grain Size Determination, Defect in Ferrous Metal

METAL FABRICATION

- Forming Operation (Hot working, Cold Working, Forging, Rolling, Extrusion & Drawing), Casting, Powder Metallurgy

Practical

1. Lab 1: Mechanical Properties of Various Steel
2. Lab 2: Microstructure Preparation for Various Steel.
3. Lab 3: Metallography Analysis Technique
4. Lab 4: Malleability Characteristics

References

1. Higgins R.A.(2006). Materials For Engineers and Technicans, fourth Edition: Newnes.
2. Neely, J.E & Bertone, TJ. (2003). Practical Metallurgy and Materials of Industry. Prentice Hall.
3. W.D. Callister, Jr. & D.G.(2008). Rethwisch, 3rd Ed. Fundamentals of Materials Science and Engineering. John Wiley & Son.
4. L. Carl Love.(1995). Principle of Metallurgy, Reston Publishing Company, Inc.

DBT105/2
ENGINEERING DRAWING

Course Outcomes

By the end of the course, the students should be able to:

1. Able to apply basic skills of engineering drawing in Metallurgical Engineering related problems.
2. Able to produce engineering drawing by using proper techniques.

Syllabus

INTRODUCTIONS TO BASICS ENGINEERING DRAWING

- Objectives, types and the importance of engineering drawing. Engineering drawing kits. Title block and texts, measurement and scaling, standard lines, wording and numbering, bordering and text block.

GEOMETRICAL CONSTRUCTION

- Methods of drawing lines, build and distribute lines and angles. Simple geometrical shape and tangent lines.

PROJECTION SYSTEMS

- Projection theory and orthographic projection concepts, types of orthographic projections. First angle projection, third angle projection, and standard dimension on orthographic projection.

ISOMETRIC AND OBLIQUE SKETCHES

- Types of sketches, isometric and oblique sketches. Standard procedure.

CROSS-SECTIONED VIEWS

- Cross-sectioned views and symbols, cutting plane or sectioned plane. Types of cross-sectioned views-half sectioned and full sectioned views - sectioned views-half sectioned and full sectioned views.

DIMENSIONING AND GEOMETRICAL TOLERANCE

- Dimensioning notation, dimensioning theory, dimensioning location systems, universal dimensioning standard and calculating tolerance.

WORKING DRAWING AND DETAILING

- Basic concepts. Detailed drawing and assembly drawing.

THREADS AND FASTENERS DRAWING

- Basic concepts. Detailed drawing of thread and fastener.

WELDING DRAWING

- Standard welding symbols, filled welds groove welds and other basic welds.

References

1. Gary R Bertoline, Eric N Wiebe, “Technical Graphics Communication”, 3rd ed., McGraw-Hill, 2003. (Text Book)
2. James H. Earle, “Engineering Design Graphics”, IIth ed.,Pearson Prentice - Hall, 2004.

3. Frederick E. Giesecke, Henry Cecil Spencer, John Thomas Dygdon, Alva Mitchell, Ivan Leroy Hill, James E Novak, "Technical Drawing" 10th Ed., Prentice Hall, 2002.

DBT106/2
BASIC COMPUTER AIDED DRAFTING

Course Outcomes

By the end of the course, the students should be able to:
1. To introduce the fundamental concept of Computer Aided Drafting to Diploma in Metallurgical Engineering Students.
2. Able to produce product design by using CAD software.
3. Able to produce engineering drawing by using proper techniques.
4. Able to make use of Computer Aided Drafting into engineering areas.
5. Able to work and solve problems in group.

Syllabus

INTRODUCTION TO COMPUTER AIDED DRAFTING

BASIC CONSTRUCTION TECHNIQUES

BASIC EDITING

DIMENSIONING 2D DRAWING

CREATING 2D DRAWING (GEOMETRIC CONSTRUCTION)

INTRODUCTION TO 3D SOLID MODELING

TO PRODUCE 2D DRAWING FROM 3D SOLID MODELING

CREATING SECTION VIEW FROM 3D MODELING

CREATING ASSEMBLY DRAWING FROM 3D SOLID DRAWING

References

1. Shawna Lockhart, Atutorial Guide to AutoCAD 2005, Prentice Hall, 2005
2. Mark Dix & Paul Riley, Discovering AutoCAD2005, Prentice Hall, 2006
3. Timothy Sean Sykes, 3D AutoCAD 2002 One Step at a time, Prentice Hall,2003
4. Shawna Lockhart, Atutorial Guide to AutoCAD 2002, Prentice Hall, 2003
5. Khairul Anwar Hanafiah, Lukisan Kejuruteraan Terbantu Komputer, UTM Skudai,1999.

DBT107/3
BASIC STATICS AND DYNAMICS

Course Outcomes

1. By the end of the course, the students should be able to:
2. Able to solve basic problems of forces and moments in two- and three-dimension and resultant of force from a system of force.
3. Able to calculate the equilibrium of static and dynamics of a particle and rigid body.
4. Able to relate the kinematics and kinetics for particle and rigid body.

Syllabus

FUNDAMENTAL CONCEPT OF FORCE
- Principles of static, introduction to scalar and vector, force vector, Cartesian vectors and vector calculations.

EQUILIBRIUM OF A PARTICLE:
- Conditions for equilibrium of a particle, free body diagram and force in 3 dimensions.

EQUIVALENT SYSTEMS OF FORCE
- Moment of force, principles of moment, moment of force about a given axis and moment of a couple. Describe the system of resultant forces and couples, system of distributed force.

EQUILIBRIUM OF RIGID BODIES
- Criteria for equilibrium of rigid body. Two-dimensional equilibrium. Free-body diagram. Equilibrium equation. Constrain of rigid body.

ANALYSIS OF STRUCTURE AND FRICTION
- Trusses, frames and machines. Method of structure analysis.

KINEMATICS OF PARTICLES
- Rectilinear motion, curvilinear motion, relative motion

KINETICS OF PARTICLES
- Forces and acceleration in rectilinear and curvilinear motion, work and energy, and impulse and momentum.

KINEMATICS OF RIGID BODIES

- Rotation about a fixed axis, general motion, and relative motion.

KINETICS OF RIGID BODIES

- Forces and acceleration, work and energy.

Practical

1. Lab 1: Equilibrium of Beam
2. Lab 2: Forces in Plane Truss

Reference

1. Hibbeler, R.C. (2005). Principle of Statics and Dynamics.10th ed. Prentice Hall. (Teks).
2. Beer, F.B. and Johnston, E. R. Jr. (2004). Vector Mechanics for Engineers: Statics and Dynamics. 7th ed., Canada. McGraw-Hill.
3. Beer and E.R. Johnson Jr. (2004). Vector Mechanics tor Engineer: Statics 7th ed. In SI Units. McGraw Hill.
4. Meriam, J. L. and Kraige, L. G. (2003). Engineering Mechanics: Static. 5th ed., USA, SI ver. Wiley.
5. Meriam, J.L. and Kraige, L.G., Engineering Mechanics: Dynamics. 5th ed., USA, SI ver. Wiley, 2003

DBT108/2
BASIC METAL WORKSHOP

Course Outcomes

By the end of the course, the students should be able to:

1. Able to apply the safety rules in the machine shop.
2. Able to describe the fundamental of metrology.
3. Able to use workshop hand tools and measuring equipments according to its characteristic and features.

Syllabus

INTRODUCTION TO WORKSHOP SAFETY

- Workshop safety and practice in the machine workshop and other environment where accident can occur. Personal protective equipment.

FUNDAMENTAL OF METROLOGY

- Concept of metrology. Basic units, symbols and physical quantities of metric system.

MEASUREMENT METHOD AND EQUIPMENTS

- Basic terms used for measurement and metrological equipments. Measurement methods, errors and equipments handling. Reading methodology and skills for basic metrological equipments.

LAYOUT TOOLS AND PROCEDURE

- Semi-precision and precision layout tools. Laying out process using proper layout tools.

INTRODUCTION TO SHEET METAL BENDING

- Concept of sheet metal bending. Principle types and common types of bending. Sheet metal bending process using proper hand tools.

BASIC HAND TOOLS

- Use of hand tools when performing bench work. Use of hacksaws for cutting metal.

BASIC HAND TOOLS

- Use of a hand file for removing surplus metal and producing finished surfaces. Use of metal fasteners, wrenches and screwdrivers.

DRILL PRESS PROCESS

- Operating parts of the drill press. Common drill press operation in accordance with established safety practices.

HAND THREADING PROCESS

- Tap to cut internal threads. Threading operation using a tap and die.

Practical

1. Linear Measurement Tools
2. Cutting Operation
3. Deburring Operation
4. Drilling Operation
5. Tapping Operation
6. Mini Project

References

1. Arthur R. Gill, Steve F. Krar, Peter Smid, Paul Wanner, Machine Tool Technology Basics, Industrial Press Inc., 2003.
2. Bruce J. Black, Workshop Processes, Practices and Materials, Newnes, 2004.
3. Ibrahim C. M., N. Ramudaram, Teknologi Bengkel Mesin, 2000.

DBT109/3
CHEMICAL THERMODYNAMIC

Course Outcomes

By the end of the course, the students should be able to:

1. Able to describe the basic concept of thermodynamic principles.
2. Able to calculate the basic principles of First Law and Second Law of Thermodynamic
3. Able to relate the principles of Chemical Equilibrium and Kinetic Reaction

Syllabus

ATOMS, MOLECULES AND IONS

- The atomic theory, molecules and ions, atomic mass, molecular mass, determination of empirical formulas, chemical reactions and equations, amounts of reactants and products and limiting reagents.

FIRST LAW OF THERMODYNAMICS

- Expansion work, thermochemical, exothermic and endothermic reactions, entalphy, standard entalphy change and heat capacity.

SECOND LAW OF THERMODYNAMIC

- Free energy, motion force of chemical reaction; Gibbs-Helmholtz equation, temperature effect on reaction viability, calculation for reaction and applying Hess Law methods.

CHEMICAL EQUILIBRIUM

- Mass reaction law, activation, the influence factor of equilibrium position – temperature, pressure and concentration, relationship between free energy and equilibrium constant, equilibrium in metallurgical process, separation pressure or semi equilibrium pressure

REACTION KINETICS

- Reaction rate, Condition effect on the reaction rates, time-concentration graph, Reaction Rate Law, determination of reaction orders, kinetic and temperature.

Practical

1. Lab 1: Determination of Molecule Weight
2. Lab 2: Exothermic and Endothermic Reactions
3. Lab 3: Enthalpy Reaction
4. Lab 5: Chemical Equilibrium - principle of Le Chatlier
5. Lab 6: Kinetic Reaction

References

1. Raymond Chang. (2005). Chemistry, 8th Edition McGraw-Hill.
2. Hac Geon Lee. (1999). Chemical Termodynamics for Metals and Materials. Imeprial College Press.
3. David R. Gaskell. (1995). Introduction to the Thermodynamics of Materials. 3rd Edition. Taylor and Francis.
4. Azizan Aziz dan, Kamaruddin Hussin. (1994). Pengenalan Kimia Metalurgi. Universiti Sains Malaysia.
5. Robert. T. Delloff. (1993). Termodynamics in MaterialsScience. McGraw Hill.
6. Smith, J.M. and H.C. Van Ness. (1987). Introduction to Chemical Engineering Thermodynamics. 4th Edition. McGraw-Hill.
7. Gaskell, David R. (1981). Introduction to Metallurgical Thermodynamics. 2nd edition. New York: McGraw-Hill.

DBT110/3
ENGINEERING SCIENCE

Course Outcome

By the end of the course, the students should be able to:

1. Able to describe the concept of material's physic and chemistry.
2. Able to describe force, momentum, circular motion principles and wave.
3. Able to solve problems on the basics of electrostatic, electromagnetism and simple DC circuit.

Syllabus

UNIT AND DIMENSION

- Physical quantity and dimension; Dimensional analysis.

MATTER

- Matter, substance, compound, molecular compound, ionic compound, measurement in chemistry, relative atomic mass and relative molecular mass, mole concepts.
- Chemical equation, redox reaction, stoichiometry, limiting reactants and percentage yield, volumetric

analysis. Physical state of matter, ideal gases and real gases, liquid state and solid state.

FORCE AND MOTION
- Scalars, vectors and their components, motion equations, and forces. Problems on forces and motions.

LINEAR MOMENTUM
- Linear momentum, Impulse, Conservation of linear momentum, elastic and inelastic collisions.

CIRCULAR MOTION
- Frequency and period. Angular Measure, Angular Speed and Velocity, Frequency and Period, Uniform Circular Motion and Centripetal acceleration.

WAVE
- Types of waves, wave motion and its parameter, generation of waves. Wave motion and its parameter, frequency, wavelength.

ELECTROSTATIC
- Coulomb's law, electric field, capacitance and resistance, and electric force line. Capacitors in series and parallel and electric forces.

MAGNETISM
- Current and magnetic fields, ferromagnetic materials. Magnetic field force in various applications, generators Induced EMF with two coils.

DC CIRCUIT
- Ohms Law and Kirchoffs Law, Resistivity, and concept of drift velocity and electric charges. Resistance of various connections, electric power, and problems on simple circuit problems.

References

1. W. Bolton (2006). Engineering Science. 5th Edition.Newnes.
2. Jerry Wilson, Anthony Buffa, (2009). "Collage Physic", 7th Edition. Pearson Education USA.
3. Giambattista, Richardson, (2007). "Collage Physic", McGraw Hill International Education.
4. Stephen, T.Thornton, Andrew Rex (1999). Modern Physic For Scientist and Engineers. 2nd Edition. Brooks Cole
5. Raymond Chang. (2009). Chemistry, 10th Edition McGraw-Hill.

DBT202/3
NON FERROUS METAL

Course Outcomes

By the end of the course, the students should be able to:
1. Able to describe non ferrous metal, its application and processing techniques.
2. Able demonstrate the microstructure of alloys, mechanical behavior and appropriate testing.
3. Able to interpret between the non ferrous metals and their properties.

Syllabus

INTRODUCTION TO NON-FERROUS METAL
- Non-ferrous metal, general properties and application. Structure of alloy, mechanical behavior and testing of non-ferrous metal.

ALUMINUM ALLOYS AND THEIR PROPERTIES I
- Aluminum alloys, their physical properties and applications.

ALUMINUM ALLOYS AND THEIR PROPERTIES II
- Applications of aluminum alloys. Precipitation hardening process.

ZINC ALLOYS AND THEIR PROPERTIES
- Production of zinc alloys, their physical properties and applications.

MAGNESIUM ALLOYS AND THEIR PROPERTIES
- Production of magnesium alloys, their physical properties and applications.

COPPER, PLUMBUM AND TITANIUM ALLOYS
- Production of copper, plumbum and titanium alloys, their physical properties and applications.

NICKEL ALLOYS AND THEIR PROPERTIES
- Production of nickel alloys, their physical properties and applications.

REFRACTORY AND PRECIOUS METALS & ADVANCE MATERIALS

- Production of refractory and precious metals, their physical properties and applications. Identify Smart Materials Alloys (SMA) and glasses. Define their physical properties and applications.

NON-FERROUS METAL PROCESSING I

- Fabrication techniques of non-ferrous metal.

NON-FERROUS METAL PROCESSING II

- Safety and environmental issues. Describe the recycling process.

Practical

1. Lab 1: Identification of non ferrous metal
2. Lab 2: Mechanical properties of non-ferrous metal
3. Lab 3: Precipitation Hardening of aluminium alloy
4. Lab 4: Sample preparation of non-ferrous metal
5. Lab 5: Microstructure of aluminium, magnesium and zinc alloy

References

1. Higgins R. A., (2006). Materials for Engineers and Technicians. Newnes.
2. Neely, J.E. & Bertone, T.J. (2003). Practical Metallurgy and Materials Of Industry. Prentice Hall.
3. W.D. Callister, Jr. & D.G. Rethwisch, 3rd Ed. Fundamentals of Materials Science and Engineering. John Wiley & Son, 2008.
4. L. Carl Love. (1985). Principle of Metallurgy. Reston Publishing Company, Inc.

DBT203/3
METALS EXTRACTIVE TECHNOLOGY

Course Outcomes

By the end of the course, the students should be able to:

1. Able to explain the principle of extractive metallurgy.
2. Able to describe the pyrometallurgy and electrometallurgy process.
3. Able to practice the hydrometallurgy process and compare to the industrial plant.

Syllabus

INTRODUCTION TO EXTRACTION OF METAL FROM ORES

- Extraction of metal from ores. Extraction processes.

INTRODUCTION TO HYDROMETALLURGY

- Introduction of hydrometallurgy processes. Leaching technique; in-situ, heap leaching and dump leaching. Vat leaching and bacterial leaching.Countercurrent leaching and explain their physical properties.

INTRODUCTION TO PYROMETALLURGY

- Pyrometallurgical process. Drying and calcinations processes. Roasting process.

INTRODUCTION TO ELECTROMETALLURGY

- Electrometallurgy processes. Electrolysis process. Electrolysis process. Describe and explain the electrowinning process.

Practical

1. Lab 1: Crushing process
2. Lab 2: Liberation
3. Lab 3: Milling process
4. Lab 4: Calcination process
5. Lab 5: Leaching process
6. Lab 6: Electro winning process

References

1. Asas Proses Metalurgi/ Samsul Bahar Sadli, Dewan Bahasa Dan Pustaka, 1997.
2. Engineering Metallurgy: Part Two: Metallurgical Process technology/ Higgins, R.A, Hodden & Stoughton, 1983.
3. Principle of Extractive Metallurgy/ Terkel Rosenqvist, McGraw Hill,1986.
4. Pengenalan kimia metalurgi / Azizan Aziz, Kamarudin Hussin, Pulau Pinang: Penerbit USM, 1998.

DBT204/3
METALS WELDING TECHNOLOGY 1

Course Outcomes

By the end of the course, the students should be able to:

1. Able to describe the fundamental theory, principles, process, equipment and application of welding, brazing and soldering.

2. Able to practice skills in Shielded Metal Arc Welding (SMAW) and spot welding techniques.
3. Able to perform weld evaluation via destructive welding tests and microstructure examination.

Syllabus

INTRODUCTION TO JOINING PROCESS
- Basic principles of welding, brazing and soldering.

WELDING SAFETY
- Welding safety concerns.

JOINT DESIGN:
- Welding joint and design.

WELDING TERMS AND SYMBOLS
- Welding terms and symbols.

SHIELDED METAL ARC WELDING (SMAW)
- Equipment and machine setup. Basic welding procedures.

WELDING METALLURGY
- Metallurgical structure of weld regions. Effects of welding on physical and mechanical properties.

INSPDESTRUCTIVE TEST
- Welding destructive tests.

METALLOGRAPHY AND WELD
- Metallographic techniques and weld discontinuities.

SPECIMEN PREPARATION
- Process in preparing welding specimen.

DISTORTION CONTROL
Shrinkage, distortion controls, restrain method, heat shaping and residual stress.

RESIDUAL STRESS MANAGEMENT
- Stress management issue in welding.

RESISITANT WELDING
- Equipment and machine setup.
- Explain the basic welding operation.

OXYACETYLENE WELDING (OAW)
- Equipment and machine setup.
- Explain the basic welding operation.

STUD WELDING, ELECTRON BEAM WELDING, FRICTION WELDING & LASER BEAM WELDING:
- Equipment and machine setup.
- Explain the basic welding operation.

PLASMA ARC WELDING, SUBMERGED ARC WELDING, ELECTROGAS WELDING & ELECTROSLAG WELDING
- Equipment and machine setup.
- Explain the basic welding operation

BRAZING, BRAZE WELDING & SOLDERING
- Equipment and machine setup.
- Explain the basic welding operation

Practical

1. Lab 1: Shielded Metal Arc Welding (SMAW)
2. Lab 2: Spot Welding
3. Lab 3: Sample Preparation and Microstructure examination.
4. Lab 4: Destructive Test

References

1. Welding Skills, Third Edition, B.J. Moniz, R.T. Miller, Americam Technical Publisher, Inc., 2004
2. Mohler, R. (1983). Practical Welding Technology. Industrial Press Inc.
3. Teknologi Kimpalan dan Fabrikasi Logam. Kok T.S. Penerbit Fajar Bakti Sdn. Bhd.(1998)
4. Zainal Abidin Ahmad. (1999). Proses Pembuatan Jilid II. Universiti Teknologi Malaysia.
5. Teori Amalan Bengkel Kejuruteraan, Amir Yazid Ali & Zaimi Mat Isa, Bentong: PTS Publications & Distributors, 2004.
6. Messler, Robert W. (1999). Principles of Welding. John Wiley & Sons, Inc. 4.

DBT206/3
FOUNDRY TECHNOLOGY

Course Outcomes

By the end of the course, the students should be able to:
1. Identify and describe the technology of foundry and the processes of casting.
2. Learn and practice the pattern making process, mold making, melting and casting, and casting finishing.

3. Describe and explain the casting defects, causes and remedies. Able to evaluate and test casting product.

Syllabus

INTRODUCTION TO FOUNDRY TECHNOLOGY
- Basic of casting process, requirements of casting and casting terminology.

METAL EXTRACTION AND PRODUCTION
- Metal extraction process, metal production and steel making processes.

METALLURGY IN CASTING
- Metal melting process, temperature-time relationship and phase diagram, describe metal heating-cooling diagram, principles of crystallization and contraction.

PATTERN MAKING
- Pattern materials and machines and tools for pattern making. Basic of pattern design and allowances, technological considerations and metal patterns.

TECHNOLOGY OF MOLDING AND COREMAKING
- Molding sands and sand conditioning process. Molding processes, core sands and coremaking.

MELTING AND CASTING
- Melting techniques and melting furnaces. Solidification process, cooling curves, fluidity & pouring temperature.

GATING SYSTEM
- Basic of gating system and the principle of directional solidification.

MOLDING AND CASTING, CASTING DEFECTS, CASTING EVALUATION AND TEST

Practical

1. Lab 1: Making Pattern by Conventional method
2. Lab 2: Foundry Molding
3. Lab 3: Foundry Melting and Pouring process
4. Lab 4: Casting Finishing
5. Lab 5: Casting Evaluation and Test

References

1. Tata (2003). Principles of Foundry Technology.McGraw-Hill New Delhi.
2. Neely, J.E & Bertone, TJ. (2003). Practical Metallurgy and Materials of Industry. Prentice Hall.
3. Schey, J.A. (2000). Introduction to Manufacturing Processes. McGraw Hill. 3. Zainal Abidin Ahmad, (1999). Proses Pembuatan Jilid 1. UTM.
4. John L.Feirer & John D.Lindbeck. (1999). Metal Technology and Process. Delmar Publishers.

DBT208/3
METALS WELDING TECHNOLOGY 2

Course Outcomes

By the end of the course, the students should be able to:
1. Able to understand and describe the welding technology and the processes of surfacing, cutting and repair welding.
2. Able to understand, perform, practice and improve skills in Gas Metal Arc Welding (GMAW) and Gas Tungsten Arc Welding (GTAW) techniques.
3. Able to perform weld evaluation via non-destructive welding examination and evaluate welding quality via microstructure examination.

Syllabus

RESISTANCE WELDING PROCESS
- Resistance spot welding, Resistance seam welding, Projection welding, Flash welding.

SOLID-STATE WELDING PROCESS
- Forge welding, Cold welding, Explosion welding, Ultrasonic welding, Diffusion welding and Friction welding.

OTHERS WELDING PROCESS
- Thermic welding, Laser beam welding, electron beam welding, Microwave Welding.

INSPECTIONS OF WELDS
- Nondestructive test.

Practical

1. Lab 1: Welding Mini Project
2. Lab 2: Spot Welding
3. Lab 3: Gas Tungsten Arc Welding (GTAW)
4. Lab 4: Welding Test
5. Lab 5: Metallography

References

1. Amir Yazid Ali & Zaimi Mat Isa (2004). Teori Amalan Bengkel Kejuruteraan, Bentong: PTS Publications & Distributors.
2. Zainal Abidin Ahmad, (1999). Proses Pembuatan Jilid II. Universiti Teknologi Malaysia.
3. Messler, Robert W. (1999). Principles of Welding. John Wiley & Sons, Inc. 4. The Ser Kok. (1988). Teknologi Kimpalan dan Fabrikasi Logam. Penerbit Fajar Bakti Sdn. Bhd.
4. Mohler, R., (1983). Practical Welding Technology. Industrial Press Inc.

DBT209/3
METALS TESTING

Course Outcomes

By the end of the course, the students should be able to:
1. Able to describe metal testing and defects.
2. Able to perform the destructive testing methods.
3. Able to conduct several types of non-destructive techniques.

Syllabus

INTRODUCTION
- The importance of metal testing, the types of metal testing, the basic of materials imperfection, vacancies and self interstitials and impurities in solids.

MATERIALS IMPERFECTION
- Linear, interfacial and bulk (volume) defects. Material characterization techniques such as XRD, SEM, XRF etc.

TENSION AND COMPRESSION TEST
- Engineering stress and strain, concept of stress and strain, stress-strain curve, stress- strain behavior, Strength in tension – elastic modulus, yield strength, plastic deformation, tensile strength.

DUCTILE AND BRITTLE BEHAVIOR OF MATERIAL
- Ductility in tension – Uniform Elongation and Elongation – reduction in area, and toughness.

IMPACT TESTING
- Charpy Impact test and Izod test.

HARDNESS TESTING
- Macro hardness testing (Rockwell and Brinell). Micro hardness testing (Knoop and Vickers), hardness conversion, correlation between hardness and tensile strength.

FATIGUE TESTING
- Fatigue failure, fatigue limit or endurance limit.

CREEP TESTING
- Generalized creep behavior – primary or transient creep, secondary creep or steady-state creep and time of rupture.

NONDESTRUCTIVE TESTING
- Fundamental of nondestructive test, Types of NDT test: Ultrasonic test, Eddy Current test, Liquid penetrate, Magnetic Particle and Flaw Detector test and explain the specific uses and the operation of each.

Practical

1. Lab 1: Compression Test
2. Lab 2: Charpy Impact Test
3. Lab 3: Hardness Test
4. Lab 4: Magnetic Particle Test
5. Lab 5: Liquid penetration test

References

1. Feirer, John L. (1999). Metal Technology ad Porcess. Albany: Delmer Publication.
2. Serope Kalpakjian. (1995). Manufacturing Engineering and Technology, Third Edition. Addison-Wesley Publishing Company.
3. John Witey; (1993).Failure of Materials in Mechanical Design: Analysis, Prediction, Preventation. New York.

DBT210/3
STRENGTH OF MATERIALS

Course Outcomes

By the end of the course, the students should be able to:
1. Able to define and describe the basic concept of stresses.
2. Able to define and describe tension test, stress-strain diagram, allowable stresses, factor of safety, centroid of gravity and moment of inertia.
3. Able to solve basic problems related to torsional loads, shear force and bending moment diagram.

Syllabus

OVERVIEW OF MECHANIC OF MATERIALS
- Basic of external load, equivalent forces, centroids, types of support reaction. Explain the types of support reactions.

EQUATION OF EQUILIBRIUM
- Free body diagram-internal force and support reaction

STRESS
- Shear force, shear areas in simple connection, allowable stress.

STRAIN
- Average normal and shear strain, Stress-strain diagram, normal stress-strain response of ductile and brittle materials, Young Modulus, yield stress, Hooke's Law.

TRANSFORMATION OF STRESS
- Poisson's ratio, Generalized Hookes Law, Creep and fatigue.

AXIAL LOAD
- Axial load, classes of problems and deflections in axially load members.

MECHANICAL PROPERTIES OF MATERIALS
- Stress-strain diagram: Young modulus, elastic and plastic region, proportional limits, yield stress, elastic limit, ultimate stress and fracture. Normal stress-strain response of ductile and brittle materials, allowable stresses. Factor of safety, centroid of gravity and moment of inertia.

TORSION
- Principles of torsion, Torsion formula, Absolute maximum shear stress.

SHEAR FORCE AND BENDING MOMENT
- Type of beams and loading. Shear force and bending moment diagrams.

DEFLECTIONS OF BEAMS AND SHAFTS
- Relationship between curvature and bending moment. Formula method. Elastic curve, examples of slope and displacement by integration.

Practical

1. Lab 1: Tensile Test of Metals.
2. Lab 2: Torsion Test.
3. Lab 3: Shear Force.
4. Lab 4: Bending Moment Test.
5. Lab 5: Beam Test.
6. Lab 6: Cantilever Beam.

References

1. Hibbler, R.C. (2003). Mechanics of Materials. Prentice Hall.
2. Ferdinand. P. Beer. (2002). Mechanics of Materials. McGraw Hill.
3. Khurmi. (1987). Strength of Materials. Chand & Company New Delhi.
4. MO Hamzah. (1988). Pengantar Analisis Struktur. USM.
5. Case & Chilver. (1987). Kekuatan Bahan Dan Struktur. DBP.
6. Cheng, Static and Strength of Materials, McGraw Hill.

DBT211/3
BASIC OF MACHINING METALS

Course Outcomes

By the end of the course, the students should be able to:
1. Able to identify the metallurgy in machining and the factors affecting the machinability of metals.
2. Able to operate grinding, lathe and milling machines.
3. Able to produce metal product by means of grinding, lathe and milling processes.

Syllabus

INTRODUCTION TO MACHINING AND MACHINABILITY
- Common machining processes. Factors affecting the machinability and metallurgy of metals.

INTRODUCTION TO GRINDERS

- Common grinding machines. Safe grinding process. Dressing and truing a wheel. Surface grinding machine and operation. Proper grinding wheel to suit the work material and grinding operation.

LATHE MACHINE AND ACCESSORIES

- Purpose of different types of engine lathes. Proper spindle accessories for the size and shape of workpiece. Proper cutting tools for machining operations.

LATHE SETUP PROCEDURES

- Mounting and removing headstock and tailstock center correctly. Alignment of the lathe centers. Proper speeds to suit various types of material. Set the feed to suit the cutting tool material, work material and part diameter.

MILLING MACHINES

- Type of milling machine and state the main milling machine parts. Purpose of common milling machine. Purpose of end mills and select speeds and feeds for various types of end mills.

ADVANCED MACHINING

- Modern milling technology. Purpose of different CNC machine tools. Advantages of CNC machining. CAD/CAM systems in the industry. Advantages of producing drawing with a CAD system.

ANALYSIS OF COMPONENT STRUCTURE

- Types of tests for determining the mechanical behavior of materials. Characteristic of advanced machining process. Mechanics of cutting, temperature in cutting and surface finish in common and advanced machining.

Practical

1. Lab 1: Bench grinding process
2. Lab 2: Lathe machine process
3. Lab 3: Milling machine process
4. Lab 4: Mini Project

References

1. Arthur R. Gill, Steve F. Krar, Peter Smid, Paul Wanner, Machine Tool Technology Basic, Industrial Press Inc., 2003
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DBT301/3
POWDER METALLURGY

Course Outcomes

By the end of the course, the students should be able to:

1. Able to define the basic of powder metallurgy principles and technology.
2. Able to practice the techniques involve and produce powder metallurgical product.
3. Able to analyze the microstructure, pore characteristics and mechanical properties of powder metallurgical product.

Syllabus

POWDER CHARACTERIZATION

- Principle of particle size distribution. Size measurement techniques and explain the problem in particle size analysis.

POWDER CHARACTERIZATION

- Particle shape. Surface area analysis, profile analysis for shape, chemical characterization, inner-particle frictions and the effects of inter-particle frictions.

POWDER COMPACTION

- Compaction processes, the theoretical basis and the impact of process parameters. Technique involves. Advance compaction techniques and the influence of powder characteristics.

SINTERING

- Theory of sintering and the pore structures in sintering and the sintering diagram. Simultaneous mechanisms, compaction effects on properties and mixed powder sintering. Enhanced sintering, sintering atmospheres and sintering furnaces.

FULL DENSITY PROCESSING

- Approaches to full density such as infiltration, hot pressing mechanism, powder forging, powder extrusion, dynamic and explosive compaction, powder rolling and plasma spray.

COMPACT CHARACTERIZATION

- Mechanical, surface and physical properties of metal powder. Discuss these unique concerns which typically center on the pore characteristic.

APPLICATION

- Diverse uses of powder metallurgy.

Practical

1. Lab 1: Powder Characterization and Selection
2. Lab 2: Precompaction and Compaction
3. Lab 3: Sintering
4. Lab 4: Density and Porosity Measurements
5. Lab 5: Compact Characterization

References

1. German, Randall M. (1994) Powder Metallurgy Science.
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3. F. Thummler and R. Oberacker (1993) An introduction to powder metallurgy.
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DBT302/3
HEAT TREATMENT

Course Outcomes

By the end of the course, the students should be able to:

1. Ability to explain the phase diagrams, microstructure and composition in metals and alloys.
2. Ability to practice the principles and applications of the heat treatment processes.
3. Ability to evaluate the properties of metals after heat treatment process.

Syllabus

INTRODUCTION

- Basic of solidification process.

PHASE DIAGRAM

- Phase diagram of pure elements. Cooling curves of pure elements with and without phase changes. Ideal cooling curve for hypoeutectic alloy, eutectic alloy and hypereutectic alloy.

BINARY PHASE DIAGRAM

- Phase diagram, phases present, phase amount and compositions. Lever rule. The non-equilibrium solidification of alloy, binary monotectic alloy system, binary eutectic and binary peritectic alloy. The invariants reaction and equilibrium diagram having intermediate phases and compounds.

HEAT TREATMENT AND APPLICATION

- Heat treatment determination, solid state transformation, critical temperature and locating the critical temperature.

PRINCIPLE OF HEAT TREATMENT

- Heat treatment of steel.

HEAT TREATMENT OF STEEL

- Annealing process, procedure and full annealing. Quenching process; quench hardening, quenching procedure and time-temperature transformation diagram. Tempering process; tempering procedure and mechanical properties. Normalizing process and normalizing procedure.

HEAT TREATMENT OF NON FERROUS

- Treatment method for annealing process, annealing procedure and annealing aluminum alloy.Ageing process and ageing procedure.

SOLUTION TREATMENT

- Beryllium and burned metal. Solution heat treatment of aluminum and precipitation heat treatment of aluminum.

Practical

1. Lab 1: Annealing
2. Lab 2: Normalizing
3. Lab 3: Quenching
4. Lab 4: Tempering
5. Lab 5: Hardness Test

References

1. L. Carl Love (1985). Principle of Metalurgy. Prentice Hall.
2. V. Ranghavan. (2001). Materials Science and Engineering, A First Course. Prentice Hall of India.
3. W. D. Callister, (1994). Materials Science and Engineering, An Introduction. 3rd Edition. John Wiley and Sons.Inc. New York.
4. Porter, D. A. and Easterling K. (1992). Phase Transformations in Metals and Alloys. 2nd edition. Routledge.
5. Smallman, R.E (1985). Modern Physical Metallurgy. Butterworth
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DBT303/3
METALS PROTECTION

Course Outcomes

By the end of the course, the students should be able to:

1. Able to describe the types of corrosion.
2. Able to explain the theory of corrosion of metals in different environments.
3. Able to practice the methods of metals protection.

Syllabus

INTRODUCTION TO CORROSION

- Classification of corrosion. Principles of corrosion – corrosion rate expressions, basic electrochemical concepts, basic corrosion concepts.

PRINCIPLES OF CORROSIONS

- Electrochemical aspects – electrochemical reactions, polarization, passivity. Environmental effects – air, water, pH, pressure, temperature. Metallurgical and other aspects.

TYPES OF CORROSIONS

- General corrosion, galvanic corrosion, crevice corrosion, pitting corrosion, under deposit corrosion, intergranular corrosion.

CORROSION PREVENTION

- Materials selections, alteration of environment, design, cathodic and anodic protection, corrosion inhibitors, coating. Corrosion investigations.

INTRODUCTION TO SURFACE TECHNOLOGY

- Surfaces nature, roughness and measurement.

INTRODUCTION TO TRIBOLOGY

- Friction in metals, reducing friction, friction measurement. Wear and lubrication. Wear measurement and lubricant selection.

INTRODUCTION TO SURFACE TREATMENT, COATING AND CLEANING

- Coating, painting, surface texturing, anodizing. Method of metal protection – mechanical surface treatment and coating, case hardening and hard facing, thermal spraying, vapor deposition, ion implantation, electroplating, hot dipping, porcelain enamelling.

Practical

1. Lab 1: Concentration potentials
2. Lab 2: Galvanic Cell
3. Lab 3: Galvanic corrosion
4. Lab 4: Anodizing
5. Lab 5: Electroplating

References

1. W. D. Callister, (2008). Materials Science and Engineering, An Introduction. 3rd Edition. John Wiley and Sons.Inc.
2. Springer (2002). Coated metal structure and properties of metal-coating compositions
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DBT351/3
SEMESTRAL PROJECT

Course Outcomes

By the end of the course, the students should be able to:

1. Able to identify problem/project, managing and implementing the project, writing the report and presentation.
2. Able to demonstrate skills acquired in practical work
3. Able to think logically, decide the right and effective approach in finding solution.
4. Able to work independently and/or in team.
5. Able to apply theory into practical.

Syllabus

The semestral projects are semestral individual projects for final year students and expected to be completed within the same semester. The projects are based of solving the engineering problem by understand the problems, troubleshooting, identify, solves and finally report writing for the documentation purposes.

References

Any publish material such as writing, multimedia or personal communication that related to the project topics.

20.0

Pusat Pengajian Kejuruteraan

Mikroelektronik

PENGENALAN

Pusat Pengajian Kejuruteraan Mikroelektronik (PPK Mikroelektronik) merupakan antara pusat pengajian yang terawal di tubuhkan di KUKUM (pada ketika itu dan UniMAP sekarang) pada 30 April 2002. Penubuhan PPK Mikroelektronik berpegang teguh kepada falsafah penubuhan UniMAP yang menekankan pentingnya kesepaduan antara pengetahuan dan praktikal yang membentuk konsep penghayatan ilmu yang sejati.

Berdasarkan falsafah tersebut, kurikulum yang dibangunkan memberikan keseimbangan intelektual antara teori dan praktikal di samping kursus-kursus keperluan universiti yang dapat membentuk keperibadian murni di kalangan pelajar. Penggabungan budaya intelektual dengan nilai-nilai murni kehidupan ini, dapat dicernakan menjadi cara hidup yang maju dan bertamadun.

Selain dari program Ijazah Tinggi dan Ijazah Sarjana Muda, PPK Mikroelektronik juga menawarkan program pengajian Diploma Kejuruteraan (Kejuruteraan Mikroelektronik).

Program Diploma Kejuruteraan diharapkan dapat melahirkan tenaga mahir sebagai Pembantu Jurutera bagi memenuhi keperluan guna tenaga negara terutama dalam bidang mikroelektronik secara khusus dan elektronik secara amnya. Oleh itu program yang dibangunkan akan sentiasa diperhalusi secara berterusan dengan:

- Mengambilkira pandangan dan kesimpulan hasil-hasil kajian serta maklumbalas dari masyarakat, khususnya industri.
- Memenuhi kehendak-kehendak badan-badan penasihat profesional yang berkaitan seperti Jabatan Perkhidmatan Awam (Bahagian Jaminan Kualiti & Akreditasi).
- Memastikan keseimbangan antara kepakaran teori dan kemahiran amali.
- Memastikan tahap pengajaran dan pembelajaran sentiasa bertaraf dunia.

PROGRAM YANG DITAWARKAN:

- Diploma Kejuruteraan (Kej. Mikroelektronik)
- Ijazah Sarjana Muda Kejuruteraan (Kej. Mikroelektronik)
- Ijazah Sarjana Muda Kejuruteraan (Kej. Elektronik)
- Ijazah Sarjana Muda Kejuruteraan (Kej. Fotonik)
- Sarjana Sains (Kej. Mikroelektronik)
- Doktor Falsafah (Ph.D)

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DIPLOMA IN MICROELECTRONICS ENGINEERING CURRICULUM						
YEAR	**FIRST**		**SECOND**		**THIRD**	
SEMESTER	**FIRST**	**SECOND**	**FIRST**	**SECOND**	**FIRST**	**SECOND**
ENGINEERING CORE COURSES (83)	DQT101/3 Mathematics I	DQT102/3 Mathematics II	DQT203/3 Mathematics III	DMT241/3 Intoduction to IC Layout	DMT351/3 Semestral Project	DIT361/6 Industrial Training
	DMT111/3 Engineering Science	DMT121/3 Electronic Devices	DMT231/3 Analogue Electronics	DMT242/3 Wafer Fabrication	DMT352/3 Electronic Instrumentation	
	DMT112/3 Circuit Theory I	DMT122/3 Circuit Theory II	DMT232/3 Basic Electrical Machine	DMT243/3 Electronic Packaging	DMT353/3 Intro to PLC	
	DCT100/2 Basic Engineering Skills	DMT123/3 Introduction to Computer Programming	DMT233/3 Digital Fundamental II	DMT244/3 Failure Analysis	DMT354/3 Introduction to Control Systems	
	DMT113/2 Engineering Drawing	DMT124/3 Digital Fundamental I	DMT234/3 Semiconductor Physics and Devices	DMT245/3 Introduction to Microcontroller	DPT333/3 Industrial Safety and Quality Management	
	DUT122/2 Information Technology Skills	DMT125/2 Materials Science				
83	**15**	**17**	**15**	**15**	**15**	**6**
UNIVERSITY REQUIREMENT COURSES (19)		DUW123/2 Communication Skills	DUW235/2 Ethnic Relationship	DUW233/2 Islamic & Asian Civilization		
	DVW410/2 Malay Language	DZWXXX/1 Badan Beruniform 2	DVW212/2 English 2	DUW224/2 Engineering Entrepreneurship	DZWXXX/1 Badan Beruniform 5	
	DVW112/2 English 1		DZWXXX/1 Badan Beruniform 3	DZWXXX/1 Badan Beruniform 4		
	DZWXXX/1 Badan Beruniform 1					
19	**5**	**3**	**5**	**5**	**1**	
102	**20**	**20**	**20**	**20**	**16**	**6**

Course Code
Ex: ABC123/4
(**A**: Degree/Diploma Programme) ; (**B**: School) ; (**C**: Types of Courses) : (**1**: Stage (Stage 1, 2, 3 & 4)) ; (**2 & 3**: Course number) ; (/**4**: unit)

PELUANG KERJAYA

Graduan lulusan Diploma Kejuruteraan (Kejuruteraan Mikroelektronik) mempunyai prospek pekerjaan yang luas, sama ada dalam syarikat swasta, industri, jabatan kerajaan dan badan-badan berkanun. Bidang kerjaya untuk graduan boleh terdiri dari sektor mikroelektronik secara khususnya dan elektronik secara amnya antaranya:

- Industri Perkilangan(Proses, Penyelenggaraan dan Kumpulan Sokongan Teknikal)
- Kejuruteraan Jaminan Kualiti atau Kawalan Kualiti
- Keboleharapan
- Analisa KegagalanPencirian Peranti dan Pengujian

Antara kerjaya berkaitan bagi graduan Diploma Kejuruteraan (Kejuruteraan Mikroelektronik)

- Juruteknik.
- Pembantu Jurutera.
- Pembantu Pegawai Latihan Vokasional

KURSUS-KURSUS YANG DITAWARKAN

1. DMT 111/3 Engineering Science
2. DMT 112/3 Circuit Theory I
3. DMT 113/2 Engineering Drawing
4. DMT 121/3 Electronic Devices
5. DMT 122/3 Circuit Theory II
6. DMT 123/3 Introduction To Computer Programming
7. DMT 124/3 Digital Fundamental I
8. DMT 125/2 Materials Science
9. DMT 231/3 Analogue Electronics
10. DMT 232/3 Basic Electrical Machine
11. DMT 233/3 Digital Fundamental II
12. DMT 234/3 Semiconductor Physics And Devices
13. DMT 241/3 Introduction To Ic Layout
14. DMT 242/3 Wafer Fabrication
15. DMT 243/3 Electronic Packaging
16. DMT 244/3 Failure Analysis
17. DMT 245/3 Introduction To Microcontroller
18. DMT 351/3 Semestral Project
19. DMT 352/3 Electronic Instrumentation
20. DMT 353/3 Introduction To Plc
21. DMT 354/3 Introduction To Control Systems

DMT111/3
ENGINEERING SCIENCE

Course Outcomes

By the end of the course, the students should be able to:

1. Describe standard unit, force and motion and their applications.
2. Apply the concept of linear momentum and forces on material.
3. Apply circular motion principles in oscillation and wave.
4. Define and apply the basics of electrostatic and electromagnetism.
5. Analyze a simple DC circuit.

Syllabus

UNIT AND DIMENSION
- Physical quantity and dimension; dimensional analysis.

FORCE AND MOTION
- Scalars, vectors and their components, motion equations, and forces. Problems on forces and motions.

LINEAR MOMENTUM
- Linear momentum, Impulse, Conservation of linear momentum, elastic and inelastic collisions

FORCES ON MATERIAL
- Problems on Strain, Stress, Fracture, Elasticity, Hooke's Law, Poisson's ratio

CIRCULAR MOTION
- Frequency and period, Angular Measure, Angular Speed and Velocity, Frequency and Period, Uniform Circular Motion and Centripetal acceleration.

WAVE
- Types of waves, wave motion and its parameter, generation of waves. Problems on wave motion and its parameter, frequency, wavelength.

ELECTROSTATIC
- Coulomb's law, electric field, capacitance and resistance, and electric force line. Capacitors in series and parallel and electric forces.

MAGNETISM
- Interaction between current and magnetic fields, ferromagnetic materials. Problems on magnetic field force in various applications, generators Induced EMF with two coils.

DC CIRCUIT
- Ohms Law and Kirchoffs Law, Resistivity, and concept of drift velocity and electric charges. Resistance of various connections, electric power, and problems on simple circuit problems.

References

1. Jerry Wilson, Anthony Buffa. "College Physics", 7th ed., Pearson Education, 2009, USA
2. Giambattista, Richardson, Richardson, "College Physics", McGraw Hill International Ed., 2007.
3. Stephen T.Thornton, Andrew Rex. "Modern Physics for Scientists & Engineers", 2nd ed, Brooks Cole, 1999.
4. W. Bolton. "Engineering Science". Fourth Edition. Newnes. 2001

DMT112/3
CIRCUIT THEORY I

Course Outcomes

By the end of the course, the students should be able to:

1. Identify the basic circuit elements, calculate and solve a circuit using Ohm's Law.
2. Identify, calculate and solve a circuit using method of circuit analysis and network theorem in DC electric circuit.
3. Identify, define and calculate the capacitance, inductance, initial and steady state condition in RL and RC circuit.

Syllabus

BASIC CIRCUIT THEORY
- Meaning of circuit analysis, Systems of units, voltage and currents.
- Power, energy, resistance and colour coding.
- Elements on the circuit (passive and active) voltage and current source.
- Ohm`s Law and power calculation with passive sign calculation.
- Nodes , Branches and Loops

RESISTIVE CIRCUIT

- Meaning of series circuits, Kirchhoff`s voltage law and voltage divider rule.
- Kirchhoff`s voltage law and voltage divider rule in series circuits.
- Meaning of parallel circuits, Kirchoff`s current law and current divider rule.
- Kirchhoff`s current law and current divider rule in parallel circuits.
- Delta to Wye Conversion, Wye to Delta Conversion
- Delta to Wye Conversion, Wye to Delta Conversion in circuit analysis.
- Resistors

METHODS OF CIRCUIT ANALYSIS

- Method of Nodal analysis, Nodal analysis with dependence sources and Nodal analysis with voltage sources.
- Method of Mesh analysis, Mesh analysis with dependence sources, Mesh analysis with current sources and Sources Transformation.

NETWORK THEOREMS

- Superposition theorem
- Thevenin`s theorem
- Norton theorem
- Maximum power transfer

CAPACITORS AND INDUCTORS

- Passive linear circuit elements: capacitors
- Capacitors, relationships between voltage, current and energy for capacitor.
- Series and parallel capacitance
- Passive linear circuit elements: inductor
- Inductors, relationships between voltage, current and energy for capacitor
- Series and parallel inductance

FIRST ORDER CIRCUIT

- Natural Response of RL circuit
- Natural Response of RC circuit
- Step Response of RL circuit
- Step Response of RC circuit

Practical

1. Lab 1 Introduction to basic laboratory equipment
2. Lab 2 Series/Parallel resistor and verification of Kirchoff`s Laws.
3. Lab 3 Nodal Analysis
4. Lab 4 Mesh Analysis
5. Lab 5 Thevenin`s Theorem and Maximum Power Transfer

References

1. Charles K. Alexander & Mathew Sadiku, " Fundamental of Electric Circuit", 4th Editions, McGraw-Hill, 2009
2. Richard C. Dorf & James A. Svoboda, "Introduction to Electric Circuits", 6th Edition, John Wiley & Sons, 2004.
3. J. David Irwin & Chwan-Hwa Wu, "Basic Engineering Circuit Analysis", 6th Edition, John Wiley & Sons, 2001.
4. Clayton R. Paul, Charles Paul, "Fundamentals of Electric Circuit Analysis", John Wiley & Sons, 2000.
5. Johnson, D.E. Johnson, J.R. & Hilburn, J.L., "Basic Electric Circuit Analysis", 5th Edition, Prentice Hall, 1996.

DMT113/2
LUKISAN KEJURUTERAAN

Course Outcomes

By the end of the course, the students should be able to:

1. Apply engineering drawing concepts and principles to solve engineering and science problems.
2. Apply drawing techniques and tools to design engineering drawings.
3. Demonstrate drafting & technical drawings with correct methods.
4. Solve engineering related problem using engineering drawing techniques.

Syllabus

INTRODUCTION TO ENGINEERING DRAWING

- Objective & list types of drawing techniques with crucial engineering drawings, drawing tools, drawing standards, title blocks & texts, measurements & scales.
- Types of standard lines, text & numbering, border lines & title box.

GEOMETRICAL DRAWING

- Methods to draw lines, constructing & dividing lines & angles, drawing simple geometrical shapes, tangent lines & spread outs.
- Stretching theory & orthographical stretching concepts, types of orthographical stretching view, first stretching angle, third stretching angle, isometric stretching.
- Dimensional standards at orthographical stretching, connection between drawings dimension & drawing works.
- Basic concept of additional stretching, relation between orthographical stretch & additional stretch.

STRETCH SYSTEM

- Stretching theory & orthographical stretching concepts, types of orthographical stretching view, first stretching angle, third stretching angle, isometric stretching.
- Dimensional standards at orthographical stretching, connection between drawings dimension & drawing works.
- Basic concept of additional stretching, relation between orthographical stretch & additional stretch.
- Basic concept of additional stretching, relation between orthographical stretch & additional stretch.

OBLIQUE & ISOMETRIC DRAWING

- Types of drawing, isometric drawing, oblique drawing, standard practice.

ELECTRICAL & ELECTRONIC DRAWINGS

- Standard graphical symbols & block diagrams, schematic drawings, wiring & cable diagrams, Printed Circuit Board. Circuit & schematic drawing.

INTRODUCTION TO COMPUTER AIDED DRAFTING

- AutoCAD screen, to respond by typing commands, starting a new drawing, using limits, grid, snap, zoom, line, absolute coordinates, erase, offset, undo, adding text, inserting a block & method to print.

BASIC EDITING & CONSTRUCTION TECHNIQUES

- Trim, fillet, chamfer, view port, editing text & explode.
- Relative X & Y coordinates, polar coordinates, using layers, using object snap, arc, circle, ellipse, & pan real time.

CREATING 2D DRAWINGS (GEOMETRIC CONSTRUCTION)

- Using polygon, polar tracking, extend, rotate, move, mirror & array. Cutting planes line & boundary hatch.
- Planes line & boundary hatch.

INTRODUCTION TO 3D SOLID MODELING

- 3D coordinate systems, user coordinates system, showing the solids toolbar, using the view toolbar, view point, creating solid models with extrude & revolve, extruding a shape, using Boolean operations, creating solid models revolution

TO PRODUCE 2D DRAWING FROM 3D SOLID MODELING

- Solid model to a multi view drawing using solview & soldraw.

PRODUCING ELECTRONIC DRAWING

- Circuit & schematic drawing.

Practical

1. Introduction to Basic Engineering Drawing
2. Geometry drawing
3. Stretch system
4. Oblique & isometric drawings
5. Electrical & Electronics Drawings
6. Introduction to Computer Aided Drafting
7. Basic editing & construction techniques
8. Creating 2D drawing (geometric constructions)
9. Introduction to 3D solid modeling
10. Producing electronic drawing

Reference

1. Gary R Bertoline, Eric N Wiebe, “Technical Graphics Communication”, 3rd ed., McGraw Hill, 2003

2. Shawna Lockhart, "A Tutorial Guide to AutoCAD 2005", Prentice Hall, 2005
3. Frederick E. Giesecke, Henry Cecil Spencer, John Thomas Dygdon, Alva Mitchell, Ivan Leroy Hill, James E Novak, "Technical Drawing" 10th ed., Prentice Hall, 2002
4. Mark Dix & Paul Riley, "Discovering AutoCAD 2005", Prentice Hall 2006
5. M. Ramzan Mainal, Badri Abdul Ghani, Yahya Samian, "Lukisan Kejuruteraan Asas", Cetakan Keenam, Universiti Teknologi Malaysia (UTM), 2000.
6. Khairul Anwar Hanafiah, "Lukisan Kejuruteraan Berbantu Komputer", UTM Skudai, 1999

DMT 121/3
ELECTRONIC DEVICES

Course Outcomes

By the end of the course, the students should be able to:
1. Identify, define and solve the theory of semiconductor materials and diode operation.
2. Define, illustrate and calculate diode applications.
3. Describe, explain and solve Bipolar Junction Transistor (BJT) operation and biasing.
4. Describe, explain and solve Field Effect Transistor (FET) operation and biasing.

Syllabus

INTRODUCTION TO SEMICONDUCTOR
- Atomic structures, semiconductors, conductors, insulators and covalent bonds. The conduction in semiconductor, n-type and p-type semiconductor. Diode. Diode operation and biasing. Solve voltage and current characteristics of various diode models.

DIODE APPLICATIONS
- Diode application. Half-wave and full-wave rectifiers. Diode limiting and clamping circuits. Solve rectifiers, power supply filters, regulations, limiting, clamping circuit and voltage multipliers related problems and illustrate the output waveform. Zener Diode operation and solve related problems.

BIPOLAR JUNCTION TRANSISTOR
- BJT. Types of transistor structure and symbol. Basic transistor operation, transistor characteristic and parameters. BJT configuration. BJT parameters. DC load-line.

DC BJT BIASING
- Types of biasing and DC operating points. Fixed bias (Base Bias) and Emitter Bias operation parameters. Voltage divider bias parameters by using exact and approximation analysis. Collector feedback and other bias parameters.

FIELD-EFFECT TRANSISTORS (FETS)
- FET. Types of FET, structure and symbol. JFET operation, JFET characteristic parameters, JFET transfer characteristic, JFET biasing and JFET bias related problem. MOSFET. MOSFET structure and symbol, MOSFET operation, MOSFET biasing and solve MOSFET bias related problems.

Practical

1. Introduction to basic laboratory equipment
2. Introduction to Diode
3. Diode as Rectifiers
4. Limiter and Clamper Circuits
5. Current and Voltage Characteristics of BJT
6. Voltage Divider Biasing
7. JFET Characteristics

References

1. Floyd, T.L., "Electronic Devices", 9th edition, Prentice Hall 2012
2. Boystead, R.L. & Nashelsky, L. "Electronic Devices and Circuit Theory", 10th edition, Prentice Hall, 2009
3. Cathey, J.J., "Schaum's outline of theory and problems of electronic devices and circuits", 4th ed, McGraw-Hill, 2002.

DMT 122/3
CIRCUIT THEORY II

Course Outcomes

By the end of the course, the students should be able to:

1. Identify, Define And Explain the electrical component in AC circuits and also use the method of circuit analysis and network theorem to SOLVE the electrical problem.
2. Identify, Define and Explain the three phase current and voltage for wye-wye, wye-delta, delta-delta and delta-wye connection.
3. Identify, Calculate and Solve the electrical circuit using two port networks parameter.

Syllabus

SINUSOIDS AND PHASORS

- The difference between AC and DC
- Cycle, period and frequency of sinusoid and solve for RMS value.
- The graph of sinusoid using analytical expression.
- Phase relationship of waveforms using phasors.
- Complex number, phasors and complex numbers in rectangular or polar form and covert between the two.
- Lead and lag relationships with phasors and sinusoids.

ALTERNATING CURRENTS (AC) RESPONSE (REACTANCE AND IMPEDANCE)

- The relationship between AC voltage and current in a resistor, capacitor and inductor and also causes a phase shift between current and voltage.
- Capacitive and inductive reactance and relationship between capacitive reactance and frequency.
- Effects of extremely high and low frequencies on capacitor and inductor.

APPLICATIONS OF CIRCUITS LAW IN AC CIRCUITS

- Kirchhoff's Laws (Voltage & Current), voltage and current divider and also star/delta transformation

SINUSOIDAL STEADY-STATE ANALYSIS

- Mesh analysis in AC Circuits
- Nodal analysis in AC Circuits

NETWORK THEOREM IN AC CIRCUITS

- Superposition theorem
- Source transformation
- Thevenin & Norton theorem
- Maximum power transfer
- Power factor correction

AC POWER ANALYSIS

- The instantaneous power, average power, Power Factor, Complex Power, Power Factor Correction
- The instantaneous power, average power, Power Factor, Complex Power, Power Factor Correction.

RESONANCE CIRCUITS

- Circuit and Calculate all the parameters for series resonance circuits
- Circuit and Calculate all the parameters for Parallel resonance circuits.

BALANCE THREE PHASE SYSTEM

- Balanced three phase voltages.
- Three phase voltage source and relationship between line and phase voltages and currents,Source and load connections:Wye-Delta,Wye-Wye
- Three phase voltage source and relationship between line and phase voltages and currents,Source and load connections:Delta-Delta,Delta-Wye
- Power calculation in three phase system.

TWO PORT NETWORKS

- Z and Y parameter
- T (ABCD) parameter and Terminated two port networks

Practical

1. Lab 1: Introduction To The Equipment and Measurement
2. Lab 2: Measurement of Phase Shift
3. Lab 3: Capacitor in AC Circuit
4. Lab 4: Inductor in AC Circuit
5. Lab 5: Series Resonance Circuit

References

1. Charles K. Alexander & Mathew Sadiku, " Fundamental of Electric Circuit", 4th Edition, McGraw-Hill, 2009
2. Richard C. Dorf & James A. Svoboda, "Introduction to Electric Circuits", 8th Edition, John Wiley & Sons, 2010.
3. Nilsson, J.W., Riedel, S.A., ''Electric Circuits'', 8th Ed., Prentice Hall, 2008.
4. J. David Irwin & Chwan-Hwa Wu, "Basic Engineering Circuit Analysis", 6th Edition, John Wiley & Sons, 2001.
5. Clayton R. Paul, Charles Paul, "Fundamentals of Electric Circuit Analysis", John Wiley & Sons, 2000.

DMT 123/3
INTRODUCTION TO COMPUTER PROGRAMMING

Course Outcomes

By the end of the course, the students should be able to:
1. Identify and sketch flowcharts to solve engineering and science problems.
2. Use and apply three types of control statements; sequence, selection and repetition.
3. Build C program using functions, and file operations.
4. Construct dynamic data structures using pointers, arrays and multidimensional arrays.

Syllabus

INTRODUCTION TO C
- Algorithm, Pseudo-code and flowchart. Determination of Identifiers and Reserved words, Preprocessor directives, data types and type declarations, Operators, Formatted input and formatted output, Program debugging

CONDITIONAL STATEMENTS
- Learn about types of selection; One way selection, Two ways selection, Multi selection and Compound Statement, Construct C program using: Nested if, Conditional operators and Switch operators

LOOPS
- Learn, use and apply; While loops and Do-while loops, Learn, use and apply; For loops and Nested loops

FUNCTIONS
- Learn and construct C program using; Library (Math & String), User-defined, Learn and construct C program using; Scope (global & local) and Passing arguments (by value)

FILES OPERATION
- File declaration, file operations and file mode, Reading data from text files and writing data to text files

POINTERS
- Define and initialize to pointer variables, pointer operators

ARRAY & MULTI-DIMENSIONAL ARRAY
- Arrays of data, and declaration of Array, Initialization of array and operations on array, Identify and use multidimensional arrays and index out of bound

Practical

1. Introduction to C programming
2. Conditional statements
3. Loops
4. Functions
5. File operations
6. Pointers
7. Arrays
8. Multidimensional arrays

References

1. Harry H. Cheng,"C for Engineers and Scientists, An Interpretive Approach", McGraw Hill International Edition, 2010
2. Deitel & Deitel, Suhizaz Sudin, R. Badlishah, Yasmin Yacob "C How To Program", Pearson-Prentice Hall, 2006
3. Jeri R. Hanly & Elliot B. Koffman "C Program Design for Engineers", Addison-Wesley, 2001
4. Tan & D Orazio "C Programming for Engineering & Computer Science", McGraw Hill, 1999
5. Forouzan, B. A. & Gilberg R. F., "Computer Science: A Structured Programming Approach Using C", Brooks/Cole, 2001
6. Al Kelley, Ira Pohl, "C by Dissection: The Essentials of C Programming" 4th ed., Addison-Wesley, 2000

DMT 124/3
Digital Fundamentals 1

Course Outcomes

By the end of the course, the students should be able to:
1. Define and describe the concepts and principles of logic design.
2. Define, describe and demonstrate combinational logic design using logic simplifications and circuit transformation.
3. Define, describe and illustrate combinational logic functions.

Syllabus

INTRODUCTION
- Design; Logic Design. Hierarchical Design; CAD Software; Logic Computation using Switches, Relays and Circuits; Transistors; Digital Representations; Encoding

NUMBER SYSTEMS
- Numbers in Binary, Octal, Hexadecimal; Conversion Between Binary, Octal, Hexadecimal; Binary Arithmetic Operations;

LOGIC GATES
- Inverter, AND, OR, NAND, NOR, EX-OR and EX-NOR Gates.

LOGIC SIMPLIFICATION
- Laws and rules of Boolean algebra, Sum-of-Product (SOP) and Product-of-Sum. Conanical forms, Karnaugh Map. Hazards and glitches

CIRCUIT TRANSFORMATION
- The Combinational Logic Circuits; Demonstrate Combinational Logic Implementation; The Universal Property of NAND and NOR Gates; Logic Circuit

COMBINATIONAL LOGIC FUNCTIONS - ENCODERS AND DECODERS
- Concept and design of Encoders and Decoders;

COMBINATIONAL LOGIC FUNCTIONS - MUX AND DEMUX
- Concept and design of Multiplexers and Demultiplexers;

COMBINATIONAL LOGIC FUNCTIONS – COMPARATORS AND PARITY
- Concept and design of Comparators, Parity;

COMBINATIONAL LOGIC FUNCTIONS - ADDERS
- Representation of Negative Numbers (Sign-Magnitude;1's Complement; 2's Complement); Arithmetic Operations of Signed Numbers; Overflow. Half Adder; Full Adder; Describe, Discuss and Illustrate Ripple Carry Adder; Carry Look-ahead Adder

COMBINATIONAL LOGIC FUNCTIONS - ALU
- Concept and design of Arithmetic Logic Unit (ALU); The concept and design of Simple Combinational Multiplier

Practical

1. Lab 1: Introduction to Digital Laboratory
2. Lab 2: Logic Gates Functions and Characteristics
3. Lab 3: Logic Simplification
4. Lab 4: Encoder / Decoder
5. Lab 5: Multiplexer / Demultiplexer

References

1. T. L. Floyd, "Digital Fundamentals", 10th Edition, Prentice Hall, 2009
2. R. H. Katz and G. Borriello, "Contemporary Logic Design", 2nd Edition, Prentice Hall, 2005.
3. R. J. Tocci, N. S.Widmer and G. L. Moss, "Digital Systems: Principles and Applications", 10th Edition, Prentice Hall, 2006.

DMT 125/2
Materials Science

Course Outcomes

By the end of the course, the students should be able to:
1. Describe types of material families, material properties, and strategy for designing material.
2. Analyze, calculate, and compare various material characteristic by measuring material's mechanical properties on strain, stress, and density, fracture, and friction.
3. Analyze and compare the structure and mechanical behavior of metal, polymer, ceramic and composite.

4. Analyze and explain specific material properties that related to the field of electric, magnetic, and optical.
5. Describe and explain material life cycle, oxidation and corrosion mechanism of material

Syllabus

INTRODUCTION TO MATERIAL PROPERTIES
- Material families and processes and material properties that include Mechanical Properties, Thermal Properties, Electrical, magnetic, and optical properties.

ATOMIC BONDING & STRUCTURE
- Primary & secondary bonding, electronic structure

CRYSTAL STRUCTURE IN MATERIAL
- BCC, FCC & HCP crystal structure, atomic position in cubic structure
- Direction in unit cell, miller indices

CRYSTALLINE IMPERFECTIONS
- Type of crystalline imperfections

MECHANICAL PROPERTIES
- Elastic mechanisms and strength, plastic work and ductility strength and toughness.

ALLOY AND METAL
- The structure and mechanical behavior of alloy and metal, e.g. Kinetics of structural change

POLYMER AND RUBBER MATERIALS
- The mechanical behavior of polymer and rubber material.

CERAMIC, GLASSES, AND COMPOSITE MATERIALS
- The mechanical properties of ceramics, glasses, and composite materials

CONDUCTOR, INSULATORS AND DIELECTRICS
- Electrical properties of materials

Reference Book

1. William F. Smith, Javad Hashemi, "Foundations of Material Science & Engineering", 5th ed, McGraw Hill, 2010
2. Ashby, M. and Jones, D.R.H. (2005). Engineering Materials I: An Introduction to Properties, Applications, and Design, 3rd Edition, Elsevier, Butterworth Heinemann.
3. Ashby, M. and Jones, D.R.H. (2006). Engineering Materials II: An Introduction to Microstructure, processing, and design, 3rd Edition, Elsevier, Butterworth Heinemann.
4. Sharma, C.P. (2004). Engineering material properties and applications of metal and alloys, Prentice Hall, New Delhi.
5. Rajput, R.K. (2000). Engineering Materials. S.Chand & Company, New Delhi.

DMT231/3
ANALOGUE ELECTRONIC

Course Outcomes

By the end of the course, the students should be able to:
1. State types of biasing, describe the function of components and determine important DC and AC parameters of amplifiers using Bipolar Junction Transistors (BJTs).
2. State types of biasing, describe the function of components and determine important DC and AC parameters of amplifiers Field Effect Transistors (FETs) amplifiers.
3. State types and classes, describe the function of components and determine important DC and AC parameters of multistage and power amplifiers.

Syllabus

INTRODUCTION
- Review of FET (MOSFET & JFET) and BJT.
- DC Biasing. Sketch DC & AC load line

BJT AMPLIFIERS – COMMON EMITTER
- Analog Signals & Linear Amplifiers
- Transistor Amplifier Configurations
- DC & AC Analysis of Common-Emitter Amplifier
- AC Load Line Analysis

BJT AMPLIFIERS – COMMON BASE
- Transistor Amplifier Configurations
- DC & AC Analysis of Common-Base Amplifier
- AC Load Line Analysis

BJT AMPLIFIERS – COMMON COLLECTOR
- Transistor Amplifier Configurations
- DC & AC Analysis of Common-Collector Amplifier
- AC Load Line Analysis

FET AMPLIFIERS – COMMON SOURCE
- Transistor Amplifier Configurations
- DC & AC Analysis of Common-Source Amplifier
- AC Load Line Analysis

FET AMPLIFIERS – COMMON GATE
- Transistor Amplifier Configurations
- DC & AC Analysis of Common-Gate Amplifier
- AC Load Line Analysis

FET AMPLIFIERS – COMMON DRAIN
- Transistor Amplifier Configurations
- DC & AC Analysis of Common-Gate Amplifier
- AC Load Line Analysis

CASCADE CONFIGURATION MULTISTAGE AMPLIFIER
- Transistor Amplifier Configurations
- DC & AC Analysis of Cascade Multistage Amplifier

DARLINGTON CONFIGURATION MULTISTAGE AMPLIFIER
- Transistor Amplifier Configurations
- DC & AC Analysis of Darlington Multistage Amplifier

CLASS A POWER AMPLIFIER
- Class of Power Amplifier
- Class A Power Amplifier analysis

CLASS B POWER AMPLIFIER
- Class of Power Amplifier
- Class B Power Amplifier analysis

CLASS AB POWER AMPLIFIER
- Class of Power Amplifier
- Class AB Power Amplifier analysis

CLASS C POWER AMPLIFIER
- Class of Power Amplifier
- Class C Power Amplifier analysis

Practical

1. Lab 1: BJT Common Emitter Amplifier (Q point, DC current voltage load line & voltage line)
2. Lab 2: BJT Common Emitter Amplifier II (AC Load line, Amplifier Voltage Gain)
3. Lab 3: BJT Common Collector Amplifier (Voltage gain input & output impedance)
4. Lab 4: FET Common Source Amplifier
5. Lab 5: Class A Power Amplifier

References

1. Neamen, D.A. (2010) *Microelectronics Circuit Analysis and Design.* Fourth Edition , McGraw Hill.
2. Floyd, T. (2005). *Electronic Devices.* 7th Edition Englewood Cliffs, New Jersey : Prentice Hall.
3. Boylestad, R.L, and Nashelsky, L. (2006). *Electronic Devices and Circuit Theory. 9th* Ed.: Prentice-Hall
4. Robert T. Paynter, (2005). *Introductory Electronic Devices and Circuits.* 9th Ed.: Prentice Hall.
5. Clemons Evangelisti, Kerr. and Klingensmith. (1994). *Introductory Electronic Devices and Circuits.* 3rd ed New Jersey Englewood: Prentice Hall

DMT 232/3
BASIC ELECTRICAL MACHINE

Course Outcomes

By the end of the course, the students should be able to:
1. Solve the basic concept of three phase system.
2. Apply the basic concept of magnetic circuit and machinery principles.
3. Define and explain the basic principles of transformer (including its general construction) and solve the fundamental equations describing its behavior.
4. Apply parameters for electrical machines.

Syllabus

BASIC CONCEPT OF THREE-PHASE SYSTEM

- Characteristics of three-phase system. Star-Delta connections, Delta-Star connections. Solve three-phase power

MAGNETIC CIRCUITS & INTRODUCTION TO MACHINERY PRINCIPLES

- Magnetic field, magnetic relationship, magnetic core losses. Magnetic circuit, inductance. Magnetic force, electromagnetic induction, induced emf.

INTRODUCTION TO MACHINERY PRINCIPLES

- Rotational Motion, The Magnetic Field, Faraday's Law – Induced Voltage from a time-changing Magnetic Field, Production of Induced Force on a Wire and Induced Voltage on a conductor moving in a magnetic field

SINGLE PHASE TRANSFORMER

- Basic construction. Principle operation and the importance of transformer. Ideal transformer. Equivalent circuit of a transformer. Voltage regulation and efficiency of a transformer

INTRODUCTION TO ELECTRICAL MACHINES

- Basic construction, principles and application of: DC Machines, induction machines, and AC Machines. Basic construction, principles and application of: induction machines. Basic construction, principles and application of: AC Machines.

Practical

1. Experiment 1: Introduction to LVVL software.
2. Experiment 2: Three-phase power measurement.
3. Experiment 3: Single-phase transformer – transformer regulation.
4. Experiment 4: Separately-excited, shunt and compound dc generators.
5. Experiment 5: Principle of a three phase induction motor.

References

1. Stephen J. Chapman. *Electric Machinery Fundamentals*, 4th Edition, McGraw Hill, 2005
2. Charles K.Alexander & Matthew Sadiku, *"Fundamentals of Electric Circuits"*, International Education, McGraw Hill, 2001
3. P.C. Sen. *Principles of Electric Machines & Power Electronics*, 2nd Edition, John Wiley & Sons, 1997
4. Edward Hughes, Ian Mckenzie Smith, John Hiley, Keith Brown. *Hughes Electrical & Electronic Technology*, Prentice Hall, 2003
5. Stephen L. Herman. *Electrical Transformers and Rotating Machines*, 2nd Edition, Thomson Delmar Learning, 2006.
6. Nilsson, J.W. & Riedel, S.A., *"Electric Circuits"*, 7th Edition, Pearson Prentice Hall, 2005.

DMT233/3
DIGITAL FUNDAMENTAL II

Course Outcomes

By the end of the course, the students should be able to:

1. Describe, explain and discuss the operation of flip flop, its applications and use the flip flops in synchronization circuits.
2. Explain, constructs, discuss and classify the counter circuit and shift register and understand the operation of various types of registers.
3. Explain and analyze the basic sequential circuit.

Syllabus

FLIP FLOPS

- Latches, Gated Latches and Edge triggered flip flops. Explain the Applications of flip flops

INTRODUCTION TO COUNTERS

- Asynchronous and Synchronous Counter Operation. The Synchronous Counter Design

COUNTER APPLICATIONS

- The Up / Down Synchronous Counters. The Design Counter Applications

INTRODUCTION TO SHIFT REGISTERS

- Basic Shift Register Functions. The operation of registers. Types of Shift Register. The Basic Shift Register Operations

SHIFT REGISTER APPLICATIONS

- The bidirectional shift register operation. The Shift Register Counters. The Shift Register Applications: State Registers, Serial Interconnection of Systems, Bit Serial Operations, UART

INTRODUCTION TO SEQUENTIAL CIRCUIT

- Sequential Circuit, Input Equation and The State Stable. Type of Sequential Circuit

SEQUENTIAL CIRCUIT DESIGN

- The State Diagram. Tthe sequential circuit with flip-flops

Practical

1. Exp 1: Latches & Gated Latches
2. Exp 2: Flip Flop
3. Exp 3: Counter Design
4. Exp 4: Shift Register Applications
5. Exp 5: State Machine

References

1. Ronald J.Tocci, Neal S.Widmer and Gregory L.Moss, "Digital Systems: Principles and Applications", 10th Edition by Prentice Hall 2006
2. Floyd, Thomas L., "Digital Fundamentals", 9th Edition by Prentice Hall 2006
3. Rafikha Aliana A. Raof et al, "Digital Electronic Design", by Pearson, Prentice Hall
4. Donald D. Givone, "Digital Principles and Design", by McGraw-Hill 2003

DMT 234/3
SEMICONDUCTOR PHYSICS AND DEVICES

Course Outcomes

By the end of the course, the students should be able to:

1. Explain the theory of semiconductor physics and devices.
2. Apply and solve problem and performance issues in semiconductor processes.
3. Apply knowledge in item 1 and 2, and to explain semiconductor device behaviors.

Syllabus

INTRODUCTION

- Introduction to semiconductor devices and technology

PART 1: SEMICONDUCTOR PHYSICS

- The Crystal Structure of Solids: The Semiconductor materials, basic crystal structure and growth techniques.
- The Semiconductor in Equilibrium: The concentration of semiconductor carriers in conduction and valence band
- Carrier Transport Phenomena: The basic transport mechanism in semiconductor crystal.
- Nonequilibrium Excess Carriers in Semiconductors: The behavior of nonequilibrium electron and hole concentration as functions of time and space.

PART 2: SEMICONDUCTOR DEVICES

- P-N Junction: Basic fabrication steps, thermal equilibrium condition, depletion region and capacitance, and capacitance characteristics.
- P-N Junction Diode: electrostatics of the pn junction in thermal equilibrium, under reverse bias, forward bias and current-voltage characteristics.
- Bipolar Transistor: the transistor action, static characteristics of bipolar transistor, frequency response and switching of bipolar transistor, and the heterojunction bipolar transistor.
- Fundamental of the MOSFET: MOSFET fundamentals, basic structure, MOS Diode, MOSFET Scaling, CMOS and BiCMOS.

Reference

1. S. M. Sze, *Semiconductor Devices: Physics and Technology*, 2nd Ed., John Willey & Sons, Inc., 2005.
2. S. M. Sze, K. K. Ng, *Physics of semiconductor devices*, John Wiley, 2007, USA.
3. F. P. Robert, *Advanced Semiconductor Fundamentals*, 2nd ed. 2003, Prentice Hall, USA.
4. Peter Y. Yu, M. Cardona, *Fundamental of Semiconductors: Physics and materials properties (advanced text in physics)*, Springer-Verlag, 2001, Germany.

5. G. G. Streetman, S. K. Banerjee, *Solid State Electronic Devices*, Prentice Hall, 2006, USA.
6. K. Kramer, W. Nicholas, G. Hitchon, *Semiconductor Devices: A Simulation Approach*, Prentice Hall, 1997, USA.
7. D. A. Neamen, Semiconductor physics and devices, Mcgraw hill, 3rd ed. 2003, USA.

DMT241/3
INTRODUCTION TO INTEGRATED CIRCUIT LAYOUT

Course Outcomes

By the end of the course, the students should be able to:
1. Explain and apply the microelectronic technologies, IC design flow and VLSI design style in Layout
2. Describe, explain and sketch the CMOS transistor concept, characteristic and logic circuit design
3. Illustrate and produce layout design flow of a circuit

Syllabus

INTRODUCTION
- The Microelectronics technologies, Integrated Circuit, Moore's Law, Integration Scales, EDA applications in the design of ic's, IC design flow, Simulation and Fabrication of IC.

CIRCUIT REPRESENTATION – SPICE NETLIST
- The flow of SPICE netlis, significance of SPICE, Netlist SPICE elements, types of SPICE analysis and input stimulus.

INTRODUCTION TO LAYOUT DESIGN
- Illustrate the masks and layout drawing as circuit representations. Explain and apply sticks diagram in Layout design. Define and apply the well, body contacts, contacts and vias in mask layout. Explain and illustrate the multilayer interconnections.

LAYOUT VERIFICATION
- Design Rules Check (DRC), Layout Versus Schematic (LVS) and SDL during Layout verification.

TRANSISTOR STRUCTURES
- Characterization and operation of Bipolar Junction Transistor (BJT), JFET, nMOS, pMOS and types of CMOS.

STATIC CMOS LOGIC CIRCUIT DESIGN
- The principles and concepts for transistor representation for pMOS and nMOS as switches. The ideal of IV Characteristic. The design of Inverter, NAND, NOR and complex logic gates in layout. The combinational and sequence logic gate.

VLSI DESIGN CONCEPT
- The principles of Field Programmable Gate Array (FPGA), Gate Arrays, Standard cells, Full custom design, System-on-Chip (SoC), Building blocks, chip layout, input and output circuits.

Practical

1. Lab 0: Introduction To Mentor IC Design Suite
2. Lab 1: Netlists using Eldo simulator
3. Lab 2: Schematic Design
4. Lab 3: Layout Design
5. Lab 4: Design Rules Check (DRC)
6. Lab 5: Layout versus Schematic (LVS)

References

1. Neil H.E. Weste, David Harris. (2005). CMOS VLSI Design. Addison Wesly.
2. John P. Uyemura (1995). *Physical Design of CMOS Integrated Circuits using L-Edit™",* PWS Thomson.
3. Christopher Saint, Judy Saint. (2002). *IC Layout Basics.* McGraw Hill.
4. Christopher Saint, Judy Saint. (2002). *IC Mask Design Essential Techniques.* McGraw Hill
5. Dan Clein. (2000). *CMOS IC Layout.* Newnes
6. Sung –Mo Kang, Yusuf Leblebici. (2005). *CMOS Digital Integrated Circuits - Analysis and Design.* Mc Graw.
7. John P. Uyemura. (1999). *CMOS Logic Circuit Design.* Kluwer.

DMT242/3
WAFER FABRICATION

Course Outcomes

By the end of the course, the students should be able to:
1. Solve the basics of semiconductor device and ability to explain the cleanroom and cleanroom protocols.
2. Apply the semiconductor process technology and construct the fabrication processes for thermal and photolithography processes.
3. Apply and construct the fabrication processes in etching and metallization.

Syllabus

INTRODUCTION
- Ability to define and describe on semiconductor process technology and wafer fabrication processes

INTRODUCTION TO CLEANROOM AND CLEANROOM PROTOCOLS
- Cleanroom standard, Cleanroom classes, cleanroom protocols and Yield

SEMICONDUCTOR BASICS
- Introduction to semiconductor, resistivity, Intrinsic and extrinsic semiconductor, doping of semiconductor, n-type and p-type dopant and basic semiconductor devices

THERMAL PROCESS
- Oxidation (wet and dry oxidation), Diffusion and Drive-in, Annealing and Rapid thermal process (RTP).

PHOTOLITHOGRAPHY
- Photolithography: Photolithography basic process, Lithography Technology Trends, Mask, Reticles, Photoresist, -ve photoresist vs +ve photoresist, photoresist handling procedures

METALLIZATION
- Conducting Thin Films, Metal Thin-Film Characteristics, Thermal Evaporation, Sputtering, CVD vs. PVD, and Metal thin film measurement

ETCH
- Etching process and its application, Etch terminology; etch rate, selectivity, etch uniformity, etch profiles, Wet etch; basic process, applications, advantages and disadvantages. Dry etch; plasma basic, ion bombardment, reactive ion etching (RIE)

PLASMA BASICS
- Plasma, Collision in Plasma, Ionization, Excitation and relaxation, Dissociation, Plasma, Ion Bombardment, PECVD and Plasma Etch Chambers.

Practical

1. Introduction to Cleanroom/ Cleanroom protocol
2. Wet and/or Dry Oxidation
3. Metallization
4. Photolithography
5. Wet etching

References

1. Hong Xiao. (2005). *Introduction to Semiconductor Manufacturing Technology*. Prentice Hall.
2. Peter Van Zant (2000). *Microchip Fabrication: A Practical Guide to Semiconductor Processing.* McGraw Hill.
3. Campbell, S. A. (2001). *Science And Engineering of Microelectronics Fabrication*. New York : Oxford University Press

DMT243/3
ELECTRONIC PACKAGING

Course Outcomes

By the end of the course, the students should be able to:
1. Define and explain the semiconductor packaging process flow.
2. Explain and identify the critical parameters in semiconductor packaging process.
3. Illustrate and relate the technology trend in semiconductor packaging.

Syllabus

INTRODUCTION TO MICROSYSTEMS PACKAGING
- Microsystems and Microsystems Technologies: Microsystems Packaging (MSP), microsystem packaging and the System Level Microsystems Technologies.

THE ROLE OF PACKAGING IN MICROELECTRONICS

- Microelectronic: Microelectronic Devices and IC Packaging, the purposes of IC Packaging, semiconductor roadmap and IC packaging challenges

GENERAL SEMICONDUCTOR PACKAGING PROCESS FLOW

- Wafer Back Grinding, Die Preparation, Die Attach, Wire Bonding, Die Overcoat, Molding, Sealing, Marking, DTFS (Deflash/Trim/Form/Singulation), Lead Finish, Electrical Testing, Tape & Reel, Dry Packing, Boxing and Labeling.

INTERCONNECTION IN IC ASSEMBLY

- The level of Interconnection, Wire Bond, Tape Automated Bonding and Flip Chip.

FUNDAMENTAL DESIGN FOR RELIABILITY

- Design for Reliability, Microsystem Failure & Failure Mechanisms. The fundamental of Design for Reliability. The Thermomechanically-Induced Failure, Electrical Induced Failure and Chemically Induced Failure

QUANTITATIVE ANALYSIS

- Statistical Process Control (SPC), Poka Yoke, 8D Process, 5S Process, Ishikawa Diagram, Gauge Repeatebility and Reproducibility (GR&R)

Practical

1. Lab 1: Decapsulation
2. Lab 2: Die Preparation
3. Lab 3: Wire bonding
4. Lab 4: Wirebond Pull Test

References

1. Rao Tummala. (2001). *Fundamentals of Microsystem Packaging.* Mc-Graw Hill Professional.
2. William D. Brown (Editor). (1999). *Advanced Electronic Packaging with Emphasis on Multichip Modules*. New York :IEEE Press Series on Microelectronics Systems. The Institute of Electrical and Electronics Engineers Inc.
3. Glenn R. Blackweel. (2000). *The Electronic Packaging Handbook.* Florida U.S : CRC Press LLC.
4. M. Datta, T.Osaka, J.W Schultze (Editor). (2005). *Microelectronic Packaging*. Florida U.S : CRC Press,

DMT244/3
FAILURE ANALYSIS

Course Outcomes

By the end of the course, the students should be able to:

1. Define (failure analysis terms), illustrate and select the appropriate failure analysis process flow.
2. Identify, compare, explain, illustrate (where applicable) and analyze the different techniques available in FA, and the corresponding failures they detect
3. Conduct experiments, investigate and analyze a sample given based on theoretical aspects learned.

Syllabus

INTRODUCTION TO FAILURE ANALYSIS

- Define Failure Analysis (FA), FA techniques, failure modes, failure mechanisms, root cause. Select and illustrate the appropriate failure analysis process flow. Explain differences between destructive and non-destructive techniques.

ELECTRICAL CHARACTERIZATION

- Name and explain different types of electrical failures. Analyze the results obtained from electrical characterization analysis.

PACKAGE ANALYSIS

- Identify and explain different techniques use to perform package analysis. Illustrate and explain the concepts and principles of scanning acoustic microscopes. Compare the advantage sand disadvantages of acoustic micro imaging and x-ray/radiographic inspection.

FAULT LOCALIZATION

- Explain the importance of fault localization. Identify the common fault localization techniques. Illustrate and explain the concepts

and principles of thermal based method. Describe photon-based method select the most suitable fa techniques to be used given a particular failure.

DIE EXPOSURE

- Give the differences between decapsulation and delidding. Illustrate and explain the different types of decapsulation method available Explain the process of backside preparation.

DIE DEPROCESSING

- Define deprocessing. Explain the purpose of deprocessing. Explain different types of deprocessing techniques. Differentiate each types of deprocessing techniques. Compare the advantages and disadvantages of each deprocessing techniques.

METALLOGRAPHIC CROSS-SECTIONING

- Explain the concepts and principles of metallographic cross-sectioning techniques. Identify types of failures that can be detected using these FA techniques.

INSPECTION TECHNIQUES

- Illustrate and differentiate the concepts and principles of Scanning Electron Microscopy (SEM) and Scanning Probe Microscopy (SPM). Compare the advantages and disadvantages of AFM vs.SEM. Explain other inspection techniques.

FAILURE ANALYSIS CHALLENGES

- Explain the ten primary challenges of FA. Explain the trend of FA

Practical

1. Lab 1: Electrical Characterization Using Curve Tracer
2. Lab 2: Plastic Mold Decapsulation
3. Lab 3: Reactive Ion Etching
4. Lab 4: Cross-Sectioning Techniques
5 Lab 5: Case study/Mini Project

References

1. Perry L. Martin (1999). *Electronic Failure Analysis Handbook.*: McGraw Hill
2. E. Ajith Amerasekera and Farid N. Najm (1997). *Failure Mechanisms in Semiconductor Devices.* 2nd Ed.: John Wiley & Sons
3. Lawrence C. Wagner, (1999). *Failure Analysis of Integrated Circuits: Tools and Techniques.*: Kluwer Academic Publishers.
4. Friedrich Beck (1998). *Integrated Circuit Failure Analysis: A Guide to Preparation Techniques.*: John Wiley & Sons

DMT245/3 INTRODUCTION TO MICROCONTROLLER

Course Outcomes

By the end of the course, the students should be able to:

1. Describe the basic hardware architecture of a microcontroller system and sketch the fundamental diagram describing its behavior.
2. Apply knowledge and concepts of microcontroller programming.
3. To use the skill to program a microcontroller system using assembly language.
4. Make connection between microcontroller systems to external devices.

Syllabus

INTRODUCTION TO 8051 MICROCONTROLLER

- Basic concepts of 8051 microcontroller architecture. A digital computer, memory system, input/output devices, microprocessor interface, busses and typical control signals.

ASSEMBLY LANGUAGE PROGRAMMING

- Assembly language programming: assembling and running an 8051 program, program counter, ROM, data types, flag bits, the PSW register, register banks and stack. Jump, Loop and CALL instruction. Time delay for various 8051 chips.

TIMER AND INTERRUPT PROGRAMMING

- Timer and interrupt: Interrupt Info, Interrupt Priority and Enable.

I/O PORT PROGRAMMING

- 8051 I/O programming and I/O bit manipulation programming.

8051 ADDRESSING MODES

- Immediate and register addressing modes. Accessing memory using various adressing modes.

ARITHMETIC AND LOGIC INSTRUCTIONS AND PROGRAM

- Arithmeric instructions. Signed number concepts and arithmetic operations. Logic and compare instructions, rotate instruction, data serialization, BCD, ASCII.

I/O INTERFACINGS AND APPLICATIONS

- Display interfacing: LED, Seven segment display. Display interfacing: Traffic light control. Analog interfacing: sampling, A/D and D/A converters, Direct motor speed control. Serial interfacing: RS232 I/O.

Practical

1. Lab 1: Introduction to assembly programming and Cross Assembler
2. Lab 2: Assembly programming 2 (Arithmetic)
3. Lab 3: Assembly programming 3 (Logic)
4. Lab 4: Simple Input & Output Controls (Switch and LED)
5. Lab 5: Interfacing with Seven Segments Display and ADC control

References

1. Muhammad Ali Mazidi, Janice Gillispie Mazidi, Rolin D. Mckinlay, "The 8051 Microcontroller and Embedded Systems Using Assembly and C", Pearson Edition, 2006
2. I. Scott Mackenzie and Raphael Chung-Wei Phan, " 8051 Microcontroller", 4th Edition, Prentice Hall, 2006.
3. Kenneth J. Ayala, " The 8051 Microcontroller – Architecture, Programming & Applications ", 2nd Edition, WEST, 1997.

DMT351/6
SEMESTRAL PROJECT

Course Outcomes

By the end of the course, the students should be able to:

1. Identify problem/project, managing and implementing the project, writing the report and presentation.
2. Demonstrate skills acquired in practical work.
3. Think logically; decide the right and effective approach in finding solutions.
4. Work independently and/or in teams
5. Apply theory into practical

Syllabus

The semestral projects are small scale research projects for final year students and expected to be completed within the same semester. The project are based on solving the engineering problem by understanding the problems, troubleshooting, identify, solves and finally report writing for the documentation purposes. The projects covered on Semiconductor Processing and IC Packaging, Microelectronic Materials, Failure Analysis and Electronic based project.

References

1. Any published material such as writing, multimedia or personal communication that related to the project topics.

DMT352/3
ELECTRONIC INSTRUMENTATION

Course Outcomes

By the end of the course, the students should be able to:

1. Describe, explain and apply the electronic measurement tools such as voltmeters, analog DC and AC meters.
2. Define, explain and construct the DC and AC bridge circuits to measure resistance, capacitance and inductance.
3. Identify, explain the function and solve the circuit of electronic measurement tools such as oscilloscopes and function generators.
4. Recognize and apply knowledge using power processing, transducers, sensors, filter and amplifier in circuit analysis.

Syllabus

INTRODUCTION TO INSTRUMENTATION

- Function, characteristic and elements of electronic instruments, error, type of error in measurement and apply the knowledge of statistical analysis error in electronic measurement.

DIRECT-CURRENT METERS

- The principles operation of d'Arsonval Meter Movement, the Ayrton Shunt and the using of d'Arsonval Meter Movement in DC Ammeter and DC Voltmeter. Circuit for Ayrton Shunt and d'Arsonval Meter Movement used in DC Ammeter and DC Voltmeter. Voltmeter Loading Effects and Ammeter Insertion Effects, Explain the operation of Ohmmeter and Multi-Range Ohmmeter.

ALTERNATING CURRENT METERS

- The circuit for d'Arsonval Meter Movement Used with Half-Wave Rectification and d'Arsonval Meter Movement Used with Full-Wave Rectification. Concept of Electrodynamometer Movement, Iron-Vane Meter Movement, Thermocouple Meter and Loading Effects of AC Voltmeters. Operation of Peak-to-Peak-Reading AC Voltmeters.

DIRECT CURRENT BRIDGES

- The circuit for Wheatstone Bridge and Kelvin Bridge, Digital Readout Bridges, Microprocessor-Controlled Bridges, and Bridges Controlled Circuit

ALTERNATING-CURRENT BRIDGES

- The circuit for Similar-Angle Bridge, Maxwell Bridge and Opposite-Angle Bridge. The circuit for Wien Bridge, Radio-Frequency Bridge, Schering Bridge.

OSCILLOSCOPES

- Basic construction of Oscilloscope. Beam Deflection of an oscilloscope, operation of Storage Oscilloscope, Sampling Oscilloscope and Digital Storage Oscilloscope. Vertical Amplifier, Horizontal Amplifier, and Sweep Generators.

SIGNAL GENERATORS

- Requirement for Oscillation, type of Audio Oscillators and Radio-Frequency Oscillators. Circuit for Audio Oscillators and Radio-Frequency Oscillators. The operation of Function Generators and Pulse Generators.

INTRODUCTION TO POWER PROCESSING

- Power Electronic and the Basics of Power Processing; AC-DC converter, DC-AC converter ,DC-DC converter, AC-AC converter and Power Rectifier. The circuit for AC-DC converter: Phase Angle Control; single phase half-wave and full-wave (R load, R-L load).

TRANSDUCERS AND SENSORS

- Transducers and: function for each transducer and sensors, Passive and Active transducers. Sensors: type of sensors, amplifier and filter, function of amplifier and filter, type of amplifier and filter.

Practical

1. Lab 1: Error in Measurement
2. Lab 2: Analog DC Voltmeters
3. Lab 3: The Wheatstone Bridge
4. Lab 4: d'Arsonval Galvanometer
5. Lab 5: Oscilloscope and Signal Generator
6. Lab 6: Sensors

References

1. Robert B. Gillies, *Quinsigamond Community College,* "Instrumentation and Measurement for Electronics Technicians", 2nd Edition, Prentice Hall, 1993.
2. Stanley Wolf, *California State University, Long Beach*, Richard F.M. Smith, *California State Polytechnic University, "*Student Reference Manual for Electronic Instrumentation Laboratories", 2nd Edition, Prentice Hall, 2003.
3. H.S . Kalsi "Electronic Instrumentation", 2nd edition, McGraw-Hill, 2004

DMT353/3
INTRODUCTION TO PROGRAMMBLE LOGIC CONTROLLER

Course Outcomes

By the end of the course, the students should be able to:
1. Define, summarize, describe the theory and basic concept of PLC and PLC hardware components
2. Produce, develop, create a PLC system using ladder diagram and mnemonic code.
3. Use, apply, change a timer and counter programming, editing and program observation

Syllabus

OVERVIEW OF PLC SYSTEM
- PLC history, fundamental aspect of PLC systems, advantages of a PLC control system. Differentiate PLC vs PC, PLC hardware, programming devices and PLC operation.

PLC HARDWARE COMPONENTS
- The introduction to input output devices, the basic principle of electric switching, type of switches such as toggle button, push button, selection switch, solenoid switch. The relay electromagnetic and solid state relay. The timer, contactor, sensor and actuator.

NUMBER SYSTEM AND FUNDAMENTALS OF LOGIC
- Overview of number system, decimal system, binary system, bits, bytes, and words, the hexadecimal number system. The conversion of numbers (binary to decimal, binary to hex and hex to decimal) and gate Boolean equations.

BASICS OF PLC PROGRAMMING
- Introduction to PLC programming language: ladder diagram symbols, basic programming instruction and mnemonic code. Ssystematic approaches of control system design using a PLC, the programming restrictions and self latching circuit.

PROGRAMMING TIMER AND COUNTER
- Operation of timers and counter: timer's types and counter, timer and counter programming and industrial applications.

Practical

1. Introduction to PLC
2. Ladder diagram & Mnemonic code
3. Advanced Ladder diagram & Mnemonic code
4. Programming a PLC Timer
5. Programming a PLC Counter
6. PLC programming using software programming

References

1. Frank D. Petruzella, "Programmable Logic Controllers", 3rd ed., *McGraw-Hill International.*, 2005
2. W. Bolton, "Programmable Logic Controllers", 5th ed., Elsevier Ltd., 2009
3. Jon Stenerson, "Fundamental of Programmable Logic Controllers, Sensors, and Communication", PEARSON-Prentice Hall, 2005.
4. Gary Dunning "Introduction to Programmable Logic Controller" 3rd ed., THOMSON DELMAR LEARNING, 2006

DMT354/3
INTRODUCTION TO CONTROL SYSTEMS

Course Outcomes

By the end of the course, the students should be able to:
1. Define, explain and illustrate the basic structure of control system.
2. Describe, transforms, solve and analyze control system problem into mathematical model.
3. Interpret, solve and analyze system performance.
4. Identify, solve and analyze system stability.

Syllabus

INTRODUCTION TO CONTROL SYSTEMS
- Basic concepts of control systems, control system examples in various applications, control system design process, classification of control system, open-loop and close-loop.

MATHEMATICAL MODELLING
- Transfer function, Laplace transform and Inverse Laplace transform to derive transfer function from differential

equation. Mathematical modeling by analyze electrical and mechanical system.

SYSTEM REPRESENTATION

- Block diagram and signal flow graph, transform block diagram to signal flow graph, block diagram and signal flow graph simplification to produce transfer function, Mason's rule reduction method.

TIME RESPONSE ANALYSIS

- Transient response and steady state response of a first and a second order system. Interpret zero and poles location towards system response, Analyze system performance.

STEADY-STATE ERRORS

- Test input signal and system type, steady state error from open-loop and close-loop transfer function, steady state error for unity and nonunity feedback system and static error constant.

LINEAR SYSTEM STABILITY

- Stability, instability and marginal stability, Routh-Hurwitz criterion, and system stability using Routh-Hurwitz criterion technique.

THE ROOT LOCUS TECHNIQUES

- Root locus concept and characteristics, root locus procedure, root locus and root contour. System stability by root locus technique.

FREQUENCY RESPONSE METHOD

- Frequency response, solve analytical expression for frequency response. Bode Plot asyptotic approximation sketch method. Sketch Bode Plot and calculate phase and gain margin. Determine system stability using Bode Plot.

CONTROLLER

- Basic introduction to PID Controller and function of PID.

Practical

1. Lab 1: Introduction To Matlab Simulink
2. Lab 2: Open-Loop & Close-Loop Systems Characteristics
3. Lab 3: Electrical & Mechanical Modeling
4. Lab 4: Time Response Analysis
5. Lab 5: Stability

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Pusat Pengajian Kejuruteraan

Pembuatan

PENGENALAN

Pada mulanya, Pusat Pengajian Kejuruteraan (PPK) Pembuatan ataupun singkatannya iaitu PPKP telah ditubuhkan dengan nama asalnya iaitu Pusat Pengajian Kejuruteraan (PPK) Sistem Pembuatan ataupun singkatannya PPKSP pada 1 Mac 2003. PPK Pembuatan telah ditubuhkan secara rasminya dengan pelantikan En Jamali Bin Md Sah selaku Pemangku Dekan bagi pusat pengajian ini. Seterusnya, cadangan pertukaran nama pusat pengajian daripada PPK Sistem Pembuatan kepada PPK Pembuatan telahpun diluluskan secara rasminya melalui surat yang diterima daripada Kementerian Pendidikan Tinggi bertarikh 30 Oktober 2004. Antara justifikasi besar berhubung perubahan nama pusat pengajian tersebut ialah disebabkan bidang Kejuruteraan Pembuatan yang merupakan satu bidang yang lebih luas jika dibandingkan dengan bidang Kejuruteraan Sistem Pembuatan atau dengan kata lain bidang Kejuruteraan Sistem Pembuatan adalah merupakan salah satu aspek yang dikaji dalam bidang Kejuruteraan Pembuatan itu sendiri.

Pada awal penubuhannya, PPK Pembuatan telahpun memulakan operasinya di lokasi Kompleks Pusat Pengajian yang terletak di Kubang Gajah, Arau. Namun, bermula pada tahun 2004 PPK Pembuatan secara rasminya telah dipindahkan ke lokasi pusat pengajiannya yang baru dan terletak di Kompleks Pusat Pengajian Jejawi bersama-sama dengan enam buah pusat pengajian yang lain pada waktu tersebut. Kemudian, PPK Pembuatan sekali lagi terpaksa dipindahkan ke lokasi baru yang terletak di Kompleks Pusat Pengajian Seberang Ramai, Kuala Perlis bermula pada 1 November 2007. Antara faktor utama perpindahan lokasi pusat pengajian kali yang kedua ini ialah untuk menampung keperluan bilik-bilik bagi staf-staf akademik di PPK Pembuatan yang semakin meningkat bilangannya; dan juga bagi memudahkan komunikasi antara staf-staf akademik dan para pelajar memandangkan majoriti daripada pelajar ditempatkan di kolej-kolej kediaman sekitar Kuala Perlis.

Sejajar dengan perkembangan industri yang semakin pesat membangun dan menjadi penyumbang utama kepada pertumbuhan ekonomi di Malaysia, PPK Pembuatan setakat ini telah menawarkan satu program pengajian di peringkat Diploma Kejuruteraan iaitu; Program Pengajian **Diploma Kejuruteraan (Kejuruteraan Pembuatan)**.

Secara umumnya, struktur kurikulum bagi bidang kejuruteraan pembuatan dirangka agar ianya dapat mewujudkan keseimbangan antara bidang pengkhususan teknikal dan juga pengurusan industri. Keseluruhan kursus teras yang ditawarkan mendedahkan pelajar kepada aspek-aspek penting dalam industri pembuatan khususnya kepada pengetahuan dan kemahiran dalam teknologi pembuatan. Teknologi pembuatan memberi tumpuan kepada pemilihan rekabentuk, bahan, proses pembuatan, penggunaan mesin, serta pengurusan pengeluaran supaya produk yang dihasilkan dapat memenuhi kehendak pengguna dan kos yang minimum.

Bagi program pengajian di peringkat Diploma Kejuruteraan ini, bilangan kredit yang diperlukan untuk menyempurnakan syarat penganugerahan Diploma Kejuruteraan ialah sebanyak 102 unit kredit, di mana 83 unit kredit adalah merangkumi kursus-kursus teras, manakala selebihnya 15 unit kredit adalah merangkumi kursus-kursus keperluan Universiti. Di samping itu, pelajar-pelajar tahun 3, semester pertama akan melaksanakan projek-projek yang berkaitan dengan program pengajian yang diikuti serta bersesuaian dengan keperluan industri. Selain itu, pelajar juga wajib menjalani Latihan Industri sekurang-kurangnya selama 16 minggu ketika berada dalam semester kedua, di tahun ketiga pengajian. Dengan adanya kemudahan makmal seperti Bilik Lukisan Kejuruteraan, Bengkel Proses Pembuatan, Kilang Mengajar, Makmal Pembuatan Termaju, Makmal Metrologi, Makmal Automasi, Makmal CAD/CAM, Makmal Termo-Bendalir dimana peralatannya setaraf dengan industri. Ini untuk melengkapkan pelajar-pelajar dengan pengetahuan dan kemahiran teknikal yang perlu di alam pekerjaan yang sebenar di industri-industri yang terpilih apabila pelajar telah memenuhi syarat untuk bergraduasi. Secara dasarnya, PPK Pembuatan telah diasaskan dengan matlamat umum untuk melahirkan tenaga mahir bukan sahaja dalam bidang

pengkhususan teknikal seperti rekabentuk, teknologi pembuatan dan pengurusan malah dilengkapi dengan kemahiran insaniah, keusahawanan, bahasa dan juga sistem maklumat.

Selain daripada itu, PPK Pembuatan juga turut menawarkan program Sarjana Muda Kejuruteraan (Kepujian) (Kejuruteraan Pembuatan), Sarjana Muda Kejuruteraan (Kepujian) (Kejuruteraan Rekabentuk Produk), Sarjana Sains (Kejuruteraan Pembuatan), Sarjana Sains (Kejuruteraan Rekabentuk Produk) dan Doktor Falsafah (Kejuruteraan Pembuatan).

Pada 1 November 2009, PPK Pembuatan telahpun mula berpindah ke kampus barunya dari Kompleks Pusat Pengajian PPK Pembuatan Seberang Ramai, Kuala Perlis ke Kampus Tetap di Ulu Pauh. Secara rasminya, PPK Pembuatan telahpun memulakan operasinya di kampus tetap tersebut dengan sepenuhnya selepas 2 minggu dari tarikh mulanya sesi perpindahan tersebut.

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- Sarjana Muda Teknologi Kejuruteraan Mekanikal (Pemesinan)
- Sarjana Sains (Kejuruteraan Pembuatan)
- Sarjana Sains (Kejuruteraan Rekabentuk Produk)
- Ph.D (Kejuruteraan Pembuatan)

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KURSUS-KURSUS YANG DITAWARKAN

1.	DPT102/3	STATICS AND DYNAMICS
2.	DPT114/3	TECHNOLOGY AND HANDWORK PRACTICE
3.	DPT122/3	ENGINEERING DRAWING AND COMPUTER AIDED DRAFTING (CAD)
4.	DPT103/3	MECHANICS OF MATERIALS
5.	DPT115/3	TECHNOLOGY AND MACHINING PRACTICE
6.	DPT123/2	3D CAD MODELING
7.	DPT214/3	PNEUMATIC AND HYDRAULIC SYSTEMS
8.	DPT211/2	MANUFACTURING PROCESS I
9.	DPT212/2	MANUFACTURING WORKSHOP PRACTICE
10.	DPT224/3	DESIGN I
11.	DPT252/3	BASIC ELECTRICAL TECHNOLOGY
12.	DPT202/3	THERMO-FLUID
13.	DPT215/3	MANUFACTURING AUTOMATION AND ROBOTICS
14.	DPT213/3	MANUFACTURING PROCESS II
15.	DPT222/2	CAD/CAM
16.	DPT225/3	DESIGN II
17.	DPT251/3	BASIC OF ELECTRONICS
18.	DPT351/3	SEMESTRAL PROJECT
19.	DPT334/2	MANUFACTURING ECONOMICS
20.	DPT331/3	FUNDAMENTALS OF INDUSTRIAL ENGINEERING
21.	DPT335/2	PRODUCTION PLANNING AND CONTROL
22.	DPT313/3	METROLOGY AND QUALITY CONTROL
23.	DPT321/3	INJECTION MOULD DESIGN
24.	DPT333/3	INDUSTRIAL SAFETY AND QUALITY MANAGEMENT

PELUANG KERJAYA

Graduan lulusan Diploma Kejuruteraan (Kejuruteraan Pembuatan) mempunyai peluang kerjaya yang amat cerah. Skop kerjaya sebagai seorang pembantu jurutera adalah luas dan mempunyai permintaan yang tinggi dari sektor swasta dan kerajaan. Peluang kerjaya yang ditawarkan oleh program ini adalah seperti berikut:

- Sebagai seorang pembantu jurutera di bahagian rekabentuk, proses pembuatan, kawalan kualiti, pengurusan, penyenggaraan, dan pengeluaran produk.
- Sebagai seorang pembantu jurutera yang mampu menyelesaikan sesuatu masalah yang melibatkan rekabentuk, proses dan pengeluaran di dalam industri pembuatan.
- Sebagai seorang pembantu jurutera dalam bidang penyelidikan dan pembangunan (R&D) di dalam sektor industi pembuatan atau kerajaan.

DIPLOMA IN MANUFACTURING ENGINEERING CURRICULUM						
YEAR	FIRST		SECOND		THIRD	
SEMESTER	FIRST	SECOND	FIRST	SECOND	FIRST	SECOND
ENGINEERING CORE COURSES	DQT101/3 Mathematics I	DQT102/3 Mathematics II	DQT203/3 Mathematics III	DPT202/3 Thermo-Fluid	DPT351/3 Semestral Project	DIT361/6 Industrial Training
	DPT102/3 Statics and Dynamics	DKT121/3 Basic Computer Programming	DPT214/3 Pneumatics and Hydraulic Systems	DPT215/3 Manufacturing Automation and Robotics	DPT334/2 Manufacturing Economics	
	DPT114/3 Technology and Handwork Practice	DPT103/3 Mechanics of Materials	DPT211/2 Manufacturing Process I	DPT213/3 Manufacturing Process II	DPT331/3 Fundamentals of Industrial Engineering	
	DPT122/3 Engineering Drawing and Computer Aided Drafting (CAD)	DPT115/3 Technology and Machining Practice	DPT212/2 Manufacturing Workshop Practice	DPT222/2 CAD/ CAM	DPT335/2 Production planning and Control	
		DPT123/2 3D CAD Modeling	DPT224/3 Design I	DPT225/3 Design II	DPT313/3 Metrology and Quality Control	
		DUT122/2 IT Skills	DPT252/3 Basic Electrical Technology	DPT251/3 Basic Electronics	DPT321/3 Injection Mould Design	
83	**12**	**16**	**16**	**17**	**16**	**6**
UNIVERSITY REQUIREMENT COURSES (19)	DUW123/2 Communication Skills		DUW235/2 Ethnic Relationship	DUW233/2 Islamic & Asian Civilization	DUW224/2 Engineering Entrepreneurship	
	DVW410/2 Malay Language	DVW212/2 English 2	DZWXXX/1 Badan Beruniform 3	DZWXXX/1 Badan Beruniform 4	DZWXXX/1 Badan Beruniform 5	
	DVW112/2 English 1	DZWXXX/1 Badan Beruniform 2				
	DZWXXX/1 Badan Beruniform 1					
19	**7**	**3**	**3**	**3**	**3**	
102	**19**	**19**	**19**	**20**	**19**	**6**

Course Code

Ex: ABC123/4
(**A**: Degree/Diploma Programme) ; (**B**: School) ; (**C**: Types of Courses) : (**1**: Stage (Stage 1, 2, 3 & 4)) ; (**2 & 3**: Course number) ; (/**4**: unit)

DPT 102/3
STATICS AND DYNAMICS

Course Outcome

By the end of the course, the students should be able to:

1. Define and describe basic concepts of physics related to static such as force, moment, Newton's First Law, Newton Third Law, trusses, frame and machine.
2. Apply basic concepts in describing, sketching and/or drawing free body diagram and solving static problems.
3. Define and describe basic concepts of physics related to dynamics, such as kinematics, kinetics, Newton Second Law, position, velocity, acceleration, work, energy, impulse and momentum.
4. Apply basic concepts in describing, sketching and/or drawing free body diagram and solving dynamic problems.

Course Syllabus

INTRODUCTION & STATICS OF PARTICLES
- Scalar and Vector
- Force Vector
- Cartesian Vector
- Rectangular components
- Forces in plane
- Vectors
- Rectangular components
- Equilibrium of A Particle and free body diagrams

EQUIVALENT SYSTEMS OF FORCE
- External and internal forces
- Vector product
- Moment of Force about a point
- Scalar product of two vectors
- Moment of couple
- Equivalent system of forces

EQUIVALENT OF RIGID
- Criteria for Equilibrium of Rigid Body
- Two-Dimensional Equilibrium
- Free-Body Diagram and Equilibrium Equation

FRICTION
- Dry friction
- Equilibrium of rigid bodies

ANALYSIS OF STRUCTURE
- Truss
- Frames and Machine

CENTROIDS AND CENTERS OF GRAVITY
- Centers of gravity of a two dimensional body
- Centroids of areas and lines
- First moments of areas
- Lines and composite plates and wires

KINEMATICS OF A PARTICLE
- Relations between position, velocity and acceleration for a particle in rectilinear and curvilinear motions.
- Dependent motion of two particles.

FORCE AND ACCELERATION
- Position, velocity and acceleration for a particle in rectilinear and curvilinear motions that are affected by the action of forces on rigid bodies.
- Accelerated motion of a particle using the equation of motion with different coordinate system.

WORK & ENERGY
- Work of a Force
- Kinetic Energy and Potential Energy
- Principle of Work & Energy
- Theorem of Conservation Energy

IMPULSE AND MOMENTUM
- Principle of Linear Impulse and Momentum
- Conservation of linear momentum for particles
- Mechanics of impacts

KINEMATICS OF RIGID BODIES
- Translation
- Rotation
- General motion of rigid bodies

Practical

1. Equilibrium of forces
2. Equilibrium of beam
3. Reaction of beam
4. Projectile motion
5. Momentum law of collision

References

1. Hibbeler, R. C. (2007), Engineering Mechanics Statics. 11th ed., Prentice Hall

2. Hibbeler, R. C.(2007), Engineering Mechanics Dynamics. 1th ed., Prentice Hall.
.3. Beer, F. B. and Johnston, E. R. Jr. (2004), Vector Mechanics for Engineers: Statics and Dynamics. 8th ed., Canada, McGraw_Hill
4. Beer and E.R. Johnson Jr. (2004), 'Vector Mechanics tor Engineer: Statics 8th ed. In SI Units', McGraw Hill.
5. Beer and E.R. Johnson Jr. (2004), 'Vector Mechanics tor Engineer: Dynamics 8th ed. In SI Units', McGraw Hill.
6. Meriam, J. L. and Kraige, L. G. (2003)., Engineering Mechanics: Statics. 5th ed., USA, SI ver. Wiley
7. Meriam, J. L. and Kraige, L. G(2003).., Engineering Mechanics: Dynamics. 5th ed., USA, SI ver. Wiley.

DPT 114/3
TECHNOLOGY AND HANDWORK PRACTICE

Course Outcome

By the end of the course, the students should be able to:
1. Define, describe and illustrate different type of manual production process (craftsmanship, e.g.: filing, chiseling, manual sawing, sheet metal, etc.).
2. Apply basic manual production techniques by selecting and using appropriate hand tools according to specifications and safety regulations.
3. Define, describe, and illustrate and use various types of measurement techniques and equipments.

Course Syllabus

INTRODUCTION TO HANDWORK AND SAFETY
- Introduction of craftsmanship workshop technology
- Manual production process and safety in the workshop

METROLOGY
- Quantities, unit and symbols
- Testing instruments
- Measurement equipments and errors

BASIC CUTTING PROCESS
- Fundamentals of basic cutting process
- Tools and process of marking out
- Filing, chiseling, manual sawing, countersinking and counter boring, drilling, tapping, reaming, and fasteners.

SHEET METAL FORMING
- Fundamentals of sheet metal forming process.
- Working tools and machinery, pattern and cutting metal, folding edges and making seams.

WELDING PROCESS
- Fundamentals of welding process
- Welding process such as oxyacetylene welding, flame cutting, arc welding and MIG/MAG welding process.

Practical

1. Fitting Work.
2. Fabrication Work.
3. Welding Work.

References

1. Steve F. Krar, Arthur R. Gill, Peter Smid. (2007), Technology of Machine Tools. 6th ed. Mc Graw Hill.
2. Mikell P. Groover. (2007), Fundamentals of Modern Manufacturing. 3rd ed. John Wiley & Sons, Inc.
3. S. Kalpakjian, S.R. Schmid. (2001), Manufacturing Engineering and Technology. 4th ed. Prentice Hall International.
4. John A. Schey. (2000), Introduction to Manufacturing Processes. Mc Graw Hill.

DPT 122/3
ENGINEERING DRAWING AND COMPUTER AIDED DRAFTING (CAD)

Course Outcome

By the end of the course, the students should be able to:
1. Define, describes, and apply technical drawing and drafting using proper technique.
2. Apply and produce technical drawing and drafting using AutoCAD software.
3. Define, describes, apply and identify basic Geometric Dimensioning and Tolerancing (GDT) on to technical drawing and drafting.

Course Syllabus

INTRODUCTIONS TO BASICS ENGINEERING DRAWING
- Sketching technique
- Technical drawing tools
- Drafting standards

INTRODUCTIONS TO CAD
- Computer Aided Drafting (CAD)
- Basic drawing, editing and toolbar for AutoCAD Software

GEOMETRIC CONSTRUCTION (ENGINEERING DRAWING)
- Drawing line in difference type and angle,simple geometrical shape, arcs tangent to each other, dividing a line and space into equal part and dividing an angle in half.

GEOMETRIC CONSTRUCTION (CAD)
- Coordinates system, drawing and editing command, and dimensioning in AutoCAD.

TECHNICAL SKETCHING (ENGINEERING DRAWING)
- Isometric and oblique sketching, and standard practices.

BASIC 3D CONSTRUCTION (CAD)
- 3D coordinate systems, user coordinates system, using the solids toolbar, using the view toolbar, using view point, creating solid models with extrude and revolve, extruding a shape, using Boolean operations, creating solid models revolution.

MULTIVIEW PROJECTION (ENGINEERING DRAWING)
- Orthographic projection, first angle projection, third angle projection and isometric projection.

MULTIVIEW PROJECTION (CAD)
- Convert a solid model (3D) to a multiview drawing using solview and soldraw.

SECTIONAL VIEW (ENGINEERING DRAWING & CAD)
- Cross-sectioned views and symbols, cutting plane or sectioned plane. Apply and Illustrate Types of cross-sectioned views-half sectioned and full sectioned views.

GEOMETRIC DIMENSIONING AND TOLERANCING (GDT)
- Dimensioning notations, dimensioning theory, dimensioning location systems, universal dimensioning standard, and calculating tolerance.

PRACTICAL

1. Introductions to basics engineering drawing
2. Introductions to CAD
3. Geometric Construction (Engineering Drawing)
4. Geometric Construction (CAD)
5. Technical Sketching (Engineering Drawing)
6. Basic 3D Construction (CAD)
7. Multiview Projection (Engineering Drawing)
8. Multiview Projection (CAD)
9. Sectional view (Engineering Drawing & CAD)
10. Geometric Dimensioning and Tolerancing (GDT)

References

1. Frederik E. Giesecke, Alva Mithell, Hendry Cecil, Ivan Leyoy Hell, Robert Olin, John Thomas Dygdon & James E. Novak. (2004), "Engineering Graphics", 8th edition, P.
2. James H. Earle. (2004), "Engineering Design Graphics", IIth ed., Pearson Prentice-Hall.
3. R.K Dhawan. (2002), "Lukisan Mesin: Dalam Unjuran Sudut Pertama", Cetakan Pertama, Golden Books Centre Sdn. Bhd.
4. Frederick E. Giesecke, Henry Cecil Spencer, John Thomas Dygdon, Alva Mitchell, Ivan Leroy , James E Novak. (2002), "Technical Drawing" 10th Ed., Prentice Hall.
5. M. R. Mainal, B. A. Ghani & Y. Samian. (2000), "Lukisan Kejuruteraan Asas", Edisi Kedua, UTM Skudai.

DPT 103/3
MECHANICS OF MATRIALS

Course Outcome

By the end of the course, the students should be able to:
1. Define and describe basic concepts and principles of mechanics of materials.
2. Discuss and analyze mechanical properties of specific materials through experimental methods.

3. Analyze stability of materials for a structure under shear, strain, torsion, bending and buckling.

Course Syllabus

STRESS
- Introduction to mechanics of materials
- Internal resultant loadings in a body.
- Normal and shear stress

STRAIN
- Normal strain
- Shear strain

MECHANICAL PROPERTIES OF MATERIALS
- Stress-strain diagram
- Mechanical properties
- Mechanics of materials

AXIAL LOAD
- Elastic deformation of a member subjected to axial load
- Statically indeterminate axially loaded member

TORSION
- Torsional loading to shaft/tube
- Torsion formula for solid and tubular shaft

BENDING
- Bending of a beams and shafts
- Shear and moment diagram for beams

BUCKLING
- Buckling
- Behavior of columns
- Critical load for a column.

Practical

1. Tensile test
2. Compression test
3. Bending test
4. Torsion test

References

1. Hibbeler, R.C. (2006)."Mechanics of Materials."5th ed Prentice Hall.
2. Beer and Johnson. (2006). Mechanics of Materials. 4th ed. McGraw-Hill.
3. Barber,J.R .,"Intermediate Mechanics of Materials." McGraw-Hill, 2001.
4. Madhuhar Vable., (2002). "Mechanics of Materials." Oxford.

DPT 115/3
TECHNOLOGY AND MACHINING PRACTICE

Course Outcome

By the end of the course, the students should be able to:
1. Define describe and explain conventional machining operation (milling, turning and grinding).
2. Operate lathe machine, milling machine and grinding machine and apply the safety precaution while working.
3. Interpret engineering drawings, and then convert raw materials to finished products by using metrology and machining process.

Course Syllabus

SAFETY
- Safety precaution in workshop

METROLOGY
- Introduction to quantities, unit &symbols, testing instruments (gages, etc)
- Measurement equipment (vernier caliper, micrometer, etc)
- Measurement errors

MILLING
- Introduction To Milling
- Types of Milling Cutter / Cutter Angles
- Mounting of Cutter
- Mounting of Workpiece
- Cutting Speed, Feed and Depth of cut.

TURNING
- Introduction to Lathe machine,
- Lathe Accessories and Cutting Speed, Feed, and Depth of Cut.
- Grinding lathe cutting tools
- Turning Operation 1 (Facing, Knurling, Grooving, Form Turning, Tapers and Taper Turning)
  Turning Operation 2 (Threads and Thread Cutting, Drilling, Boring, Reaming, and Tapping)

GRINDING
- Types of Abrasives, Surface Grinders and Accessories
- Surface Grinding Operations
- Cylindrical Grinders
- Universal Cutter
- Tool Grinder

Practical

1. Lathe Machining
2. Milling Machining
3. Grinding Machining

References

1. Steve F. Krar, Arthur R.Gill, Peter Smid. (2007), Technology of Machine Tools. 6th ed. Mc Graw Hill.
2. Mikell P. Groover. (2007), Fundamentals of Modern Manufacturing. 3rd ed. John Wiley & Sons, Inc.
3. S. Kalpakjian, S.R. Schmid. (2001), Manufacturing Engineering and Technology. 4th ed. Prentice Hall International.
4. John A. Schey. (2000), Introduction to Manufacturing Processes. McGraw Hill.

DPT 123/2
3D CAD MODELING

Course Outcome

By the end of the course, the students should be able to:

1. Design 3D model of components by using Unigraphics software.
2. Apply and produce technical/2D drawing using Unigraphics software.
3. Apply and produce assembly drawing and exploded drawing using Unigraphics software.
4. Apply and produce 3D animation and rendering for the components using Unigraphics software.

Course Syllabus

INTRODUCTIONS TO CAD

- Basic drawing
- Editing and toolbar for 3D Modeling Software
- Coordinate Systems & Reference features for designing in 3D Modeling Software

3D MODELING CONSTRUCTION

- Solid modeling, preference, layers, sub-functions, sketch, form feature, reference features, swept features, special features, library manager, associative features, primitives, feature operation, boolen operations, edit feature and model navigator

SURFACE MODELING

- Basic approach to surface modeling, WCS, curve, curve operation, free form feature, direct modeling

2D DRAFTING

- Convert a solid model (3D) to a multiview drawing using solview and soldraw.
- Cross-sectioned views and symbols, cutting plane or sectioned plane
- Cross-sectioned views-half sectioned and full sectioned views

EXPLODED VIEW AND ASSEMBLY DRAWING

- Assembly structure, mating conditions, component, exploded views, sequencing, wave, cloning, reports, context control, envelope, assembly navigator and assembly preferences.

RENDERING

- Photo rendering, adding lights, applying colors, textures, material and user defined image on an object

3D ANIMATION

- 3D animation to a design projects

References

1. James H. Earle. (2004), “Engineering Design Graphics”, IIth ed.,Pearson Prentice-Hall.
2. Frederick E. Giesecke, Henry Cecil Spencer, John Thomas Dygdon, Alva Mitchell, Ivan Leroy Hill, James E Novak. (2002), “Technical Drawing” 10th Ed., Prentice Hall.
3. R.K Dhawan. (2002), “Lukisan Mesin: Dalam Unjuran Sudut Pertama”, Cetakan Pertama, Golden Books Centre Sdn. Bhd.
4. Frederik E. Giesecke, Alva Mithell, Hendry Cecil, Ivan Leyoy Hell, Robert Olin, John Thomas Dygdon & James E. Novak. (2004), “Engineering Graphics”, 8th edition, Pearson.
5. A. N. Zulkifli, M. H. Omar & F. F. Mohamed, “Computer Aided Drafting”, UUM.

DPT 214/3
PNEUMATIC AND HYDRAULIC SYSTEMS

Course Outcome

By the end of the course, the students should be able to:
1. Describe, explain, and discuss concepts of Pneumatic & Hydraulic Systems.
2. Explain and illustrate the components and symbols of Pneumatic & Hydraulic Systems.
3. Apply and design simple circuits of Pneumatic Systems that related to industrial applications.
4. Apply and interpret the Electro-Pneumatic Systems applications.

Course Syllabus

FUNDAMENTAL OF PNEUMATIC SYSTEM
- Fundamental of Pneumatic System which include the Physical properties of air, Characteristics of air and Control theory.

COMPONENTS OF PNEUMATIC SYSTEM
- Pneumatic System structure
- Air Generation and Distribution
- Configuration and construction of Directional Control Valves, Non-return Valves, Flow control Valves, Pressure Valves and Combinational Valves which include the symbols and standards in Pneumatic System.

ACTUATORS AND OUTPUT DEVICES
- Types of Actuators
- Output Devices in Pneumatic System

DEVELOPMENT OF SINGLE AND MULTIPLE ACTUATORS CIRCUIT
- Direct and Indirect control of a pneumatic cylinder
- Logic functions (AND, OR)
- Control of multiple actuators
- Signal elimination by reversing valves

FUNDAMENTAL OF BASIC HYDRAULIC SYSTEM
- Hydraulic fluid, reservoirs or tanks, pumps, pressure reducing valves, directional control valves and actuators

PUMPS AND MOTORS
- Pumps Classification, Positive-Displacement Pumps, Volumetric Displacement, Volumetric Efficiency and Cavitations

VALVES AND CYLINDERS
- Valves operation
- Cylinder terminology

ELECTRO-PNEUMATIC SYSTEM
- Electro-Pneumatic System
- Systems components
- Development of single and multiple actuator circuits

FUNDAMENTAL CONTROL FOR ELECTRO-PNEUMATIC SYSTEM
- Feedback in electro-pneumatic controls
- System control chain

Practical

1. Pneumatic System.
2. Electro-Pneumatic Systems
3. Hydraulic System
4. Mini Project

References

1. P. Croser, J. Thomson. (1991), Electro-Pneumatics, Basic Level, Festo Didactic KG, D-7300 Esslingen 1.
3. Richard W. Vockroth. (1994), Industrial Hydraulics, Delmar.
4. Z. J. Lansky, Lawrence F. Schrader, JR. (1986), Industrial Pneumatic Control, Dekker.
5. Igor L. Krivts, German V. Krejnin. (2006), Pneumatics Actuating Systems for Automatic Equipment, Structure and Design, Taylor & Francis.
6. Peter Rohner, Gorden Smith. (1990) Pneumatic Control for Industrial Automation, Revised Edition, John Wiley & Sons.
6. Khairur Rijal Jamaludin. (2004), Reka Bentuk Sistem Kuasa Bendalir, Universiti Teknologi Malaysia.

DPT 211/2
MANUFACTURING PROCESS I

Course Outcomes

By the end of the course, the students should be able to:
1. Define, describe and illustrate the manufacturing processes.
2. Make selection material for manufacturing processes.

3. Identify the manufacturing processes to produce a quality product.

Course Syllabus

INTRODUCTION TO MANUFACTURING TECHNOLOGY
- Introduction to manufacturing processes and production systems

MECHANICAL PROPERTIES OF MATERIALS
- Mechanical properties and testing of materials
- Tension, compression, torsion, bending, hardness, fatigue, creep and impact test

MATERIALS SELECTION
- Metals, polymers, ceramics and composite

HEAT TREATMENT PROCESS
- Hardening, annealing, quenching, normalizing, and tempering

METAL CASTING PROCESS
- Sand casting, vacuum casting, investment casting, etc.

METAL FORMING PROCESS
- Rolling, forging, extrusion, drawing, etc.

PLASTIC-SHAPING PROCESSES
- Injection moulding, blow moulding, rotational moulding, thermoforming, rapid prototyping process

JOINING AND ASSEMBLY PROCESSES
- Welding, brazing, soldering, adhesive bonding, and mechanical fastening methods.

References

1. S. Kalpakjian, S.R. Schmid (2001). Manufacturing Engineering and Technology. 4th Ed. Prentice Hall International.
2. Groover, M.P. (2002). Fundamentals of Modern Manufacturing. 2nd ed. John Willey & Sons.
3. Schey, J.A. (2000). Introduction to Manufacturing Processes. 3rd ed. Mc-Graw Hill
4. Ostwald F.P., Jairo Munoz. (1997). Manufacturing Processes and Systems. 9th ed. John Wiley & Sons.
5. DeGarmo, E.P. Black, J T., Kohser, R A. (1997) Material and Processes in Manufacturing. 8th ed. John Wiley & Sons.
6. Zainal Abidin Ahmad. (1999). Proses Pembuatan. Jilid I. UTM: Cetak Ratu Sdn. Bhd.
7. Zainal Abidin Ahmad. (1999). Proses Pembuatan Jilid II. UTM: Cetak Ratu Sdn. Bhd.

DPT 212/2
MANUFACTURING WORKSHOP PRACTICE

Course Outcomes

By the end of the course, the students should be able to:
1. Describe and understand the rules in manufacturing laboratory.
2. Operate the machine and apply the safety precaution while working.
3. Produce finished product based on manufacturing technology.

Course Syllabus

BRIEFING
- Briefing on lab schedule, grouping, safety precautions and work evaluation.

LAB 1: HEAT TREATMENT 1
- Annealing, normalizing, quenching and tempering

LAB 2: HEAT TREATMENT 2
- Effects of different heat treatment processes and cooling rates have on the mechanical properties of a common structural steel.

LAB 3: SAND CASTING 1(PATTERN DESIGN)
- Produce the pattern that will be used in the sand casting process.

LAB 4: SAND CASTING 2 (MOULD MAKING)
- Produce the product by using the pattern that has been produced from earlier lab session.

LAB 5: VACUUM CASTING
- Produce the product by using vacuum casting process.

LAB 6: POWDER METALLURGY
- Produce the product by using powder metallurgy process.

LAB 7: INJECTION MOLDING
- Produce the product by using injection molding process.

LAB 8: RAPID PROTOTYPING – FUSED DEPOSITION MODELLING (FDM)

- Produce the product by using rapid prototyping – FDM process.

Practical

1. Heat Treatment Process.
2. Sand Casting Process.
3. Vacuum Casting Process.
4. Powder Metallurgy Process.
5. Injection Molding Process.
6. Rapid Prototyping Process.

References

1. S. Kalpakjian, S.R. Schmid. (2001), Manufacturing Engineering and Technology, 4th Ed, Prentice Hall International.
2. Groover, M.P (2002), Fundamentals of Modern Manufacturing. 2nd ed. John Wiley & Sons.
3. Schey, J.A. (2002) Introduction to Manufacturing Processes. 3rd ed. Mc-Graw Hill.
4. Ostwald, P.F., Jairo Munoz. (1997). Manufacturing Processes and Systems. 9th ed. John Wiley & Sons.
5. E. Paul DeGarmo, E.P., Black, J T., Kohser, R.A. (1997). Material and Processes in Manufacturing. 8th ed. John Wiley & Sons.
6. Zainal Abidin Ahmad. (1999). Proses Pembuatan. Jilid I. UTM: Cetak Ratu Sdn. Bhd.
7. Zainal Abidin Ahmad. (1999). Proses Pembuatan Jilid II. UTM: Cetak Ratu Sdn. Bhd.

DPT 224/3
DESIGN I

Course Outcomes

By the end of the course, the students should be able to:

1. Define, describe and remember the basic concept and procedures of engineering design process.
2. Apply all of the steps of engineering design process for design projects.
3. Acquire skills in CAD/CAE tools in engineering design application.
4. Deliver oral presentation and written report on the assinged engineering design project through effective teamwork and project management.

Course Syllabus

INTRODUCTION TO ENGINEERING DESIGN

- Principles of engineering design in product realization process

ENGINEERING DESIGN PROCESS

- Strategies, methods and means in the design process.

FORMULATING DESIGN PROBLEMS

- QFD tools for design problem's formulation.

CONCEPTUAL DESIGN

- Design concepts are generated, evaluated, and selected for further development.

GEOMETRIC DIMENSIONING & TOLERANCING (GDT)

- GDT techniques in drafting, modeling and manfacturing.

DESIGN FOR X

- DFM
- DFA

BUILDING PROTOTYPES

- Functions and importance of prototype in engineering design

ECONOMICS IN ENGINEERING

- Methods of engineering design costing

DOCUMENTATION AND PRESENTATION OF ENGINEERING DESIGN PROJECT

- Requirements for written report and oral presentation of the engineering design project.

Practical

1. Learning and familiarization of Unigraphic software commands.
2. Parts design using Unigraphic software.
3. Parts assembly using Unigraphic software.
4. Part analysis using Unigraphic software.

References

1. Rudolph J Eggert. (2005), Engineering Design, New Jersey: Prentice Hall.
2. B.Hyman. (2003), Fundamental of Engineering Design. 2nd Edition. New Jersey: Prentice Hall.

3. Ullman, D.G. The Mechanical Design Process. 2nd ed. McGraw Hill International Edition, 1997.
4. Dieter G. E. (1991). Engineering Design – A Materials and Processing Approach. McGram Hill.

DPT 252/3
BASIC ELECTRICAL TECHNOLOGY

Course Outcomes

By the end of the course, the students should be able to:

1. Define and explain the terms and units used in basic electrical system and apply the electrical laws and theorems to solve simple D.C circuits to determine the voltage, current, resistance and power.
2. Explain and calculate single phase and three phase A.C. circuits for its impedance, voltage, current, power and power factors.
3. Explain the basic concept of magnetic fields and the principle operation of transformer including the calculation for the induced E.M.F, equivalent resistance, reactance and impedance, regulation and efficiency.
4. Define and explain the concept and principles used in D.C. machines and three phase induction motor including the determination of E.M.F generated, back E.M.F, motor speed, losses and efficiency.

Course Syllabus

INTRODUCTION TO ELECTRIC SYSTEM

- Basic electrical system, electric current, charge, voltage, electromotive force, potential difference and resistance

DIRECT CURRENT (D.C) CIRCUITS

- Kirchhoff's law
- Superposition theorem
- Thevenin theorem
- Norton theorem

ALTERNATING CURRENT (A.C) CIRCUITS

- Alternating waveform for frequency,period,peak, average, r.m.s voltage and current, form and peak factor
- Impedance, voltage and current in single phase series and parallel a.c circuits for resistive, inductive and capacitive

THREE-PHASE SYSTEMS

- Star and Delta connection

ELECTROMAGNETISM

- Production of magnetic field is produced by electric currents.
- Application of screw rule in magnetism, Faraday's Law, Lenz's law and Fleming's right hand rule.

TRANSFORMERS

- Principle operation of a transformer.
- E.M.F induced in primary and secondary transformer.
- Equivalent circuit of transformer, regulation of transformer, and transformer efficiency.

DC MACHINES

- Characteristic of separately-excited generator and shunt-wound generator
- Characteristic of shunt-wound motor and series-wound motor
- Calculation generated e.m.f, back e.m.f, and efficiency of DC Machines

THREE PHASE INDUCTION MOTORS

- Calculation for the synchronous speed at the given of frequency in the stator windings, the slip, rotor speed, induction motor losses and efficiency.

Practical

1. Introduction to Basic Laboratory Equipment
2. Ohm's Law Relationship
3. Kirchhoff's Law
4. Thevenin and Norton Theorems
5. Three-Phase Wiring System
6. Single-Phase Transformer
7. DC Motor and generator
8. Three-Phase AC Induction Motor

References

1. John Bird. (2003), Electrical Circuit Theory and Technology. 2nd Edition, Newnes.
2. Edward Hughes. (2002), Electrical and Electronic Technology. 8th Edition, Prentice Hall.
3. Stephen J. Chapman. (2005), "Electric Machinery Fundamentals", 4th Edition, McGraw Hill.
4. Charles K. Alexander & Matthew Sadiku. (2001). "Fundamentals of Electric Circuits", International Edu., McGraw Hill.

5. V.K. Mehta. (1996), Principles of Electrical Engineering and Electronics.S.Chand.
6. Eugene C. Lister and Robert J. Ruch. (2000), Electric Circuits and Machines. 7th Edition, McGraw-Hill.

DPT 202/3
THERMO-FLUID

Course Outcomes

By the end of the course, the students should be able to:

1. Define, describe and explain an understanding of the principles of thermodynamics, heat transfer and fluid mechanics.
2. Make discriminating decisions concerning the practical engineering applications of these areas and reinforce their connectivity through analysis of thermal systems.
3. Applying the theory to solve a simple thermal systems through the knowledge gained in these courses. This includes: making appropriate simplifying assumptions and applying the relevant governing principles/ equations.
4. Discuss on fluid properties and fluids at rest. The fundamental laws governing the motion of fluids.

Course Syllabus

BASIC CONCEPTS OF THERMODYNAMICS

- Dimensions and units, thermodynamic system, boundary and surroundings, properties of a system, state and equilibrium, processes and cycles. state postulate, pressure and measuring devices, Pascal law, hydrostatic pressure, temperature and measuring devices, Zeroth law of thermodynamics, fluid properties.
- State postulate, pressure and measuring devices, Pascal law, hydrostatic pressure, temperature and measuring devices, Zeroth law of thermodynamics, fluid properties.

THE FIRST LAW THERMODYNAMICS

- Forms of energy: heat transfer, mechanical and non-mechanical works, conservation of energy, internal energy, enthalpy, first law of thermodynamics, energy balance, conservation of mass, continuity equation, mass flow rate, specific heat at constant volume for solids and liquids.

THERMODYNAMIC PROPERTIES OF LIQUIDS AND SOLIDS

- Phase change processes of pure substances, property diagrams of phase change processes, internal energy, enthalphy, fraction ratio, steam tables, Mollier charts.

HEAT TRANSFER MOD

- Mod of heat transfer (Conduction, Convection and Radiation). DISCUSS the Conduction, convection (Natural Convection and Forced Convection), radiation and combined of mod heat transfer.

CONTINUE (HEAT TRANSFER MOD)

- Mod of heat transfer (Conduction, Convection and Radiation). DISCUSS the Conduction, convection (Natural Convection and Forced Convection), radiation and combined of mod heat transfer.

FLUID IN STATICS

- Pressure and its variation in a stationary gas and liquid, standard atmosphere.

FLUID IN MOTION

- Description of fluid motion – streaklines, streamlines, behaviour of fluid motions, flow properties – velocity, convective and instantaneous acceleration, viscous flow, fluid properties-viscosity, Conservation of momentum, momentum theorem, Flow impinge on a flat plate.

MATHEMATICAL/GOVERNING EQUATION ON FLOW

- Euler equation, incompressible flow-Bernoulli equation.

BASIC TYPE OF FLOW

- Governing equations, boundary conditions, laminar flow, turbulent flow, Coutte flow, Poiseulle flow, boundary layer concepts, turbulent boundary layer over a flat plate, skin friction and drag

Practical

1. Temperature measurement
2. First Law Thermodynamics
3. Refrigerator/Air-Cond
4. Heat-Exchanger
5. Hydrostatic Pressure
6. Bernoulli's Theorem
7. Study of flow measurement device
8. Investigation of laminar & Turbulent flow stream
9. Flow through orifice & mouthpiece
10. Losses in pipe friction

References

1. Yunus A. Cengel and Robert H.Tunner. (2005), Fundamental of Thermal-Fluid Sciences, 2nd ed., McGraw-Hill.
2. Cengel, A. Y. and Boles, M. A. (2001), Thermodynamics: An Engineering Approach, 4th ed., McGraw Hill, New York.
3. Massey, B.S. (1998), Mechanics of Fluid, 7th ed., Chapman & Hall.
4. Douglas, J.F., Gasiorek, J.M. and Swaffield, J.A. (1995), Fluid Mechanics, 3rd ed., Addison Wesley Longman.
5. Rogers G.F.C and Mayhew Y.R. (1967), Engineering Thermodynamics: Work and Heat Transfer, 2nd ed., English Language Book Society and Longman Green & Co LTD.

DPT 215/3
MANUFACTURING AUTOMATION AND ROBOTICS

Course Outcomes

By the end of the course, the students should be able to:

1. Explain the concept of Automation System, Material Handling System, Safety and intergration of various devices.
2. Apply the Pneumatics and Hydraulic system which include industrial sensor using the FluidSIM software.
3. Explain and illustrate the concept of Robotics which include type of robots and the suitable application in industries.
4. Explain the fundamental of PLC and apply the PLC programming for simple application.

Course Syllabus

INTRODUCTION OF AUTOMATION
- Basic elements of an Automated System, Advanced Automation Functions and Level of Automation.

CONTROL TECHNOLOGIES
- Fundamental of Industrial Control Systems and Hardware Components for Automation and Process Control

MATERIAL HANDLING AND IDENTIFICATION TECHNOLOGIES
- Material Handling
- Material Transport Equipment
- Conventional Storage Methods and Equipment
- Automatic Identification and Data Capture

AUTOMATED PRODUCTION LINES AND ASSEMBLY SYSTEMS
- Fundamentals of Automated Production Lines and Automated Assembly System.
- Applications of Automated Production Lines

FLEXIBLE MANUFACTURING SYSTEMS (FMS)
- FMS Components, Applications and Benefits for Industries.

INTRODUCTION TO ROBOTICS
- General characteristic and component of an Industrial Robotics
- Robot manipulator, control unit and vehicle and robot's base.

ROBOTICS (END OF ARM TOOLING)
- Types and function of end-of arm tooling used in Industrial Robotics

ROBOTICS (INDUSTRIAL APPLICATION)
- Categories and types of robot application. EXPLAIN the advantages of using robots in industries.

ROBOT MAINTENANCE AND SEFTY
- Robotic safety, level of danger, safeguarding a work cell, operator, programmer and repair personnel, and interlocking devices.

FUNDAMENTALS OF PROGRAMMABLE LOGIC CONTROL (PLC)

- Ladder logic, CPU, programmer, input devices, and output devices.

INDUSTRIAL SENSORS

- Description of sensors and typical uses of digital and analog sensors

Practical

1. Pneumatic and Electro-pneumatic System.
2. Hydraulic System.
3. PLC System.
4. Robotic System.

References

1. Jon Stenerson. (2003), Industrial Automation and Process Control., Prentice Hall.
2. James A. Rehg, Glenn J. Sartori. (2007), Programmable Logic Controllers, Prentice Hall. New Jersey,
3. Jon Stenerson. (2004), Fundamentals of Programmable Logic Controllers, Sensors, and Communications, 3rd ed., Prentice Hall.
4. Khairur Rijal Jamaludin. (2004), Reka Bentuk Sistem Kuasa Bendalir, Universiti Teknologi Malaysia.
5. John S. Cundiff. (2002), Fluid Power Circuits and Controls, Fundamentals and Applications., CRC Press.
6. Mikell P. Groover. (2001), Automation, Production Systems, and Computer-Integrated Manufacturing, 2nd ed., Prentice Hall.

DPT 213/3
MANUFACTURING PROCESS II

Course Outcomes

By the end of the course, the students should be able to:

1. Explain computer numerical control (CNC) processes, tools related and control systems.
2. Generate or edit Numerical Control (NC) codes manually.
3. Explain the principles of operations of other advanced manufacturing processes and their applications.

Course Syllabus

INTRODUCTION TO CNC

- Introduction to evolution, advantages and disadvantages of CNC.

CNC HARDWARE BASICS

- Structure of CNC machine tools.
- Spindle design, drives, actuation systems, feedback devices, axes.

CNC MACHINE TOOLS AND CONTROL SYSTEM

- Machining centers, machine control unit, support system.
- Turning tool geometry and milling tooling system.
- Tool presetting, automatic tool changers, work holding, cutting speed, feed rate, and depth of cut.

CNC PROGRAMMING (MILLING)

- Acceptable CNC Milling machine programming practices.
- The sequence of machine operations.
- Tool compensation and how to program machine using linear movement and circular movement.

CNC PROGRAMMING (TURNING)

- Two main axes of movement associated with the CNC Turning machine
- The recommended sequence of machine operations.
- The use of tool setting using ATS and how to program a part using G70 and G71 canned cycles.

ELECTRICAL DISCHARGE MACHINING (EDM)

- The wire-feed EDM process.
- The basic components of a wire-feed EDM
- Concept of machining using EDM.

WATER JET MACHINING, ABRASIVE WATER JET MACHINING AND ABRSSIVE FLOW MACHINING

- Water jet machining and abrasive machining.
- Water Jet Machining (WJM), Abrasive Water Jet Machining (AWJM) and Abrasive Flow Machining (AFM)and also their advantages and limitations.

ELECTROCHEMICAL MACHINING, HIGH SPEED MACHINING AND LASER MANUFACTURING

- Electrochemichal Machining, High Speed Machining and Laser Manufacturing.
- The advantages of these machining operations.

Practical

1. CNC Milling Machine.
2. CNC Turning Machine.
3. CNC EDM Wire Cut.

References

1. Jon Stenerson. (2007), Kelly Curran, Computer Numerical Control Operation and Programming. 3rd ed., Prentice Hall.
2. P.N. Rao. (2002), CAD/CAM Principles and Applications, 2nd ed., Mc Graw Hill.
3. Smid. (2002), CNC Programming Handbook, 2nd ed., Industrial Press.
4. Steve Krar, Arthur Gill, Peter Smid. (2001), Computer Numerical Control Simplified, 1st ed., Industrial Press Inc. New York.
5. Mikell P. Groover. (2007), Fundamentals of Modern Manufacturing, 3rd ed., John Wiley & Sons, Inc.
6. S. Kalpakjian, S.R. Schmid. (2001), Manufacturing Engineering and Technology. 4th ed., Prentice Hall International.

DPT 222/2
CAD/CAM

Course Outcomes

By the end of the course, the students should be able to:

1. Utilize CAD/CAM system as part of product development process.
2. Generate part programming for machining process based on CAD file
3. Simulate and transfer part programming for Computer Numerical Control machining

Course Syllabus

INTRODUCTION TO CAD/CAM SYSTEM

- Introduction to CAD/CAM systems and its application in product development process.

GEOMETRIC MODELING SYSTEMS FOR CAD/CAM

- Wireframe modeling, surface modeling and solid modeling.

LAB 1: CAD DRAWING/ MODELING FOR CAM SYSTEM

- Techniques of CAD drawing/ modeling for CAM system using CAM software.
- Techniques in part programming. This includes hardware configuration, types of NC systems, manual and computer assisted part programming.

LAB 2: BASIC DRILL, POCKET, SLOT AND CONTOUR MILLING ON CAM SOFTWARE

- Techniques of basic drill, pocket, slot and contour.

LAB 3: ADVANCED POCKETING AND CONTOURING MILLING ON CAM SOFTWARE

- Techniques advanced pocketing, contouring and surface machining.

LAB 4: BASIC STRAIGHT AND CONTOUR TURNING ON CAM SOFTWARE

- Techniques of straight and contour turning.

LAB 5: TOOLPATH GENERATION, MODIFICATION AND VERIFICATION

- Techniques in toolpath generations, modifications and verifications using CAM software.

LAB 6: CNC CODE GENERATION USING CAM SOFTWARE AND MACHINE POST PROCESSOR

- Techniques in CNC code generation using CAM software post processor.

LAB 7: APPLY CNC PROGRAMMING TO ACTUAL MACHINING

- Technique of downloading CNC code into CNC machine; machine tools and table settings, etc.

Practical

1. CAD drawing/ modeling for CAM system
2. Basic drill, pocket, slot and contour milling on CAM software
3. Advanced pocketing and contouring milling on CAM software
4. Basic straight and contour turning on CAM software
5. Toolpath generations, modifications and verifications
6. CNC code generation using CAM software and machine post processor
7. Apply CNC programming to actual machining

References

1. P.N. Rao (2002). CAD/CAM Principles and Applications, Mc Graw Hill.
2. Lee, K. (1999). Principles of CAD/CAM/CAE. 1st ed. Prentice Hall.
3. McMahon, (1993). D/CAM from principles to practice. Addition-Wesley.
4. Kief, (1992). CNC reference guide. Waters McGraw-Hill.

DPT 225/3
DESIGN II

Course Outcomes

By the end of the course, the students should be able to:

1. Define and apply fundamental components in designning machine element.
2. Define and apply the basic principles in designning jig and fixtures.
3. Analyze simple design problems by using basic mechanical analysis.
4. Analyze simple design problems by using CAE software.

Course Syllabus

INTRODUCTION TO MACHINE COMPONENT
- Applications of machine components.

MACHINE DESIGN CONSIDERATION
- Deflection, strains energy method, Free Body Diagram, Stress Concentration, Steady and Variable Loading-Fatigue.

GEARS
- Design gear, gear features geometry, velocity ratio, contact ratio, and etc.

SHAFT
- Calculation of forces and torques on shafts and diameter required.

BELTS AND PULLEY
- Types and basic features of belts.
- Calculation of speed ratio, angle of contact and relationships between pitch length, centre distance sheave diameters and length of span.

CHAIN DRIVES
- Types and basic features of chain drives.
- Calculation and relation between center distance, chain length, number of teeth and diameter in sprocket and arc of contact.

MOTORS
- Types of motors used in machine.
- Motor selection factors, principle operation, speeds of AC and DC motor.

FASTENERS
- Types of fasteners, permanent joints and temporary joints

INTRODUCTION TO CAE SOFTWARE
- General application of CAE

Practical

1. Whirling of shafts
2. Plate clutch friction
3. Torsion
4. Worm gear
5. Spur gear
6. Belt drive
7. Chain drive
8. Introduction to CAE software

References

1. David H. Myszka. (2005), Machine and Mechanism: Applied Kinematics Analysis, Prentice Hall.
2. Spotts, etc. (2005). Design of Machine Elements. 8th ed. Prentice Hall.
3. Juvinall, R.C. dan Marshek, K.M. (2000), Fundamentals of Machine Component Design. 3rd ed. Wiley.
4. Shigley, J.E. and Mischke, C.R. (1989), Mechanical Engineering Design. 5th ed. McGraw-Hill.

DPT 251/3
BASIC ELECTRONICS

Course Outcomes

By the end of the course, the students should be able to:
1. Identify and explain electronic component.
2. Analyse electronic circuits.
3. Identify and describe the application of electronic devices.

Course Syllabus

INTRODUCTION TO BASIC ELECTRONICS
- Electronic Basic components, Semiconductors, Conductors, and Insulators.
- N-Type and P-type semiconductors.
- The PN junction.

DIODE APPLICATIONS
- Half-wave rectifier
- Full-wave rectifier
- Power supply filters
- Diode limiting and clamping

SPECIAL-PURPOSE DIODES
- Zener Diodes characteristic and applications.

BIPOLAR JUNCTION TRANSISTORS
- Transistor construction and operation
- Transistor characteristics and parameter

OPERATIONAL AMPLIFIER
- Introduction to Operational Amplifiers and Op-Amp parameters

NUMBER SYSTEMS AND CODES
- Binary-to-decimal conversion.
- Decimal-to-binary conversion.
- Octal number system.
- Hexadecimal number system.

LOGIC GATES AND BOOLEAN ALGEBRA
- Truth Tables, OR operation with OR Gates. AND Operation with AND gates. NOT operation. NOR gates and NAND gates.
- Boolean theorems and DeMorgan's theorems.

COMBINATIONAL LOGIC CIRCUITS
- Karnaugh map method
- Exclusive-OR and Exclusive-NOR circuits

ANALOG AND DIGITAL APPLICATION
- Application of Industrial analog and digital devices.

Practical

1. Rectifier Circuit
2. Zener Diode
3. Bipolar Junction Transistor Logic Gates
4. Op-Amp Inverting and Non-inverting Amplifiers
5. Logic Gates
6. DeMorgan's Theorem
7. Karnaugh Map

References

1. Knight, S. A. (1996). Electronics for Engineering. BH Newness.
2. Diefender, A. J. and Holtan, B. E. (1994). Principles of Electronic Instrumentation. 3rd ed. Saunders College.
3. Louis N. (1994). Introduction to Digital Technology. 4th ed. Prentice Hall.
4. Floyd, T. L. (1995*)*. Electronics Fundamentals, Circuits, Devices & Applications. Prentice Hall.

DPT 351/3
SEMESTRAL PROJECT

Course Outcomes

By the end of the course, the students should be able to:
1. Identify problem/project, managing and implementing the project, writing the report and presentation.
2. Demonstrate skills acquired in practical work
3. Think logically, decide the right and effective approach in finding solution.
4. Work independently and/or in team.
5. Apply theory into practical.

Course Syllabus

This course is implemented in individual or groups (maximum of 3 students per group) and should be completed in one semester period. The group should finished their project based on the human's life problem statement in engineering field which consists of design, mechanical, manufacturing, automation, electric and electronic. Besides that, each group will discuss with their project supervisor based on project's title and proposal paper, final report, log book, presentation and finished work (product).

References

1. Semestral Project's Guideline for Diploma Engineering Programmes, UniMAP, 2008.

2. Suitable reference (book, journal, internet, news paper, etc) for semestral project's.

DPT 334/2
MANUFACTURING ECONOMICS

Course Outcome

By the end of the course, the students should be able to:
1. Explain engineering economy and cost accounting concept and their role in decision making.
2. Apply engineering and cost accounting methods in solving cash flow problems.
3. Provide suitable solution for discrete cash flow problems.
4. Analyze money-time relationship.
5. Compare and get effective investment return.

Course Syllabus

INTRODUCTION
- General concepts, functions and the nature of the field of engineering economy and it's role in decision making.

UNDERSTANDING FINANCIAL STATEMENT
- Balance sheet, income statement and cash flow statement.

COST CONCEPTS
- Types of costs and economic studies.

COST & OVERHEAD
- Direct material cost, direct labour cost and overhead cost.
- Analysing cost using absorption/ traditional costing and activity based costing methods.

COST-VOLUME-PROFIT RELATIONSHIP
- Analysing breakeven by mathematically and graphically for both scenarios, price dependent on demand and price independent from demands.

DEPRRECIATION
- Depreciation concepts and terminology.(straight-line, declining-balance, sum-of-years digit, declining balance switchover to straight line and unit-production method).

MONEY-TIME RELATIONSHIP AND EQUIVALENCE
- Simple interest and compound interest
- Analysing uniform amount (A), present equivalent value (P) and future equivalent value (F) both mathematically and graphically (cash flow diagram

APPLICATION MONEY-TIME RELATIONSHIP
- Effective investment by using concept of equivalence (Present Worth, Annual Worth and Future Worth), internal rate of return (IRR), external rate of return (ERR), payback period and investment balance diagram.

COMPARING ALTERNATIVES
- Concept of equivalence, incremental IRR and incremental ERR methods.

References

1. Sullivan, W. G., Wicks, E. M. & Luxhoj, J. T. (2006) "Engineering Economy", 13/E, Prentice Hall.
2. Park, C.S. (2004) "Fundamental of Engineering Economics", Prentice Hall.
3. Park, C. S. (20067)"Contemporary Engineering Economics", 4/E, Prentice Hall, 2007.
4. Newnan, D. G., Eschenbach, T. G. and Lavelle, J. P. (2004) "Engineering Economics Analysis", Oxford.
5. Eschenbach, T. G. (2003), "Engineering Economy: Applying Theory to Practice", 2/E, Oxford.
6. Blank, L. and Tarquin, A. (2006), "Engineering Economy", 6/E, McGraw Hill.
7. Rigs, J. L., Bedworth, D. D. and Randhawa, S. U. (1197), "Engineering Economics", 4/E, McGraw Hill.

DPT 331/3
FUNDAMENTALS OF INDUSTRIAL ENGINEERING

Course Outcome

By the end of the course, the students should be able to:
1. Define, describe the Introduction of Industrial and Manufacturing Engineering, Ergonomics, Productivity and Safety
2. Describe and identify tools of the Facilities Planning, Work Study and Measurement, PPC, Ergonomics and QC for operation improvement

- Apply knowledge, techniques and tools of the Facilities Planning, Work Study and Measurement, PPC, Ergonomics and Productivity on solving industrial engineering problems for increasing productivity

Course Syllabus

INTRODUCTION TO INDUSTRIAL ENGINEERING
- Introduction Fundamental of Industrial Engineering in production and productivity.

MANUFACTURING ENGINEERING
- Product structure and specification, to ensure on product outcomes and process, evaluation on process cost and documentation.

FACILITIES PLANNING
- Facilities location, arrangement, strategic planning and material transportation.

WORK STUDY and MEASUREMENT
- Measurement and method on work study.

PRODUCTION PLANNING and CONTROL
- PPC elements, function and forecast; Aggregate Planning, MPS, Loading, Scheduling and Inventory Control.

ERGONOMICS
- Anthropometry and Design, Human-Machine System.

QUALITY CONTROL
- 7 QC Tools.

PRODUCTIVITY
- Productivity Measurement.

SAFETY
- General Safety Precaution on Work Place.

References

1. Turner, W.C. et. al. (1993), Introduction to Industrial and Systems Engineering, 3rd. ed. , Prentice Hall.
2. Fred E. Meyers, Matthew P. Stephens. (2004), Manufacturing Facilities Design and Material Handling. Prentice Hall.
3. Niebel , Benjamin; Freivalds, Andris. (2003), Methods, Standards, & Work Design. 11th Edition.
4. Lee, J. Krajewski & Larry, P. Ritzman. (2002), Operations Management Strategy and Analysis, 6th ed., Prentice Hall.

DPT 335/2
PRODUCTION PLANNING AND CONTROL

Course Outcome

By the end of the course, the students should be able to:
1. Define, describe and explain the fundamentals of Production Planning Systems which include of Forecasting methods, Capacity Planning, Aggregate Planning and Process & Facility Layout.
2. Apply, analyze and solve cases or problems on Production Planning Systems which include of Forecasting, Capacity Planning, Aggregate Planning and Process & Facility Layout.
3. Define, describe and explain the fundamentals of Production Management Systems which include of inventory and supply chain management. Material requirement planning(MRP) and Scheduling methods.
4. Apply, analyze and solve cases or problems on Production Management Systems which include of inventory management, material requirement planning(MRP) and Scheduling methods.

Course Syllabus

INTRODUCTION TO OPERATIONS MANAGEMENT
- Operation management, management process, decision making, historical evolution of operation management.

FORECASTING
- Forecasting processes, elements of forecasting, approaches, jugdement and opinion forecasting, time series data forecasting, forecasting techniques.

CAPACITY PLANNING
- Capacity requirements planning, determinants of effective capacity, capacity strategies, Calculation of the efficiency/utilization , cost-volume analysis, make or buy decison making, financial analysis.

PROCESS SELECTION & FACILITY LAYOUT
- Process selection, facilities layouts.
- Calculation of Line balancing.

AGGREGATE PLANNING
- Aggregate planning techniques, processes and inputs, approaches.
- Level strategies. Calculation of aggregate planning.

AGGREGATE PLANNING
- Calculation of Master scheduling, dissagregrate planning, rough-cut planning, projected-on-hand inventory.

INVENTORY MANAGEMENT
- Type and function of inventory system. Key terms in inventory, Economics Order Quantity (EOQ) models, Cost-minimization. Calculation costs, economic run-size.

MATERIALS REQUIREMENT PLANNING (MRP)
- Calculation of MRP inputs, Bill of materials (BOM), benefits and requirements of MRP, MRP processing.

PRODUCTION SCHEDULING
- Scheduling systems, objectives, loading, sequencing assignment methods, sequencing rules.

SUPPLY CHAIN MANAGEMENT
- Typical supply chain, logistics, supply chains issues, suppliers, purchasing cycle, Collaborative Planning, Forecasting, and Replenishment (CPFR).

References

1. Bruce T. Barkley, (2008), Project Management, In New Product Development. McGraw-Hill, New York, USA.
2. William J. Stevenson, (2005), Operations Management, McGraw-Hill, New York, Eighth Edition, USA.

DPT 313/3
METROLOGY AND QUALITY CONTROL

Course Outcome

By the end of the course, the students should be able to:
1. Define, describe and apply the concepts, tools and techniques in linear and angular measurement.
2. Define, describe and apply the concept, tools and techniques in surface measurement and coordinate measuring system.
3. Define, describe and apply the concept, tools and techniques in quality control.

Course Syllabus

INTRODUCTION TO METROLOGY AND QUALITY
- Introduction to metrology, measurement principle and quality.

LINEAR MEASUREMENT
- Measurement instruments such as vernier caliper, micrometer, profile projector, gage block, surface plate and other dimensional measurement instrument.

ANGLE MEASUREMENT
- Importance of circle in metrology and its relationship to angle measurement, the role of squares and the role of levels

SURFACE MEASUREMENT
- Significant of surface metrology and the instrument for surface measurement

COORDINATE MEASURING MACHINE
- Types, the role, modes of operation and application of CMM.

INTRODUCTION TO SEVEN BASIC QC TOOLS
- Basic QC tools such as check sheet, Flow chart, histogram, pareto chart, cause and effect diagram, scatter diagram and control chart.

CONTROL CHARTS FOR VARIABLES
- Control chart techniques, state of control, specifications, process capability and etc.

CONTROL CHARTS FOR ATTRIBUTES
- Control charts for nonconforming units, control charts for count of nonconformities, and etc.

FUNDAMENTALS OF ACCEPTANCE SAMPLING AND RELIABILITY
- Fundamentals concept of acceptance sampling and reliability.

Practical

1. Linear Measurement
2. Angular Measurement
3. Surface Measurement

4. Coordinate Measuring Machine
5. Application of basic QC tools
6. Application of variable control chart
7. Application of attribute control chart

References

1. Besterfield, D. H. (2004), Quality Control. 7th Edition, Upper Saddle River; New Jersey, Pearson Prentice Hall.
2. Dotson, C.L. (2006), Fundamentals of Dimensional Metrology. 5th Edition, Unites States, Thomson Delmar Learning.

DPT 321/3
INJECTION MOULD DESIGN

Course Outcome

By the end of the course, the students should be able to:
1. Define and describe basic terminology process in plastic injection molding and mould design.
2. Define and describe the procedure of designing plastic products for injection moulding process.
3. Apply Moldflow Plastic Insight (MPI) software for plastic part design.
4. Design the mould for plastic injection moulding by using Unigraphics software.

Course Syllabus

INTRODUCTION TO PLASTIC TECHNOLOGY
- Basic terminology process flow in plastic injection molding

GENERAL MOULD CONSTRUCTION CONCEPT
- Material in fabricate mould, types of gates, runner and venting
- Design of lifter, side pull, parting line, insert mould base size, engraving and texturing process.

DESIGNING PRODUCT WITH PLASTICS
- Type of polymeric material for producing product, product design consideration, product defect after injection process.

INJECTION MOULD DESIGN
- Design core, cavity, runner, gate, cooling channel, ejection system and assembly drawing

MOLDFLOW ANALYSIS
- Mold Flow software in plastic flow simulation inside cavities. Interprete the gate position, runner size and gate size.

INJECTION MOULDING CALCULATION
- Calculation the shot and plasticizing capacity, the cycle time, the clamping force and mould cost.

Practical

1. Part design using Unigraphics software.
2. Generating CAM data by using Unigraphics software.
3. Analyzing plastic flow inside mould by using Moldflow Plastic Insight software.
4. Assembly drawing mould for plastic injection moulding by using Unigraphics software.

References

1. R.G.W.Pye. (1991) Injection Mould Design, , Logman Scientific & Technical, 4th Edition.
2. G. Boothroyd, P. Dewhurst, W. Knight. (2002), 'Product Design for Manufacture and Assembly', 2nd Edition, Marcel Dekker Inc.
3. K. Stoechert. (1993), "Gastrow Injection Molds: 108 Proven Design", 2nd. Edition, Hanser Publisher, New York.
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5. L. Sors and I. Balazs. (1989) "Design of Plastic Moulds and Dies", Elsevier, Amsterdam.

22.0

Pusat Pengajian

Pembangunan Insan Dan Teknokomunikasi (iKOM)

PENGENALAN

Pusat Teknologi Komunikasi dan Pembangunan Insan (PTKPI) yang dahulunya dikenali sebagai Pusat Kemahiran Komunikasi dan Keusahawanan (PKKK) berfungsi sebagai satu Pusat Khidmat (Service Centre) yang dipertanggungjawabkan menguruskan kursus-kursus wajib universiti pada masa ini.

Menjelang tahun 2014, PTKPI mengorak langkah lebih maju dengan menawarkan satu program baharu iaitu Ijazah Sarjana Muda Komunikasi Media Baharu. Sehubungan itu, PTKPI akan dinaiktaraf sebagai sebuah Pusat Pengajian yang dikenali sebagai Pusat Pengajian Pembangunan Insan dan Teknokomunikasi (iKOM).

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KURSUS KEPERLUAN / WAJIB UNIVERSITI

Pelajar-pelajar program diploma perlu mengumpul 10 unit daripada kursus yang ditawarkan oleh iKOM mengikut pembahagian seperti berikut:

Kursus	Unit
Wajib Universiti	10
Jumlah	**10**

Senarai Kursus Wajib Universiti

Setiap pelajar perlu mengumpul 10 unit wajib universiti seperti yang dinyatakan di atas dengan mengambil senarai kursus seperti di bawah:

Kursus	Kod Kursus	Unit
Tamadun Islam & Tamadun Asia, TITAS	DUW233	2
Hubungan Etnik	DUW235	2
Keusahawanan Kejuruteraan	DUW224	2
Kemahiran Komunikasi	DUW123	2
Kemahiran Teknologi Maklumat	DUT 122	2
Jumlah unit		**10**

Bagi membantu pelajar mendaftar kursus wajib universiti secara lebih terancang pihak iKOM berinisiatif menyediakan jadual pendaftaran kursus mengikut program dan semester.

TAHUN	NAMA KURSUS [KOD]	SEMESTER 1	SEMESTER 2
PERTAMA	Kemahiran Teknologi maklumat / Information Technology Skills [DUT122]	• Kej. Elektrik • Kej. Komputer • Kej. Mikroelektronik	• Kej. Mekatronik • Kej. Metalurgi • Kej. Pembuatan
	Kemahiran Komunikasi / Communication Skills [DUW123]	• Kej. Mekatronik • Kej. Metalurgi • Kej. Pembuatan	• Kej. Elektrik • Kej. Komputer • Kej. Mikroelektronik
KEDUA	Tamadun Islam dan Tamadun Asia / Islamic Civilization and Asia Civilization [DUW233]	• Kej. Elektrik • Kej. Komputer • Kej. Metalurgi	• Kej. Mekatronik • Kej. Mikroelektronik • Kej. Pembuatan
	Hubungan Etnik / Etnic Relation [DUW235]	• Kej. Mekatronik • Kej. Mikroelektronik • Kej. Pembuatan	• Kej. Elektrik • Kej. Komputer • Kej. Metalurgi
	Keusahawanan Kejuruteraan / Engineering Entrepneurship [DUW224]	TIADA	• Kej. Komputer • Kej. Mikroelektronik
KETIGA	Keusahawanan Kejuruteraan / Engineering Entrepneurship [DUW224]	• Kej. Elektrik • Kej. Mekatronik • Kej. Metalurgi • Kej. Pembuatan	TIADA

KURSUS - KURSUS YANG DITAWARKAN

DUT122 Kemahiran Teknologi Maklumat/ Information Technology Skills

DUW123 Kemahiran Komunikasi / Communication Skills

DUW224 Keusahawanan Kejuruteraan / Engineering Entrepreneurship

DUW233 Tamadun Islam & Tamadun Asia (Titas) / Islamic Civilization And Asia Civilization (Titas)

DUW235 Hubungan Etnik /Ethnic Relation

KURSUS TERAS DAN WAJIB UNIVERSITI

DUT122
KEMAHIRAN TEKNOLOGI MAKLUMAT (INFORMATION TECHNOLOGY SKILLS)

Course Outcomes

By the end of the course, the students should be able to:
1. Gain a perspective of information technology.
2. Understand of why computers are essential components in business and society.
3. Explore the fundamentals of information technology such as the computer hardware, computer software, networking, the World Wide Web and communication technology.
4. Understand how to obtain and store information

Syllabus

- **BASIC INTRODUCTION TO COMPUTERS**
- **FUNDAMENTALS OF THE WORLD WIDE WEB AND INTERNET**
- **SOFTWARE FOR SYSTEMS**
- **SYSTEM UNIT COMPONENTS**
- **UNDERSTANDING INPUT**
- **UNDERSTANDING OUTPUT**
- **TYPES OF STORAGE**
- **TYPES OF UTILITY PROGRAMS AND OPERATING SYSTEMS**
- **NETWORKS AND COMMUNICATIONS**
- **MANAGING A DATABASE**
- **MANAGE COMPUTING SECURELY, SAFELY AND ETHICALLY**
- **EXPLORING INFORMATION SYSTEM DEVELOPMENT**
- **COMPUTER PROGRAMS AND PROGRAMMING LANGUAGES**
- **ENTERPRISE COMPUTING**
- **CAREERS IN COMPUTERS AND CERTIFICATION**

References

1. Shelly, G.B., Vermaat, M.E. (2011). *Discovering Computers, Complete: Your Interactive Guide to the Digital World.*
2. Shelly, G.B., Vermaat, M.E. (2010). *Discovering Computers 2011: Living in a Digital World*. Cengage Learning: Boston, USA.
3. Gallo, M.A. and Hancock, W.M, (2002) *Computer Communication and Networking Technologies*. Brooks / Cole
4. Horak, J (2002). *Communication: Systems and Networks.*2nd ed. M&T Books.
5. Littlejohn, S.W, (1999) *Theories of Human Communication*, Wadsworth Publishing.
6. Tanenbaum, A.S. (1996) *Computer Networks*, 3rd ed. Prentice – Hall Inc.

DUW123
KEMAHIRAN KOMUNIKASI (COMMUNICATION SKILLS)

Course Outcomes

By the end of the course, the students should be able to:
1. Define the terms and concepts of communication.
2. Explain/describe the skills of interpersonal communication.
3. Explain/describe the skills of small group communication.
4. Explain/describe the skills of organizational communication and leadership communication
5. Explain/describe the skills of intercultural communication

Course Syllabus

INTRODUCTION TO COMMUNICATION
- Definition of communication
- Communication model
- Types of communication
- Verbal and nonverbal communication

INTERPERSONAL COMMUNICATION
- Definition of interpersonal communication
- Interpersonal relationships and communication
- Skills in managing interpersonal conflicts
- Listening skills

SMALL GROUP'S COMMUNICATION
- Group's size
- Small group's interaction
- To develop and to raise the interpersonal reliance in small groups.
- Managing conflicts in group.

ORGANISATIONAL COMMUNICATION
- Definition of organization
- Definition of Organizational communication
- Introduction to the approach of communication in organization
- The Communication structure and linkages in organization
- Supportive communication and relationship in communication in organization

LEADERSHIP COMMUNICATION
- Definition: superior, leader, leadership
- Leadership theories
- Leadership and communication function in organization
- Superior behavioral management
- Subordinate's behavioral towards superior

INTERCULTURAL COMMUNICATION
- Cultural perspective
- Challenges in intercultural communication
- Guidance on how to communicate effectively in intercultural.

References

1. Beck, C.E. (1999). *Managerial communication: bridging theory and practice*. Prentice-Hall Inc.
2. Devito, J.A. (2003). *Human communication: the basic course.* 9th Ed. Pearson Education Inc.
3. Wood, J.T. (2004). *Communication mosaics: an introduction to the field of communication*. 3rd Ed. Wadsworth, Thomson Learning.
4. Stewart, J. and Logan, C. (1998). *Together: communicating interpersonally*. 5th Ed. McGraw-Hill.
5. Wilcox, D.L., Ault, P.H., Agee, W.K. and Cameron, G.T. (2001). **Essential** *of public relations*. Addison-Wesley Educational Publishers Inc.

DUW224
KEUSAHAWANAN KEJURUTERAAN (ENGINEERING ENTREPRENEURSHIP)

Course Outcomes

By the end of the course, the students should be able to:
1. To understand the principles of entrepreneurship and its importance in the business fields.
2. To identify the criterias that a person should need in order to be involved and be successful in the entrepreneurship fields.
3. To make an effective business plan.
4. To identify entrepreneurial opportunities that has beneficial potential.

Syllabus

INTRODUCTION TO ENTREPRENEUR AND ENTREPRENEURSHIP
- Definition of Entrepreneur and Entrepreneurship
- The Fundamental of Entrepreneurship
- The Risks of Entrepreneurship

BUSINESS OPPORTUNITIES
- Process of recognizing business opportunities
- Process of analyzing business opportunities
- Process of evaluating business opportunities
- Process of selecting business opportunities

THE FUNDAMENTAL OF BUSINESS
- Types of business in Malaysia
- Partnership and Sole Proprietorship
- Companies and Companies' Laws
- Contract, tender and invoice

BUSINESS PLANNING AND SPONSORSHIP/FINANCIAL SOURCES
- Marketing Plan
- Operational and Organization Plan
- Financial Plan
- Sponsorship/Financial Sources

ENTREPRENEURSHIP NETWORKING
- Definition of Networking
- Types of Entrepreneurship Networking
- The Importance of Entrepreneurship Networking
- Strategies and Development of Entrepreneurship Networking Technopreneurship

References

1. Ab. Aziz Yusof. (2000). *Usahawan dan Pengukuhan Jaringan Rakan Niaga*.; UUM.
2. Ab. Aziz Yusof (1999). *Asas – asas Keusahawanan*.; Prentice Hall, Petaling Jaya, Selangor.
3. Abu Bakar Hamed, Rusmala Mohd. Daud & Siti Nabila Abdul Khalid (1998). *Asas Pengurusan Perniagaan*.; UUM.
4. Donald F & Richard M.(1995). *Entrepreneurship A Contemporary Approach*. 3rd edition.; Dryden Press USA.

DUW 233
TAMADUN ISLAM & TAMADUN ASIA (TITAS)
(ISLAMIC CIVILIZATION AND ASIA CIVILIZATION)

Course Outcomes

By the end of the course, the students should be able:

1. To expose the student about the culture concept of Islam & Asian Culture.
2. To increase student's understand on fundamental of Islam & Asia Civilization
3. To expose the student on the Islam Hadari concept that been expose in Malaysia.
4. To expose the student with contemporary issues in Islam & Asian Civilization

Syllabus

INTRODUCTION TO CIVILIZATION KNOWLEDGE

- Civilization Concept
- Definition
- Features
- Objectives

INTERACTION OF DIFFERENT CIVILIZATION

- The Development of Malaysia Civilization
- Universal values in Civilization
- Similarities and Differences
- Examples of Interaction in history (language, arts and literature)

ISLAM IN MALAY CIVILIZATION AND ITS ROLE IN DEVELOPING MALAYSIAN CIVILIZATION

- Concept of Civilization
  - Definition
  - 8 Objectives
  - Basic in Islamic Civilization
  - Sources
- Islam in Malay Civilization
  - Existence Theory
  - Effect and Inference of Islam in Malay Civilizations
  - Islam Civilization
    - World's view on Islam Civilization
    - Specific and General Characteristic
    - Objective
    - Primer Sources
    - Islam in Malay Civilization
  - Roles of Malay Civilization in developing Malaysia Civilization
    - Islam Hadhari

CONTEMPORARY ISSUES IN ISLAM AND ASIA CIVILIZATION

- Western hegemony and globalization
  - Media
  - Politics
  - Social
  - Human Rights
- Perception on "Jihad"
- Environmental Crises
- Science and Ethics
- Effect on the contemporary development towards country and the society

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DUW 235
HUBUNGAN ETNIK
(ETHNIC RELATION)

Course Outcomes

By the end of the course, the students should be able:

1. To expose the student with plurality culture, society
2. To give understand on social cooperation in Malaysia & basic harmony ethic relationship.
3. To increase student understand on culture plurality challenges & ethic relationship in Malaysia.
4. To create awareness on Islam Hadhari concept of ethic relationship
5. To give learning experience to the student on social & Malaysian society culture

Syllabus

THE FUNDAMENTAL CONCEPTS OF ETHNIC RELATION

- Introduction to ethnic relation concepts i.e. cultural plurality, societies and concept of 'Islam Hadari'.

HISTORY OF PLURALITY IN MALAY SOCIETY.

PERLEMBAGAAN STATUTORY MALAYSIA-IN THE CONTEXT OF ETHNIC RELATION IN MALAYSIA

- **ECONOMICS IN THE CONTEXT OF ETHNIC RELATION IN MALAYSIA**
- **CHALLENGES OF ETHNIC RELATION IN MALAYSIA AND GLOBAL WORLD.**
- **POLITICS IN THE CONTEXT OF ETHNIC RELATION IN MALAYSIA**
- **THE CONCEPT OF "ISLAM HADHARI" AND ETHNIC RELATION.**
- **ETHNIC RELATION IN A WAY TO SOCIETY INTEGRATION**

References

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MAP
Majlis
Reebok

23.0

Pusat

Kejuruteraan

PENGENALAN

Penubuhan Pusat Kejuruteraan adalah untuk mengendalikan makmal-makmal dan bengkel-bengkel umum (gunasama) yang diperlukan oleh pelbagai program yang ditawarkan di UniMAP. Berlokasi di Kampus Pauh Putra, ia amat sesuai bagi mewujudkan suasana industi dan kejururuteraan yang sebenar.

Objektif penubuhan Pusat Kejuruteraan adalah untuk menawarkan kemudahan kepada kursus-kursus yang berteraskan latihan dan kemahiran teknikal di samping menyediakan kemudahan untuk aktiviti-aktiviti penyelidikan dan pembangunan produk. Konsep 'Teaching Factory' yang diperkenalkan di Pusat Kejuruteraan adalah untuk memberi pendedahan awal kepada pelajar suasana bekerja di industri. Di samping itu juga, hampir kesemua peralatan/ mesin di sini adalah teknologi terkini di industri.

Pusat Kejuruteraan diketuai oleh seorang Dekan, beliau turut di bantu oleh Timbalan Dekan, Pengerusi Rancangan, Pegawai Latihan Vokasional serta staf teknikal yang berpengalaman dalam bidang masing-masing. Bahagian pentadbiran pula diselia oleh Penolong Pendaftar, Pembantu Tadbir (Kesetiausahaan), Pembantu Tadbir (Perkeranian dan Operasi) dan Pembantu Am Pejabat.

Pusat Kejuruteraan menawarkan tiga kursus teras untuk pelajar-pelajar kejuruteraan pada peringkat ijazah iaitu:

- Engineering Skills / Kemahiran Kejuruteraan (ECT111)
- Engineering Skills / Kemahiran Kejuruteraan (ECT112)
- Engineering Skills / Kemahiran Kejuruteraan (PCT111)

Selain itu Pusat Kejuruteraan juga menawarkan kursus teras pada peringkat diploma iaitu:

- Basic Engineering Skills / Kemahiran Asas Kejuruteraan (DCT100)

Pusat Kejuruteraan turut menyediakan kursus-kursus serta latihan teknikal untuk kakitangan UniMAP dan pihak luar. Komposisi Pusat Kejuruteraan adalah terdiri daripada makmal dan bengkel pengajaran seperti berikut :

- **Makmal Fabrikasi PCB**
  Rekabentuk dan fabrikasi 'Printed Circuit Board' (PCB)

- **Makmal PLC**
  Aplikasi PLC dalam automasi

- **Makmal Komputer dan Makmal CAD/CAM**
  Perisian AUTOCAD, ORCAD dan MATLAB

- **Bengkel Pendawaian Elektrik**
  Pendawaian elektrik domestik & industri serta mesin elektrik.

- **Bengkel Kejuruteraan Mekanikal**
  Bengkel pemesinan konvensional (lathe, milling, grinding), gegas, pembentukan logam dan kimpalan (arc, gas)

- **Makmal Asas Komputer**
  Pemasangan komponen komputer dan perisian

- **Teaching Factory/ Kilang Mengajar**

- **Makmal Lukisan Kejuruteraan**

PROGRAM YANG DITAWARKAN

- Engineering Skills / Kemahiran Kejuruteraan (ECT111)
- Engineering Skills / Kemahiran Kejuruteraan (ECT112)
- Basic Engineering Skills / Kemahiran Asas Kejuruteraan (DCT100)
- Basic Engineering Skills / Kemahiran Asas Kejuruteraan (PCT111)

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DCT100/2
BASIC ENGINEERING SKILLS

Synopsis

The aim of this course is to provide students with basic engineering skills. This includes basic knowledge of computer, construction and measurement of electronic circuit, basic knowledge of electrical wiring and also an exposure to measurement techniques, fitting and sheet metal process. Besides that, an experience to the welding techniques and handling of mechanical machine are also offered. This course is 100% practical which carried out 2 units of credit hours.

Course Outcomes

By the end of the course, the students should be able to:-

1. Assemble and configuration of basic computer
2. Measuring and testing the electronic circuit
3. Understand and competent in constructing basic electrical wiring.
4. Apply basic skills of measurement technique fitting and sheet metal process
5. Apply basic skills of handling mechanical machines and welding techniques

Syllabus

BASIC COMPUTER
- Introduction to basic component of computer.
- Computer Assembly.
- Introduction to operating system and configurations.

ELECTRONIC CIRCUIT
- Schematic design using OrCAD.
- Prototyping technique.
- Test and measurement of electronic circuits.
- Introduction to basic PCB fabrication process.

ELECTRICAL WIRING
- Basic circuits wiring.
- 3-pin plug.
- Fluorescent lamp.

MECHANICAL
- Measurement techniques and tools.
- Fitting process.
- Sheet metal.
- Gas welding.
- Arc welding.
- Lathe machine.
- Milling machine.

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24.0

Pusat Kerjasama

Industri Dan Agensi Kerajaan

Pusat Kerjasama Industri dan Agensi Kerajaan (CIGC)

Pusat Kerjasama Industri dan Agensi Kerajaan (CIGC) berperanan menjalinkan hubungan dengan pihak industri dan agensi kerajaan dalam pelbagai aspek terutamanya bagi menjalankan program dan juga aktiviti yang berorientasikan dunia pengeluaran dan aplikasi kejuruteraan sebenar. Pusat ini juga melambangkan kepelbagaian penawaran program dan aktiviti akademik yang berteraskan penyertaan dan komitmen daripada pihak industri. Semua program dan aktiviti Pusat ini bakal menjadi sebahagian kursus dan aktiviti teras kejuruteraan yang mampu mempertingkatkan daya saing di dalam bidang rekabentuk, pemprosesan dan pengeluaran pelbagai produk yang berteraskan kejuruteraan. Antara program yang ditawarkan kepada pelajar adalah seperti Pendedahan Industri (IndEx), Kursus Keusahawanan Teknologi (IndEnt), Forum dan Seminar, Latihan Staf di Industri (Staff Internship), Ceramah Industri dan Industrial Training (InTra). Jadual program-program akan dihebahkan kepada pelajar dari semasa ke semasa.

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KURSUS DITAWARKAN

DIT361/6
INDUSTRIAL TRAINING

Course Outcomes

By the end of the course, the students should be able to:
1. Demonstrate engineering practice and professional attitude.
2. Apply theoretical knowledge and practical skills to application in industry.
3. Adapt to real working environment.
4. Develop soft skills (work etiquettes, communication, management, teamwork and etc).
5. Improve students' creativity skill and sharing ideas with other.

Syllabus

Students will be exposed to technical and application aspect as well as other aspect such as company organization structure, company operation, department function, work procedure, safety procedure, management, communication, technical skills, project costing and presentation. The students also need to submit their log book and final report at the end of Industrial Training.

Overall, the course is practical.
The minimum training duration for Industrial Training is 4 months.

References

UniMAP industrial training manual and log book.

UniMAP KE ARAH MS
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25.0

Pusat

Kokurikulum

PENGENALAN

Jabatan Pengajian Tinggi melalui surat bertarikh 3 Ogos 2008 telah mengarahkan Pusat Kokurikulum ditubuhkan di semua Institusi Pengajian Tinggi Awam (IPTA) Malaysia. Ini bertujuan mencapai matlamat seperti yang digariskan dalam Pelan Strategik Pengajian Tinggi Negara (PSPTN) bagi memperkasakan *learning outcome* melalui aktiviti kokurikulum.

Untuk makluman, dahulunya Unit Kokurikulum UniMAP ditubuhkan pada tahun 2002 dan diletakkan di bawah Pusat Kemahiran Komunikasi dan Keusahawanan (PKKK) ataupun dikenali sebagai Pusat Teknologi Komunikasi & Pembangunan Insan (PTKPI). Oleh yang demikian, Pusat Kokurikulum telah berpindah dan beroperasi pada tarikh 08 Jun 2010 bertempat di Taman Utara Jejawi (berdepan dengan bangunan JPJ Perlis). Pada tanggal 29 Julai 2010 dengan rasminya Pusat Kokurikulum telah dilancarkan penubuhannya oleh Y.Bhg. Dato' Naib Canselor UniMAP.

Di bawah Pusat KoKurikulum terdapat kursus-kursus Badan Beruniform dan Kokurikulum. Semua pelajar Diploma adalah diwajibkan untuk mengambil 5 Unit selama 5 semester. Untuk makluman, Pusat Kokurikulum telah menawarkan sebanyak 7 kursus Badan Beruniform untuk pelajar Diploma tanpa mengira program akademik yang diambilnya.

KURSUS BADAN BERUNIFORM YANG DITAWARKAN OLEH PUSAT KOKURIKULUM

Pelajar-pelajar program diploma perlu mengumpul 5 unit daripada kursus yang ditawarkan mengikut pembahagian seperti berikut sepanjang pangajian.

BIL	SENARAI KURSUS	KOD KURSUS	TAHUN / SEMESTER	UNIT	PRA SYARAT PENDAFTARAN
1.	PALAPES Darat I [Army ROTU I]	DZW107	TAHUN 1 / SEM I	1	Perlu lulus ujian kelayakan
	PALAPES Darat II [Army ROTU II]	DZW108	TAHUN 1 / SEM II	1	Lulus kursus DZW107
	PALAPES Darat III [Army ROTU III]	DZW207	TAHUN 2 / SEM I	1	Lulus kursus DZW108
	PALAPES Darat IV [Army ROTU IV]	DZW208	TAHUN 2 / SEM II	1	Lulus kursus DZW207
	PALAPES Darat V [Army ROTU V]	DZW307	TAHUN 3 / SEM I	1	Lulus kursus DZW208
	PALAPES Darat VI [Army ROTU VI]	DZW308	TAHUN 3 / SEM II	1	Lulus kursus DZW307
2.	Kumpulan Latihan KelanaSiswa Malaysia I (KLKM I) [Malaysian University Rover Training Group I (MURTG I)]	DZW111	TAHUN 1 / SEM I	1	Tiada
	Kumpulan Latihan KelanaSiswa Malaysia II (KLKM II) [Malaysian University Rover Training Group II (MURTG II)]	DZW112	TAHUN 1 / SEM II	1	Lulus kursus DZW111
	Kumpulan Latihan KelanaSiswa Malaysia III (KLKM III) [Malaysian University Rover Training Group III (MURTG III)]	DZW211	TAHUN 2 / SEM I	1	Lulus kursus DZW112
	Kumpulan Latihan KelanaSiswa Malaysia IV (KLKM IV) [Malaysian University Rover Training Group IV (MURTG IV)]	DZW212	TAHUN 2 / SEM II	1	Lulus kursus DZW211
	Kumpulan Latihan KelanaSiswa Malaysia V (KLKM V) [Malaysian University Rover Training Group V (MURTG V]	DZW311	TAHUN 3 / SEM I	1	Lulus kursus DZW212

BIL	SENARAI KURSUS	KOD KURSUS	TAHUN / SEMESTER	UNIT	PRA SYARAT PENDAFTARAN
3.	Briged Bomba dan Penyelamat I [Fire and Rescue Briged I]	DZW113	TAHUN 1 / SEM I & II	1	Tiada
	Briged Bomba dan Penyelamat II [Fire and Rescue Briged II]	DZW114	TAHUN 1 / SEM II	1	Lulus kursus DZW113
	Briged Bomba dan Penyelamat III [Fire and Rescue Briged III]	DZW213	TAHUN 2 / SEM I	1	Lulus kursus DZW114
	Briged Bomba dan Penyelamat IV [Fire and Rescue Briged IV]	DZW214	TAHUN 2 / SEM II	1	Lulus kursus DZW213
	Briged Bomba dan Penyelamat V [Fire and Rescue Briged V]	DZW313	TAHUN 3 / SEM I	1	Lulus kursus DZW214
4.	Bulan Sabit Merah Malaysia I (BSMM I) [Malaysian Red Crescent I (MRC I)]	DZW115	TAHUN 1 / SEM I	1	Tiada
	Bulan Sabit Merah Malaysia II (BSMM II) [Malaysian Red Crescent II (MRC II)]	DZW116	TAHUN 1 / SEM II	1	Lulus kursus DZW115
	Bulan Sabit Merah Malaysia III (BSMM III) [Malaysian Red Crescent III (MRC III)	DZW215	TAHUN 2 / SEM I	1	Lulus kursus DZW116
	Bulan Sabit Merah Malaysia IV(BSMM IV) [Malaysian Red Crescent IV (MRC IV)	DZW216	TAHUN 2 / SEM II	1	Lulus kursus DZW215
	Bulan Sabit Merah Malaysia V (BSMM V) [Malaysian Red Crescent V (MRC V)	DZW315	TAHUN 3 / SEM I	1	Lulus kursus DZW216
5.	Pertahanan Awam I [Civil Defense I]	DZW117	TAHUN 1 / SEM I	1	Tiada
	Pertahanan Awam II [Civil Defense II]	DZW118	TAHUN 1 / SEM II	1	Lulus kursus DZW117
	Pertahanan Awam III [Civil Defense III]	DZW217	TAHUN 2 / SEM I	1	Lulus kursus DZW118
	Pertahanan Awam IV [Civil Defense IV]	DZW218	TAHUN 2 / SEM II	1	Lulus kursus DZW217
	Pertahanan Awam V [Civil Defense V]	DZW317	TAHUN 3 / SEM I	1	Lulus kursus DZW218

BIL	SENARAI KURSUS	KOD KURSUS	TAHUN / SEMESTER	UNIT	PRA SYARAT PENDAFTARAN
6.	Pandu Puteri Siswi I (PPS I) [Girl Guide I (GG I)]	DZW119	TAHUN 1 / SEM I	1	Tiada
	Pandu Puteri Siswi II (PPS II) [Girl Guide II (GG II)]	DZW120	TAHUN 1 / SEM II	1	Lulus kursus DZW119
	Pandu Puteri Siswi III (PPS III) [Girl Guide III (GG III)]	DZW219	TAHUN 2 / SEM I	1	Lulus kursus DZW120
	Pandu Puteri Siswi IV (PPS IV) [Girl Guide IV (GG IV)]	DZW220	TAHUN 2 / SEM II	1	Lulus kursus DZW219
	Pandu Puteri Siswi V (PPS V) [Girl Guide V (GG V)]	DZW319	TAHUN 3 / SEM I	1	Lulus kursus DZW220
7.	St. John Ambulans Malaysia I [Malaysian St. John Ambulance I]	DZW121	TAHUN 1 / SEM I	1	Tiada
	St. John Ambulans Malaysia II [Malaysian St. John Ambulance II]	DZW122	TAHUN 1 / SEM II	1	Lulus kursus DZW121
	St. John Ambulans Malaysia III [Malaysian St. John Ambulance III]	DZW221	TAHUN 2 / SEM I	1	Lulus kursus DZW122
	St. John Ambulans Malaysia IV [Malaysian St. John Ambulance IV]	DZW222	TAHUN 2 / SEM II	1	Lulus kursus DZW221
	St. John Ambulans Malaysia V [Malaysian St. John Ambulance V]	DZW321	TAHUN 3 / SEM I	1	Lulus kursus DZW222

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KURSUS - KURSUS YANG DITAWARKAN DAN SILIBUS KURSUS PUSAT KOKURIKULUM

KURSUS BADAN BERUNIFORM

DZW107	PALAPES Darat I [Army ROTU I]
DZW108	PALAPES Darat II [Army ROTU II]
DZW207	PALAPES Darat III [Army ROTU III]
DZW208	PALAPES Darat IV [Army ROTU IV]
DZW307	PALAPES Darat V [Army ROTU V]
DZW308	PALAPES Darat VI [Army ROTU VI]
DZW111	Kumpulan Latihan KelanaSiswa Malaysia I (KLKM I) [Malaysian University Rover Training Group I (MURTG I)]
DZW112	Kumpulan Latihan KelanaSiswa Malaysia II (KLKM II) [Malaysian University Rover Training Group II (MURTG II)]
DZW211	Kumpulan Latihan KelanaSiswa Malaysia III (KLKM III) [Malaysian University Rover Training GroupIII (MURTG III)
DZW212	Kumpulan Latihan KelanaSiswa Malaysia IV (KLKM IV) [Malaysian University Rover Training Group IV (MURTG IV)

DZW311 Kumpulan Latihan KelanaSiswa Malaysia V (KLKM V)
[Malaysian University Rover Training Group V (MURTG V)

DZW113 Briged Bomba dan Penyelamat I
[Fire and Rescue Briged I]

DZW114 Briged Bomba dan Penyelamat II
[Fire and Rescue Briged II]

DZW213 Briged Bomba dan Penyelamat III
[Fire and Rescue Briged III]

DZW214 Briged Bomba dan Penyelamat IV
[Fire and Rescue Briged IV]

DZW313 Briged Bomba dan Penyelamat V
[Fire and Rescue Briged V]

DZW115 Bulan Sabit Merah Malaysia I (BSMMI)
[Malaysian Red Crescent I (MRC I)]

DZW116 Bulan Sabit Merah Malaysia II (BSMM II)
[Malaysian Red Crescent II (MRC II)]

DZW215 Bulan Sabit Merah Malaysia III (BSMM III)
[Malaysian Red Crescent III (MRCIII)]

DZW216 Bulan Sabit Merah Malaysia IV (BSMM IV)
[Malaysian Red Crescent IV (MRCIII)]

DZW315 Bulan Sabit Merah Malaysia V (BSMM V)
[Malaysian Red Crescent V (MRC V)]

DZW117 Pertahanan Awam I
[Civil Defense I]

DZW118 Pertahanan Awam II
[Civil Defense II]

DZW217 Pertahanan Awam III
[Civil Defense III]

DZW218 Pertahanan Awam IV
[Civil Defense IV]

DZW317 Pertahanan Awam V
[Civil Defense V]

DZW119 Pandu Puteri Siswi I (PPS I)
[GG I (PPS I)]

DZW120 Pandu Puteri Siswi II (PPS II)
[GG II (PPS II)]

DZW219 Pandu Puteri Siswi III (PPS III)
[GG III (PPS III)]

DZW220 Pandu Puteri Siswi IV (PPS IV)
[GG IV (PPS IV)]

DZW319 Pandu Puteri Siswi V (PPS V)
[GG V (PPS V)]

DZW121 St. John Ambulans Malaysia I [Malaysia St. John Ambulance I]

DZW122 St. John Ambulans Malaysia II [Malaysia St. John Ambulance II]

DZW221 St. John Ambulans Malaysia III [Malaysia St. John Ambulance III]

DZW222 St. John Ambulans Malaysia IV [Malaysia St. John Ambulance IV]

DZW321 St. John Ambulans Malaysia V [Malaysia St. John Ambulance V]

KURSUS BADAN BERUNIFORM

DZW107
PALAPES DARAT I /(ROTU ARMY I)

Course Outcomes

Diakhir kursus ini pelajar dapat:-
1. Menggunakan dan mengaplikasikan pengetahuan dalam kursus Badan Beruniform
2. Menggunakan pengetahuan dan teknik-teknik kemahiran dalam kursus Badan Beruniform
3. Mengaplikasikan aspek-aspek keselamatan semasa menjalani aktiviti-aktiviti dan latihan dalam kursus Badan Beruniform

Silibus

- Modul latihan bagi PALAPES Darat adalah berpandukan kepada modul yang dikeluarkan oleh Kolej Tentera Darat ATM yang dibahagikan kepada tiga (3) peringkat latihan
- Semester 1 dan 2 - Peringkat Junior

Rujukan

1. Modul Latihan dari Kolej Tentera Darat ATM
2. Buku Panduan Senjata-senjata Kompeni, Kementerian Pertahanan Malaysia, 2004
3. Buku Panduan Askar Wataniah, Kementerian Pertahanan Malaysia, 1995

DZW108
PALAPES DARAT II / (ROTU ARMY II)

Course Outcomes

Diakhir kursus ini pelajar dapat:-
1. Menggunakan dan mengaplikasikan pengetahuan dalam kursus Badan Beruniform
2. Menggunakan pengetahuan dan teknik-teknik kemahiran dalam kursus Badan Beruniform
3. Mengaplikasikan aspek-aspek keselamatan semasa menjalani aktiviti-aktiviti dan latihan dalam kursus Badan Beruniform

Silibus

- Modul latihan bagi PALAPES Darat adalah berpandukan kepada modul yang dikeluarkan oleh Kolej Tentera Darat ATM yang dibahagikan kepada tiga (3) peringkat latihan
- Semester 1 dan 2 - Peringkat Junior

Rujukan

1. Modul latihan dari Kolej Tentera Darat ATM
2. Buku Panduan Senjata-senjata Kompeni, Kementerian Pertahanan Malaysia, 2004
3. Buku Panduan Askar Wataniah, Kementerian Pertahanan Malaysia, 1995

DZW207
PALAPES DARAT III /
(ROTU ARMY III)

Course Outcomes

Diakhir kursus ini pelajar dapat:-
1. Menggunakan dan mengaplikasikan pengetahuan dalam kursus Badan Beruniform
2. Menggunakan pengetahuan dan teknik-teknik kemahiran dalam kursus Badan Beruniform
3. Mengaplikasikan aspek-aspek keselamatan semasa menjalani aktiviti-aktiviti dan latihan dalam kursus Badan Beruniform

Silibus

- Modul latihan bagi PALAPES Darat adalah berpandukan kepada modul yang dikeluarkan oleh Kolej Tentera Darat ATM yang dibahagikan kepada tiga (3) peringkat latihan
- Semester 1 dan 2 - Peringkat Junior
- Semester 3 dan 4 - Peringkat Intermediate
- Semester 5 dan 6 - Peringkat Senior

Rujukan

1. Modul latihan dari Kolej Tentera Darat ATM
2. Buku Panduan Senjata-senjata Kompeni , Kementerian Pertahanan Malaysia, 2004
3. Buku Panduan Askar Wataniah, Kementerian Pertahanan Malaysia, 1995

DZW208
PALAPES DARAT IV / (ROTU ARMY IV)

Course Outcomes

Diakhir kursus ini pelajar dapat:-
1. Menggunakan dan mengaplikasikan pengetahuan dalam kursus Badan Beruniform
2. Menggunakan pengetahuan dan teknik-teknik kemahiran dalam kursus Badan Beruniform
3. Mengaplikasikan aspek-aspek keselamatan semasa menjalani aktiviti-aktiviti dan latihan dalam kursus Badan Beruniform

Silibus

- Modul latihan bagi PALAPES Darat adalah berpandukan kepada modul yang dikeluarkan oleh Kolej Tentera Darat ATM yang dibahagikan kepada tiga (3) peringkat latihan
- Semester 1 dan 2 - Peringkat Junior
- Semester 3 dan 4- Peringkat Intermediate
- Semester 5 dan 6- Peringkat Senior

Rujukan

1. Modul latihan dari Kolej Tentera Darat ATM
2. Buku Panduan Senjata-senjata Kompeni, Kementerian Pertahanan Malaysia, 2004
3. Buku Panduan Askar Wataniah, Kementerian Pertahanan Malaysia, 1995

DZW307
PALAPES DARAT V / (ROTU ARMY V)

Course Outcomes

Diakhir kursus ini pelajar dapat:-
1. Menggunakan dan mengaplikasikan pengetahuan dalam kursus Badan Beruniform
2. Menggunakan pengetahuan dan teknik-teknik kemahiran dalam kursus Badan Beruniform
3. Mengaplikasikan aspek-aspek keselamatan semasa menjalani aktiviti-aktiviti dan latihan dalam kursus Badan Beruniformm

Silibus

- Modul latihan bagi PALAPES Darat adalah berpandukan kepada modul yang dikeluarkan oleh Kolej Tentera Darat ATM yang dibahagikan kepada tiga (3) peringkat latihan
- Semester 1 dan 2 - Peringkat Junior
- Semester 3 dan 4 - Peringkat Intermediate
- Semester 5 dan 6 - Peringkat Senior

Rujukan

1. Modul latihan dari Kolej Tentera Darat ATM
2. Buku Panduan Senjata-senjata Kompeni, Kementerian Pertahanan Malaysia, 2004
3. Buku Panduan Askar Wataniah, Kementerian Pertahanan Malaysia, 1995

DZW308
PALAPES DARAT VI / (ROTU ARMY VI)

Course Outcomes

Diakhir kursus ini pelajar dapat:-
1. Menggunakan dan mengaplikasikan pengetahuan dalam kursus Badan Beruniform
2. Menggunakan pengetahuan dan teknik-teknik kemahiran dalam kursus Badan Beruniform
3. Mengaplikasikan aspek-aspek keselamatan semasa menjalani aktiviti-aktiviti dan latihan dalam kursus Badan Beruniform

Silibus

- Modul latihan bagi PALAPES Darat adalah berpandukan kepada modul yang dikeluarkan oleh Kolej Tentera Darat ATM yang dibahagikan kepada tiga (3) peringkat latihan
- Semester 1 dan 2 - Peringkat Junior
- Semester 3 dan 4 - Peringkat Intermediate
- Semester 5 dan 6 - Peringkat Senior

Rujukan

1. Modul latihan dari Kolej Tentera Darat ATM
2. Buku Panduan Senjata-senjata Kompeni, Kementerian Pertahanan Malaysia, 2004
3. Buku Panduan Askar Wataniah, Kementerian Pertahanan Malaysia, 1995

DZW111
KUMPULAN LATIHAN KELANASISWA MALAYSIA I (KLKM I)
[MALAYSIAN UNIVERSITY ROVER TRAINING GROUP I (MURTG I)]

Course Outcomes

Diakhir kursus ini pelajar dapat:-
1. Menggunakan dan mengaplikasikan pengetahuan dalam kursus Badan Beruniform
2. Menggunakan pengetahuan dan teknik-teknik kemahiran dalam kursus Badan Beruniform
3. Mengaplikasikan aspek-aspek keselamatan semasa menjalani aktiviti-aktiviti dan latihan dalam kursus Badan Beruniform

Silibus

- Taklimat asas & skema latihan pengakap kelana (keahlian)
- Struktur organisasi
- Istiadat & kemahiran berpengakap (keahlian)
- Pengenalan perkhemahan (keahlian)
- Kemahiran pengakap
- Penyediaan kertas kerja cadangan projek
- Ujian Praktikal
- Ujian Teori

Rujukan

1. Panduan Pengurusan Kumpulan Latihan Kelana Siswa Malaysia
2. Panduan Program Latihan Pengakap Muda
3. Panduan Skim Lencana Pengakap Malaysia

DZW112
KUMPULAN LATIHAN KELANASISWA MALAYSIA II (KLKM II)
[MALAYSIAN UNIVERSITY ROVER TRAINING GROUP II (MURTG II)]

Course Outcomes

Diakhir kursus ini pelajar dapat:-
1. Menggunakan dan mengaplikasikan pengetahuan dalam kursus Badan Beruniform
2. Menggunakan pengetahuan dan teknik-teknik kemahiran dalam kursus Badan Beruniform
3. Mengaplikasikan aspek-aspek keselamatan semasa menjalani aktiviti-aktiviti dan latihan dalam kursus Badan Beruniform

Silibus

- Kursus kepimpinan pengakap Modul A (Lencana Kepimpinan)
- Pertolongan cemas asas (Lencana perkhidmatan)
- Asas berkayak (Kemahiran Asas)
- Menyediakan profil projek ringkas serta pembentangan (Lencana kepimpinan)
- Ikatan dan simpulan
- Ujian Praktikal
- Ujian Teori

Rujukan

1. Panduan Pengurusan Kumpulan Latihan Kelana Siswa Malaysia
2. Panduan Program Latihan Pengakap Muda
3. Panduan Skim Lencana Pengakap Malaysia

DZW211
KUMPULAN LATIHAN KELANASISWA MALAYSIA III (KLKM III)
[MALAYSIAN UNIVERSITY ROVER TRAINING GROUP III (MURTG III)]

Course Outcomes

Diakhir kursus ini pelajar dapat:-
1. Menggunakan dan mengaplikasikan pengetahuan dalam kursus Badan Beruniform
2. Menggunakan pengetahuan dan teknik-teknik kemahiran dalam kursus Badan Beruniform
3. Mengaplikasikan aspek-aspek keselamatan semasa menjalani aktiviti-aktiviti dan latihan dalam kursus Badan Beruniform

Silibus

- Taklimat asas & Skema Latihan Pengakap Kelana
- Struktur Penubuhan Pengakap Malaysia
- Skim Pemakaian Uniform dan Lencana Pengakap
- Kemahiran Berkhemah
- Asas Perbarisan Pengakap
- Isyarat Pengakap
- Ujian Praktikal
- Ujian Teori

Rujukan

1. Panduan Pengurusan Kumpulan Latihan Kelana Siswa Malaysia
2. Panduan Program Latihan Pengakap Muda
3. Panduan Skim Lencana Pengakap Malaysia

DZW212
KUMPULAN LATIHAN KELANASISWA MALAYSIA IV (KLKM IV)
[MALAYSIAN UNIVERSITY ROVER TRAINING GROUP IV (MURTG IV)]

Course Outcomes

Diakhir kursus ini pelajar dapat:-
1. Menggunakan dan mengaplikasikan pengetahuan dalam kursus Badan Beruniform
2. Menggunakan pengetahuan dan teknik-teknik kemahiran dalam kursus Badan Beruniform
3. Mengaplikasikan aspek-aspek keselamatan semasa menjalani aktiviti-aktiviti dan latihan dalam kursus Badan Beruniform

Silibus

- Taklimat asas & Skema Latihan Pengakap Kelana
- Istiadat dalam Pengakap
- Menyediakan Kertas Cadangan Projek
- Pengembaraan Pengakap
- Teknik Anggaran
- Asas Pertolongan Cemas
- Permainan Pengakap
- Ujian Praktikal
- Ujian Teori

Rujukan

1. Panduan pengurusan Kumpulan Latihan Kelana Siswa Malaysia
2. Panduan Program Latihan Pengakap Muda
3. Panduan Skim Lencana Pengakap Malaysia

DZW311
KUMPULAN LATIHAN KELANASISWA MALAYSIA V (KLKM V)
[MALAYSIAN UNIVERSITY ROVER TRAINING GROUP V (MURTG V)]

Course Outcomes

Diakhir kursus ini pelajar dapat:-
1. Menggunakan dan mengaplikasikan pengetahuan dalam kursus Badan Beruniform
2. Menggunakan pengetahuan dan teknik-teknik kemahiran dalam kursus Badan Beruniform
3. Mengaplikasikan aspek-aspek keselamatan semasa menjalani aktiviti-aktiviti dan latihan dalam kursus Badan Beruniform

Silibus

- Taklimat asas & Skema Latihan Pengakap
- Struktur Organisasi Pengakap Malaysia
- Skim Lencana Perkhidmatan
- Kemahiran Mengurus/Mengelola Aktiviti Pengakap
- Skim Lencana Kemahiran
- Anugerah Tertinggi Pengakap
- Perbentangan Projek Kumpulan
- Ujian Praktikal
- Rumusan

Rujukan

1. Panduan pengurusan Kumpulan Latihan Kelana Siswa Malaysia
2. Panduan Program Latihan Pengakap Muda
3. Panduan Skim Lencana Pengakap Malaysia

DZW113
BRIGED BOMBA DAN PENYELAMAT I / FIRE AND RESCUE BRIGED I

Course Outcomes

Diakhir kursus ini pelajar dapat:-
1. Menggunakan dan mengaplikasikan pengetahuan dalam kursus Badan Beruniform
2. Menggunakan pengetahuan dan teknik-teknik kemahiran dalam kursus Badan Beruniform
3. Mengaplikasikan aspek-aspek keselamatan semasa menjalani aktiviti-aktiviti dan latihan dalam kursus Badan Beruniform

Silibus

- Sejarah Jabatan Bomba dan Penyelamat Malaysia (JBPM)
- Kawad Kaki Asas 1
- Pengenalan Peralatan dan Latihan (Hose Fitting) Asas 1
- Hose Fitting Asas 1
- Kawad Operasi Asas 1
- Kimia Kebakaran Asas
- Pengudaraan Asas 1
- Pengenalan Peralatan dan Latihan Alat Pemadam Api (APA) Asas 1
- Pengenalan Peralatan dan Latihan Pili Bomba Asas 1
- Latihan Praktikal Pengawalan Api di Kolej Kediaman
- Pengenalan Peralatan Tali Penyelamat Asas 1
- Tatacara Menyelamat Mangsa Asas 1
- Ujian Praktikal
- Ujian Bertulis

Rujukan

1. Manual Pertolongan Cemas (BRCS, SJAA, SAA).
2. Manual Bomba dan Penyelamat Malaysia.

DZW114
BRIGED BOMBA DAN PENYELAMAT II / FIRE AND RESCUE BRIGED II

Course Outcomes

Diakhir kursus ini pelajar dapat:-
1. Menggunakan dan mengaplikasikan pengetahuan dalam kursus Badan Beruniform
2. Menggunakan pengetahuan dan teknik-teknik kemahiran dalam kursus Badan Beruniform
3. Mengaplikasikan aspek-aspek keselamatan semasa menjalani aktiviti-aktiviti dan latihan dalam kursus Badan Beruniform

Silibus

- Perjumpaan jurulatih dengan pelajar
- Akta Jabatan Bomba dan Penyelamat
- Teknik Membawa Mangsa
- Pengurusan Risiko Kebakaran
- Pengurusan Bencana
- Asas Pertolongan Cemas
- Tali dan Ikatan
- Reppling
- Fire Engineering
- Pencegahan Kebakaran di Kampus /kolej
- Latihan Praktikal Kebakaran di Kolej Kediaman
- Asas Ikhtiar Hidup
- Ujian Bertulis
- Ujian Praktikal

Rujukan

1. Manual Pertolongan Cemas (BRCS, SJAA, SAA).
2. Manual Bomba dan Penyelamat Malaysia.

DZW213
BRIGED BOMBA DAN PENYELAMAT III / FIRE AND RESCUE BRIGED III

Course Outcomes

Diakhir kursus ini pelajar dapat:-
1. Menggunakan dan mengaplikasikan pengetahuan dalam kursus Badan Beruniform
2. Menggunakan pengetahuan dan teknik-teknik kemahiran dalam kursus Badan Beruniform
3. Mengaplikasikan aspek-aspek keselamatan semasa menjalani aktiviti-aktiviti dan latihan dalam kursus Badan Beruniform

Silibus

- (Ulangan dan Lanjutan) Sejarah Jabatan Bomba dan Penyelamat Malaysia (JBPM)
- (Ulangan dan Lanjutan) Kawad Kaki Asas 1& 2
- (Ulangan dan Lanjutan) Pengenalan Peralatan dan Latihan (Hose Fitting) Asas 1&2
- Hose Fitting Asas 1&2
- (Ulangan dan Lanjutan) Kawad Operasi Asas 1& 2
- (Ulangan dan Lanjutan) Kimia Kebakaran Asas

Rujukan

1. Manual Pertolongan Cemas (BRCS, SJAA, SAA).
2. Manual Bomba dan Penyelamat Malaysia.

DZW214
BRIGED BOMBA DAN PENYELAMAT IV / FIRE AND RESCUE BRIGED IV

Course Outcomes

Diakhir kursus ini pelajar dapat:-
1. Menggunakan dan mengaplikasikan pengetahuan dalam kursus Badan Beruniform
2. Menggunakan pengetahuan dan teknik-teknik kemahiran dalam kursus Badan Beruniform
3. Mengaplikasikan aspek-aspek keselamatan semasa menjalani aktiviti-aktiviti dan latihan dalam kursus Badan Beruniform

Silibus

- Perjumpaan Jurulatih dengan Pelajar
- Sejarah Jabatan Bomba dan Penyelamat Malaysia (JBPM)
- Kawad Kaki Asas 1
- Kawad Kaki Asas 1&2
- Kimia Kebakaran
- Pengenalan Peralatan Bomba
- Kawad Hose 1
- Alat Pemadam Api (APA)
- Kawad Hose 2
- Alat Pemadam Api (APA)

- Alat Penafasan (BA)
- Aktiviti Luar

Rujukan

1. Manual Pertolongan Cemas (BRCS, SJAA, SAA).
2. Manual Bomba dan Penyelamat Malaysia.

DZW313
BRIGED BOMBA DAN PENYELAMAT V / FIRE AND RESCUE BRIGED V

Course Outcomes

Diakhir kursus ini pelajar dapat:-
1. Menggunakan dan mengaplikasikan pengetahuan dalam kursus Badan Beruniform
2. Menggunakan pengetahuan dan teknik-teknik kemahiran dalam kursus Badan Beruniform
3. Mengaplikasikan aspek-aspek keselamatan semasa menjalani aktiviti-aktiviti dan latihan dalam kursus Badan Beruniform

Silibus

- Kawad Kaki/ Kawad Operasi-Alat Pemasangan Tetap Pasif
- Perlindungan Aktif-Tali-ikatan &Simpulan
- Sistem Pengudaraan-Bekalan Air
- Alat Penafasan-Kawad kaki/Kawad Operasi dan Ulangkaji Penyelamat
- Tatacara Pengongsian Bangunan dan Pemilihan Pernafasan - Lawatan
- Aktiviti Perkhemahan/Khidmat Masyarakat
- Minggu Ulangkaji/Ujian Praktikal & Penilaian Pelajar

Rujukan

1. Manual Pertolongan Cemas (BRCS, SJAA, SAA).
2. Manual Bomba dan Penyelamat Malaysia.

DZW115
BULAN SABIT MERAH MALAYSIA I / MALAYSIAN RED CRESENT I

Course Outcomes

Diakhir kursus ini pelajar dapat:-
1. Menggunakan dan mengaplikasikan pengetahuan dalam kursus Badan Beruniform
2. Menggunakan pengetahuan dan teknik-teknik kemahiran dalam kursus Badan Beruniform
3. Mengaplikasikan aspek-aspek keselamatan semasa menjalani aktiviti-aktiviti dan latihan dalam kursus Badan Beruniform

Silibus

- Sejarah palang Merah
- Prinsip-prinsip Asas
- Struktur dan Organisasi Pergerakan Palang Merah/Bulan Sabit Merah Kebangsaan
- Persatuan Bulan Sabit Merah Malaysia
- Undang-undang Kemanusiaan Antarabangsa
- Undang-undang Asas Konvokesyen - Kawad Asas Ulangan
- Protokol-protokol Tambahan
- Pertolongan Cemas Asas - Kawad Asas Ulangan
- Struktur Tubuh
- Sistem Peredaran Darah
- Sistem Pernafasan
- Asifikasi - Kawad Asas Ulangan
- Ujian Praktikal
- Ujian Bertulis

Rujukan

1. Akta Persatuan Palang Merah Malaysia (PERBADANAN), 1965 (Akta Parlimen 540,1965).
2. Perlembagaan dan Undang-undang Persatuan Palang Merah Malaysia.
3. Manual Pertolongan Cemas PBSMM.
4. Manual Pertolongan Cemas (BRCS, SJAA, SAA).
5. Pertolongan Cemas Praktikal (BRCS).
6. Panduan Menyelamat Jantung CPR Persatuan Jantung Amerika

DZW116
BULAN SABIT MERAH MALAYSIA II / MALAYSIAN RED CRESENT II

Course Outcomes

Diakhir kursus ini pelajar dapat:-
1. Menggunakan dan mengaplikasikan pengetahuan dalam kursus Badan Beruniform
2. Menggunakan pengetahuan dan teknik-teknik kemahiran dalam kursus Badan Beruniform

3. Mengaplikasikan aspek-aspek keselamatan semasa menjalani aktiviti-aktiviti dan latihan dalam kursus Badan Beruniform

Silibus

- (Lanjutan) Sejarah Palang Merah
- (Lanjutan) Prinsip-prinsip Asas-Kawad Asas
- (Lanjutan) Struktur dan Organisasi Pergerakan Palang Merah / Bulan Sabit Merah Antarabangsa
- (Lanjutan) Persatuan Bulan Sabit Merah Malaysia - Kawad Asas Ulangan
- Undang-undang Kemanusiaan Antarabangsa
- (Lanjutan) Undang-undang Asas Konvokesyen - Kawad Asas Ulangan
- Ujian Praktikal
- Ujian Bertulis

Rujukan

1. Akta Persatuan Palang Merah Malaysia (PERBADANAN), 1965 (Akta Parlimen 540,1965).
2. Perlembagaan dan Undang-undang Persatuan Palang Merah Malaysia.
3. Manual Pertolongan Cemas PBSMM.
4. Manual Pertolongan Cemas (BRCS, SJAA, SAA).
5. Pertolongan Cemas Praktikal (BRCS).
6. Panduan Menyelamat Jantung CPR Persatuan Jantung Amerika.

DZW215
BULAN SABIT MERAH MALAYSIA III / MALAYSIAN RED CRESENT III

Course Outcomes

Diakhir kursus ini pelajar dapat:-
1. Menggunakan dan mengaplikasikan pengetahuan dalam kursus Badan Beruniform
2. Menggunakan pengetahuan dan teknik-teknik kemahiran dalam kursus Badan Beruniform
3. Mengaplikasikan aspek-aspek keselamatan semasa menjalani aktiviti-aktiviti dan latihan dalam kursus Badan Beruniform

Silibus

- Struktur dan Organisasi Pergerakan Palang Merah/Bulan Sabit Kebangsaan - Bulan Sabit Merah Malaysia
- Pertolongan Cemas Asas - Skop Pertolongan Cemas
- Struktur Tubuh - Sistem Peredaran Darah, Sistem Pernafasan dan Mekanisme Pernafasan dan Kaedah Menangani KecerderaanAkibat Kemalangan Yang Melibatkan Kecerderaan Sistem Peredaran Darah dan Pernafasan
- Pengurusan Bencana
- Pengurusan Penyediaan keperluan asas semasa bencana
- Ulangan PCA (Pertolongan Cemas), Kawad Asas Ulangan
- Ujian Praktikal
- Ujian Bertulis

Rujukan

1. Akta Persatuan Palang Merah Malaysia (PERBADANAN), (Akta Parlimen 540, 1965). Perlembagaan dan Undang-Undang Palang Merah Malaysia.
2. Manual Pertolongan Cemas BSMM.
3. Manual Pertolongan Cemas (BRCS, SJAA, SAA).
4. Pertolongan Cemas Praktikal (BRCS).
5. Panduan Menyelamat Jantung CPR Persatuan Jantung Amerika.

DZW216 BULAN SABIT MERAH MALAYSIA IV / MALAYSIAN RED CRESENT IV

Course Outcomes

Diakhir kursus ini pelajar dapat:-
1. Menggunakan dan mengaplikasikan pengetahuan dalam kursus Badan Beruniform
2. Menggunakan pengetahuan dan teknik-teknik kemahiran dalam kursus Badan Beruniform
3. Mengaplikasikan aspek-aspek keselamatan semasa menjalani aktiviti-aktiviti dan latihan dalam kursus Badan Beruniform

Silibus

- Pengurusan Bencana
- Pengurusan Bencana
- Pengurusan Bencana
- Pengurusan Bencana
- Pengurusan Bencana
- Pengurusan Bencana
- Pengurusan Bencana

- Pengurusan Bencana
- Pengurusan Bencana
- Pengurusan Bencana
- Pengurusan Bencana
- Pengurusan Bencana

Rujukan

1. Akta Persatuan Palang Merah Malaysia (PERBADANAN), (Akta Parlimen 540, 1965).
2. Perlembagaan dan Undang-Undang Palang Merah Malaysia.
3. Manual Pertolongan Cemas BSMM.
4. Manual Pertolongan Cemas (BRCS, SJAA, SAA).
5. Pertolongan Cemas Praktikal (BRCS).
6. Panduan Menyelamat Jantung CPR Persatuan Jantung Amerika.

DZW315
BULAN SABIT MERAH MALAYSIA V / MALAYSIAN RED CRESENT V

Course Outcomes

Diakhir kursus ini pelajar dapat:-
1. Menggunakan dan mengaplikasikan pengetahuan dalam kursus Badan Beruniform
2. Menggunakan pengetahuan dan teknik-teknik kemahiran dalam kursus Badan Beruniform
3. Mengaplikasikan aspek-aspek keselamatan semasa menjalani aktiviti-aktiviti dan latihan dalam kursus Badan Beruniform

Silibus

- Anatomi Tubuh
- Sistem Perdarahan
- Sistem Pernafasan
- Asiksia (Gangguan Pernafasan)
- Luka dan Pendarahan
- Balutan dan Pembalut
- CPR
- Patah dan Kecederaan Sukan
- Renjatan
- Terbakar dan keracunan (Kemalangan Industri)
- Pitam dan Tidak Sedarkan Diri
- Mengangkat dan Pindahan

Rujukan

1. Akta Persatuan Palang Merah Malaysia (PERBADANAN), (Akta Parlimen 540, 1965).
2. Perlembagaan dan Undang-Undang Palang Merah Malaysia.
3. Manual Pertolongan Cemas BSMM.
4. Manual Pertolongan Cemas (BRCS, SJAA, SAA).
5. Pertolongan Cemas Praktikal (BRCS).
6. Panduan Menyelamat Jantung CPR Persatuan Jantung Amerika.

DZW117
PERTAHANAN AWAM I / CIVIL DEFENSE I

Course Outcomes

Diakhir kursus ini pelajar dapat:-
1. Menggunakan dan mengaplikasikan pengetahuan dalam kursus Badan Beruniform
2. Menggunakan pengetahuan dan teknik-teknik kemahiran dalam kursus Badan Beruniform
3. Mengaplikasikan aspek-aspek keselamatan semasa menjalani aktiviti-aktiviti dan latihan dalam kursus Badan Beruniform

Silibus

- Asas Pengurusan Bencana Peringkat Lanjutan - Kawad Kaki Asas 1
- Pertolongan Cemas Asas - Kawad Asas Ulangan
- Latihan Mendirikan Khemah Basic Life Support dan CPR - Kawad Asas Ulangan
- Kursus Kepimpinan Lanjutan serta Team Building - Kawad Kaki Asas 2
- Ujian Bertulis
- Ujian Praktikal

Rujukan

1. Buku Pandual Pengurusan Kor Siswa Siswi Pertahanan Awam (Kor SISPA). (2011) Universiti Teknologi MARA, Shah Alam, Selangor.
2. Pertolongan Cemas:Manual Pelajar (1999), Federal Publication, Selangor
3. AliNafiah.(2011) Panduan Menyelamatkan Nyawa. Pertolongan Cemas.Shuth Network Sdn Bhd

DZW118
PERTAHANAN AWAM II / CIVIL DEFENSE II

Course Outcomes

Diakhir kursus ini pelajar dapat:-
1. Menggunakan dan mengaplikasikan pengetahuan dalam kursus Badan Beruniform
2. Menggunakan pengetahuan dan teknik-teknik kemahiran dalam kursus Badan Beruniform
3. Mengaplikasikan aspek-aspek keselamatan semasa menjalani aktiviti-aktiviti dan latihan dalam kursus Badan Beruniform

Silibus

- Kawad Kaki
- Simulasi Teknik Ektrikasi dan Mengeluarkan Mangsa
- Teknik Menyelamat Semasa Kecemasan
- Ikatan dan Simpulan Tali
- Teknik Usungan di Kawasan Bencana
- Manual Keselamatan Operasi Gergaji Berantai
- Sains Kebakaran dan Alat Pemadam Api
- Teknik Pembacaan Peta dan Kompas
- Prosedur Keselamatan Semasa Kebakaran Bangunan
- Mengurus Pusat Bantuan Kecemasan (Makanan)
- Bencana Alam (Teoti dan Praktikal)
- Simulasi Pertolongan Cemas

Rujukan

1. Buku Pandual Pengurusan Kor Siswa Siswi Pertahanan Awam (Kor SISPA). (2011) Universiti Teknologi MARA, Shah Alam, Selangor.
2. Pertolongan Cemas: Manual Pelajar (1999), Federal Publication, Selangor
3. AliNafiah. (2011) Panduan Menyelamatkan Nyawa. Pertolongan Cemas. Shuth Network Sdn Bhd

DZW217
PERTAHANAN AWAM III / CIVIL DEFENSE III

Course Outcomes

Diakhir kursus ini pelajar dapat:-
1. Menggunakan dan mengaplikasikan pengetahuan dalam kursus Badan Beruniform
2. Menggunakan pengetahuan dan teknik-teknik kemahiran dalam kursus Badan Beruniform
3. Mengaplikasikan aspek-aspek keselamatan semasa menjalani aktiviti-aktiviti dan latihan dalam kursus Badan Beruniform

Silibus

- Asas Pengurusan Bencana- Kawad Kaki Asas
- Pertolongan Cemas Asas - Kawad Asas Ulangan
- Panduan Perlaksanaan CPR Ulangan Serta Peringkat Lanjutan - Kawad Asas Ulangan
- Kursus Kepimpinan Lanjutan serta Team Building - Kawad Kaki Asas 2
- Ujian Bertulis
- Ujian Praktikal

Rujukan

1. Buku Pandual Pengurusan Kor Siswa Siswi Pertahanan Awam (Kor SISPA). (2011) Universiti Teknologi MARA, Shah Alam, Selangor.
2. Pertolongan Cemas:Manual Pelajar (1999), Federal Publication, Selangor
3. AliNafiah. (2011) Panduan Menyelamatkan Nyawa. Pertolongan Cemas.Shuth Network Sdn Bhd

DZW218
PERTAHANAN AWAM IV / CIVIL DEFENSE IV

Course Outcomes

Diakhir kursus ini pelajar dapat:-
1. Menggunakan dan mengaplikasikan pengetahuan dalam kursus Badan Beruniform
2. Menggunakan pengetahuan dan teknik-teknik kemahiran dalam kursus Badan Beruniform
3. Mengaplikasikan aspek-aspek keselamatan semasa menjalani aktiviti-aktiviti dan latihan dalam kursus Badan Beruniform

Silibus

- Kawad Kaki
- Pengendalian Mesyuarat
- Sahsiah, Etika Pegawai dan Kepimpinan
- Sahsiah, Etika Pegawai dan Kepimpinan
- Etiket dan Protokol
- Etiket dan Protokol
- Latihan Ketahanan Diri
- Kursus Kejurulatihan Kemahiran
- Kursus Bakal Pegawai
- Kerja Kursus (Kajian Kes)

Rujukan

1. Buku Panduan Pengurusan Kor Siswa Siswi Pertahanan Awam (Kor SISPA). (2011) Universiti Teknologi MARA, Shah Alam, Selangor.
2. AliNafiah. (2011) Panduan Menyelamatkan Nyawa. Pertolongan Cemas. Shuth Network Sdn Bhd

DZW317
PERTAHANAN AWAM V / CIVIL DEFENSE V

Course Outcomes

Diakhir kursus ini pelajar dapat:-
1. Menggunakan dan mengaplikasikan pengetahuan dalam kursus Badan Beruniform
2. Menggunakan pengetahuan dan teknik-teknik kemahiran dalam kursus Badan Beruniform
3. Mengaplikasikan aspek-aspek keselamatan semasa menjalani aktiviti-aktiviti dan latihan dalam kursus Badan Beruniform

Silibus

- Kawad Kaki
- Simpulan Teknik Ektrikasi dan Mengeluarkan Mangsa
- Teknik Menyelamat Semasa Kecemasan
- Ikatan dan Simpulan Kecemasan
- Teknik Usungan di Kawasan Bencana
- Manual Keselamatan Operasi Gergaji Berantai
- Sains Kebakaran dan Alat Pemadam Api
- Teknik Pembacaan Peta dan Kompas
- Prosedur Keselamatan Semasa Kebakaran Banggunan
- Mengurus Pusat Bantuan Kecemasan (Makanan)
- Bencana Alam (Teori dan Praktikal)
- Simulasi Pertolongan Cemas

Rujukan

1. Buku Pandual Pengurusan Kor Siswa Siswi Pertahanan Awam (Kor SISPA). (2011) Universiti Teknologi MARA, Shah Alam, Selangor.
2. Pertolongan Cemas:Manual Pelajar (1999), Federal Publication, Selangor
3. AliNafiah. (2011) Panduan Menyelamatkan Nyawa. Pertolongan Cemas.Shuth Network Sdn Bhd

DZW119
PANDU PUTERI SISWI I (PPS I) / GIRL GUIDE I (GG I)

Course Outcomes

Diakhir kursus ini pelajar dapat:-
1. Menggunakan dan mengaplikasikan pengetahuan dalam kursus Badan Beruniform
2. Menggunakan pengetahuan dan teknik-teknik kemahiran dalam kursus Badan Beruniform
3. Mengaplikasikan aspek-aspek keselamatan semasa menjalani aktiviti-aktiviti dan latihan dalam kursus Badan Beruniform

Silibus

- (Pengetahuan) Sejarah perkembangan dan struktur asas pengurusan organisasi
- Sistem Nilai-Sahsiah
- Kawad Kaki & Istiadat Kepanduan
- Perkhemahan-Ilmu Perkhemahan
- Ilmu Pertolongan Cemas
- Kesukarelawan/Khidmat Masyarakat
- Sesi Perbentangan Laporan
- Ujian Praktikal
- Ujian Bertulis

Rujukan

1. The Girl Guide Act 1953/ Akta Pandu Puteri 1953 (Disemak 1991) Akta 456
2. World Association of Girls Guide and Scouts (WAGGGS) Constitution.
3. Perlembagaan Persatuan Pandu Puteri Malaysia.

4. Dasar Pertubuhan dan Undang-undang (DPU).
5. Skim Latihan Persatuan Pandu Puteri Malaysia yang telah diperakui oleh WAGGGS.
6. WAGGS Policies.
7. The Girl Guide / Girl Scout Method:
   a. Commitment through the Promise and Law.
   b. The Patrol system.
   c. Learning by doing.
   d. Progressive self development
   e. Symbolism
   f. Active co-operation between youth and adults.
   g. Outdoors activities.
   h. Service in the community.

DZW120
PANDU PUTERI SISWI II (PPS II) / GIRL GUIDE II (GG II)

Course Outcomes

Diakhir kursus ini pelajar dapat:-
1. Menggunakan dan mengaplikasikan pengetahuan dalam kursus Badan Beruniform
2. Menggunakan pengetahuan dan teknik-teknik kemahiran dalam kursus Badan Beruniform
3. Mengaplikasikan aspek-aspek keselamatan semasa menjalani aktiviti-aktiviti dan latihan dalam kursus Badan Beruniform

Silibus

- Pengurusan dan Pentadbiran
- Displin dan Kerohanian
- Istiadat
- Istiadat
- Sejarah Perkembangan Pandu Puteri
- Struktur dan Organisasi Persatuan Pandu Puteri Sedunia (WAGGS)
- Perlembagaan Persatuan Pandu Puteri Malaysia
- Perlembagaan Persatuan Pandu Puteri Malaysia
- Asas Pertolongan Cemas
- Perkhemahan
- Sumbangan Ahli Pandu Puteri

Rujukan

1. The Girl Guide Act 1953/ Akta Pandu Puteri 1953 (Disemak 1991) Akta 456
2. World Association of Girls Guide and Scouts (WAGGGS) Constitution.
3. Perlembagaan Persatuan Pandu Puteri Malaysia.
4. Dasar Pertubuhan dan Undang-undang (DPU).
5. Skim Latihan Persatuan Pandu Puteri Malaysia yang telah diperakui oleh WAGGGS.
6. WAGGS Policies.
7. The Girl Guide / Girl Scout Method:
   a. Commitment through the Promise and Law.
   b. The Patrol system.
   c. Learning by doing.
   d. Progressive self development
   e. Symbolism
   f. Active co-operation between youth and adults.
   g. Outdoors activities.
   h. Service in the community

DUW219
PANDU PUTERI SISWI III (PPS III) / GIRL GUIDE III (GG III)

Course Outcomes

Diakhir kursus ini pelajar dapat:-
1. Menggunakan dan mengaplikasikan pengetahuan dalam kursus Badan Beruniform
2. Menggunakan pengetahuan dan teknik-teknik kemahiran dalam kursus Badan Beruniform
3. Mengaplikasikan aspek-aspek keselamatan semasa menjalani aktiviti-aktiviti dan latihan dalam kursus Badan Beruniform

Silibus

- Pengurusan dan Pentadbiran
- Displin dan Kerohanian
- Istiadat
- Istiadat
- Sejarah Perkembangan Pandu Puteri
- Struktur dan Organisasi Persatuan Pandu Puteri Sedunia (WAGGS)
- Perlembagaan Persatuan Pandu Puteri Malaysia
- Perlembagaan Persatuan Pandu Puteri Malaysia
- Asas Pertolongan Cemas
- Perkhemahan
- Sumbangan Ahli Pandu Puteri

Rujukan

1. The Girl Guide Act 1953/ Akta Pandu Puteri 1953 (Disemak 1991) Akta 456
2. World Association of Girls Guide and Scouts (WAGGGS) Constitution.

3. Perlembagaan Persatuan Pandu Puteri Malaysia.
4. Dasar Pertubuhan dan Undang-undang (DPU).
5. Skim Latihan Persatuan Pandu Puteri Malaysia yang telah diperakui oleh WAGGGS.
6. WAGGS Policies.
7. The Girl Guide / Girl Scout Method.

DZW220
PANDU PUTERI SISWI IV (PPS IV) / GIRL GUIDE IV (GG IV)

Course Outcomes

Diakhir kursus ini pelajar dapat:-
1. Menggunakan dan mengaplikasikan pengetahuan dalam kursus Badan Beruniform
2. Menggunakan pengetahuan dan teknik-teknik kemahiran dalam kursus Badan Beruniform
3. Mengaplikasikan aspek-aspek keselamatan semasa menjalani aktiviti-aktiviti dan latihan dalam kursus Badan Beruniform

Silibus

- Pengurusan dan Pentadbiran
- Displin dan Kerohanian
- Istiadat
- Istiadat
- Sejarah Perkembangan Pandu Puteri
- Struktur dan Organisasi Persatuan Pandu Puteri Sedunia (WAGGS)
- Perlembagaan Persatuan Pandu Puteri Malaysia
- Perlembagaan Persatuan Pandu Puteri Malaysia
- Asas Pertolongan Cemas
- Perkhemahan
- Sumbangan Ahli Pandu Puteri

Rujukan

1. Ab. Alim Abdul Rahim. (2004). Pengurusan Gerak Kerja Kokurikulum. Kuala Lumpur. Fajar Bakti Sdn.Bhd.
2. Ab. Alim Abdul Rahim. (2004). Panduan Perkhemahan, Simpulan dan Pioneering. Kuala Lumpur. Fajar Bakti Sdn. Bhd.
3. Dasar Pertubuhan dan Undang-undang – Am – Siswi – Pemimpin. (2011). Persatuan Pandu Puteri Malaysia.
4. Persatuan Pandu Puteri Malaysia. (2011).Perlembagaan Persatuan Pandu Puteri Malaysia. Kuala Lumpur.
5. Dasar Pertubuhan dan Undang-undang Perkhemahan Persatuan Pandu Puteri Malaysia (2011).
6. Risalah Upacara dan Istiadat Pandu Puteri. (2011). Persatuan Pandu Puteri Malaysia.
7. Baden -Powell, R. (2005). Ilmu Pengakap Bagi Budak-Budak. (Terjemahan). Batu Caves: Edusystem Sdn. Bhd.
8. Khairul Azman Arshad (2006). Asas Perkhemahan Dan Ikhtiar Hidup. Shah Alam: Fajar Bakti Sdn. Bhd.

DZW319
PANDU PUTERI SISWI V (PPS V) / GIRL GUIDE V (GG V)

Course Outcomes

Diakhir kursus ini pelajar dapat:-
1. Menggunakan dan mengaplikasikan pengetahuan dalam kursus Badan Beruniform
2. Menggunakan pengetahuan dan teknik-teknik kemahiran dalam kursus Badan Beruniform
3. Mengaplikasikan aspek-aspek keselamatan semasa menjalani aktiviti-aktiviti dan latihan dalam kursus Badan Beruniform

Silibus

- Pengetahuan
- Lawatan ke Ibu Pejabat Negeri dan Kuala Lumpur
- Pengurusan dan Kepimpinan
- Kemahiran Komunikasi
- Kawad dan Istiadat Kepanduan
- Pengurusan Mesyuarat dan Penyediaan Kertas Kerja
- Ketatanegaraan
- Tugas Berkumpulan (Berkaitan topik Perbincangan)
- Kembara
- Kawad Kaki Ulangan, Panji-panji dan Istiadat
- Etika Sosial
- Ujian Praktikal
- Ujian Teori

Rujukan

1. The Girl Guide Act 1953/ Akta Pandu Puteri 1953 (Disemak 1991) Akta 456

2. World Association of Girls Guide and Scouts (WAGGGS) Constitution.
3. Perlembagaan Persatuan Pandu Puteri Malaysia.
4. Dasar Pertubuhan dan Undang-undang (DPU).
5. Skim Latihan Persatuan Pandu Puteri Malaysia yang telah diperakui oleh WAGGGS.
6. WAGGS Policies.
7. The Girl Guide / Girl Scout Method:
   a. Commitment through the Promise and Law.
   b. The Patrol system.
   c. Learning by doing.
   d. Progressive self development
   e. Symbolism
   f. Active co-operation between youth and adults.
   g. Outdoors activities.
   h. Service in the community.

DZW121
ST. JOHN AMBULANS MALAYSIA I / MALAYSIAN ST. JOHN AMBULANCE I

Course Outcomes

Diakhir kursus ini pelajar dapat:-
1. Menggunakan dan mengaplikasikan pengetahuan dalam kursus Badan Beruniform
2. Menggunakan pengetahuan dan teknik-teknik kemahiran dalam kursus Badan Beruniform
3. Mengaplikasikan aspek-aspek keselamatan semasa menjalani aktiviti-aktiviti dan latihan dalam kursus Badan Beruniform

Silibus

- Pengenalan - Pertolongan Cemas
- Tindakan Kecemasan
- Menilai mangsa Kecemasan
- Sistem Peredaran Darah
- Luka dan Pendarahan
- Renjatan
- Pembalut dan Penebat
- Pengenalan kepada CPR
- Ujian Bertulis dan Praktikal

Rujukan

1. First Aid Manual, 8th edition (2002). Authorised manual of the UK's leading First Aid providers. Great Britain: Dorling Kindersley
2. Harvey D. Grant, Robert H. Murray, Jr., J. David Bergeron. Emergency Care, 5th Edition. U.S.A: Prentice-Hall International
3. Basic Life Support, Guidelines 2005, Handbook for Healthcare Providers, 4th Edition

DZW122
ST. JOHN AMBULANS MALAYSIA II / MALAYSIAN ST. JOHN AMBULANCE II

Course Outcomes

Diakhir kursus ini pelajar dapat:-
1. Menggunakan dan mengaplikasikan pengetahuan dalam kursus Badan Beruniform
2. Menggunakan pengetahuan dan teknik-teknik kemahiran dalam kursus Badan Beruniform
3. Mengaplikasikan aspek-aspek keselamatan semasa menjalani aktiviti-aktiviti dan latihan dalam kursus Badan Beruniform

Silibus

- Rangka Manusia
- Kecerderaan Sendi dan otot
- Patah dari tempat-tempat tertentu dan Pengendaliannya
- Pelbagai
- Anatomi dan Fisiologi
- Renjatan
- Kekurangan Oksigen dalam Darah
- Tercekik (Choking)
- Ulangkaji Pertolongan Cemas
- Ujian Bertulis dan praktikal

Rujukan

1. First Aid Manual, 8th edition (2002). Authorised manual of the UK's leading First Aid providers. Great Britain: Dorling Kindersley
2. Harvey D. Grant, Robert H. Murray, Jr., J. David Bergeron. Emergency Care, 5th Edition. U.S.A: Prentice-Hall International
3. Basic Life Support, Guidelines 2005, Handbook for Healthcare Providers, 4th Edition

DZW221
ST. JOHN AMBULANS MALAYSIA III / MALAYSIAN ST. JOHN AMBULANCE III

Course Outcomes

Diakhir kursus ini pelajar dapat:-
1. Menggunakan dan mengaplikasikan pengetahuan dalam kursus Badan Beruniform
2. Menggunakan pengetahuan dan teknik-teknik kemahiran dalam kursus Badan Beruniform

3. Mengaplikasikan aspek-aspek keselamatan semasa menjalani aktiviti-aktiviti dan latihan dalam kursus Badan Beruniform

Silibus

- Rangka Manusia
- Daya Sedar yang Lemah
- Medical Emergencies
- Keracunan
- Keracunan
- Mengendalikan Mangsa Kecerderaan
- Usungan Bagi Pertolongan Cemas
- Usungan Menggunakan Pengusung
- Pelbagai
- Ulangkaji
- Ulangkaji Pertolongan Cemas
- Ulangkaji Bertulis dan Praktikal

Rujukan

1. First Aid Manual, 8th edition (2002). Authorised manual of the UK's leading First Aid providers. Great Britain: Dorling Kindersley
2. Harvey D. Grant, Robert H. Murray, Jr., J. David Bergeron. Emergency Care, 5th Edition. U.S.A: Prentice-Hall International
3. Basic Life Support, Guidelines 2005, Handbook for Healthcare Providers, 4th Edition

DZW222
ST. JOHN AMBULANS MALAYSIA IV / MALAYSIAN ST. JOHN AMBULANCE IV

Course Outcomes

Diakhir kursus ini pelajar dapat:-
1. Menggunakan dan mengaplikasikan pengetahuan dalam kursus Badan Beruniform
2. Menggunakan pengetahuan dan teknik-teknik kemahiran dalam kursus Badan Beruniform
3. Mengaplikasikan aspek-aspek keselamatan semasa menjalani aktiviti-aktiviti dan latihan dalam kursus Badan Beruniform

Silibus

- Kecerderaan Tulang Belakang
- Keadaan tercekik pada bayi
- Bersalin Kecemasan
- Cara mengambil dan merekod vital sign mangsa
- Pengendalian patah di pelvis/ paha/lutut/betis
- 6 Medical Emergencies
- Ulangkaji Pemindahan Mangsa
- Ulangkaji Pemindahan Mangsa
- Ulangkaji
- Ulangkaji CPR
- Ulangkaji Pertolongan Cemas
- Ulangkaji Bertulis dan Praktikal

Rujukan

1. First Aid Manual, 8th edition (2002). Authorised manual of the UK's leading First Aid providers. Great Britain: Dorling Kindersley
2. Harvey D. Grant, Robert H. Murray, Jr., J. David Bergeron. Emergency Care, 5th Edition. U.S.A: Prentice-Hall International
3. Basic Life Support, Guidelines 2005, Handbook for Healthcare Providers, 4th Edition

DZW321
ST. JOHN AMBULANS MALAYSIA V / MALAYSIAN ST. JOHN AMBULANCE V

Course Outcomes

Diakhir kursus ini pelajar dapat:-
1. Menggunakan dan mengaplikasikan pengetahuan dalam kursus Badan Beruniform
2. Menggunakan pengetahuan dan teknik-teknik kemahiran dalam kursus Badan Beruniform
3. Mengaplikasikan aspek-aspek keselamatan semasa menjalani aktiviti-aktiviti dan latihan dalam kursus Badan Beruniform

Silibus

- Pengenalan
- Pengagihan Topik Pertolongan Cemas Untuk Persembahan oleh Kumpulan
  - Tunjuk ajar memberi kuliah
  - Perbincangan Antara Kumpulan
- Perbincangan dan Persediaan terakhir sebelum persembahan kumpulan
- Persembahan Kumpulan 1
  - Persembahan Kumpulan 2
  - Perbincangan dan Tunjuk Ajar untuk lebih baik

- Persembahan Kumpulan 3
  - Persembahan Kumpulan 4
  - Perbincangan dan Tunjuk Ajar untuk lebih baik
- Persembahan Kumpulan 5
  - Persembahan Kumpulan 6
  - Perbincangan dan Tunjuk Ajar untuk lebih baik
- Persembahan Kumpulan 7
  - Persembahan Kumpulan 8
  - Perbincangan dan Tunjuk Ajar untuk lebih baik
- Persembahan Kumpulan 9
  - Persembahan Kumpulan 10
  - Perbincangan dan Tunjuk Ajar untuk lebih baik
- Persembahan Kumpulan 11
  - Persembahan Kumpulan 12
  - Perbincangan dan Tunjuk Ajar untuk lebih baik
- Persembahan Kumpulan 13
  - Persembahan Kumpulan 14
  - Perbincangan dan Tunjuk Ajar untuk lebih baik
- Perbincangan dan Rumusan

Rujukan

1. First Aid Manual, 8th edition (2002). Authorised manual of the UK's leading First Aid providers. Great Britain: Dorling Kindersley
2. Harvey D. Grant, Robert H. Murray, Jr., J. David Bergeron. Emergency Care, 5th Edition. U.S.A: Prentice-Hall International
3. Basic Life Support, Guidelines 2005, Handbook for Healthcare Providers, 4th Edition

26.0

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KURSUS-KURSUS YANG DITAWARKAN

Kursus Diploma

DQT101/3 Mathematics I
DQT102/3 Mathematics II
DQT203/3 Mathematics III

DQT101/3 MATHEMATICS I

Course Outcomes

By the end of the course, the student should be able to:

1. Express the concepts of trigonometric and solve the problems involving trigonometric functions.
2. Express the operations and solve the problems involving complex numbers
3. Identify the properties and solve the operations involving matrices
4. Identify and apply the concepts of vectors and solve the problems involving vectors.

Course Synopsis

This course will introduce the fundamental principles and concepts in algebra and trigonometry. The topics that will be discussed in this course are trigonometric, complex numbers, matrices and vectors.

Course Syllabus

CHAPTER 1: TRIGONOMETRIC

- Introduction to trigonometric functions
- Trigonometric Ratios and Identities
- Compound Angle
- Solution of Trigonometric Equations
- Inverse Trigonometric Functions

CHAPTER 2: COMPLEX NUMBERS

- Introduction and definitions
- Operations of complex numbers
- The complex plane
- The modulus and argument of a complex numbers
- The polar form of complex numbers
- The exponential form of complex numbers
- De moivre's theorem
- Expansions for $\cos^n$ and $\sin^n$ of multiply of θ Applications involve complex numbers
- Loci in the complex numbers

CHAPTER 3: MATRICES

- Introduction
- Type of matrices
- Determinant
- Minor, cofactor and adjoint
- The inverse matrix
- Solving the systems of linear equations
- Inversion method
- Gaussian elimination and Gauss-Jordan elimination
- Cramer's Rule

CHAPTER 4: VECTORS

- Introduction
- Vectors representation
- Vectors negative
- Two equal vectors
- Addition of vectors
- Substraction of vectors
- Scalar multiplication of vectors
- Parallel vectors
- Components of vectors in terms of unit vectors, Vectors in two dimension ($\square^2$), Vectors in three dimension ($\square^3$)
- Position vectors
- Components of vectors
- Magnitude (length) of vectors
- Unit vectors
- Direction angles and direction cosines

- Operations of vectors by components
- Product of two vectors
- Applications of the scalar/dot product and cross product

References

1. Stroud, K. A. (2007). *En.gineering Mathematics.* 6th Ed Palgrave: MacMillan.
2. Stroud, K. A. (1996). *Further En.gineering Mathematics*, 3rd. Ed. MacMillan.
3. Stroud, K. A. (1995). *En.gineering Mathematics*, 4th. Ed. MacMillan.

DQT102/3
MATHEMATICS II

Course Outcomes

By the end of the course, the student should be able to:

1. Define the definition of limits, and find the limits
2. Express and discuss the concepts of differentiation and differentiate any given function.
3. Express, understand and discuss the concepts with its application of integration and integrate any given function
4. Understand how to apply the concepts of statistics and probability

Course Synopsis

Among the topics that will be covered in this course are limits, derivatives, methods of differentiation, and its applications, integrals and methods of integration, and statistics and probability.

Course Syllabus

CHAPTER 1: Limits
- Limits
- One Sided Limits
- Limits Properties
- Limits Involve Infinity
- Continuity

CHAPTER 2: Differentiation
- Definition of Differentiation
- Differentiation Rules
  - Differentiation of Standard Functions
  - The Sum/Difference Rule
  - The Product Rule
  - The Quotient Rule
  - The Chain Rule
  - The Power Rule
- Derivatives of The Trigonometric Function
- Derivatives of The Logarithmic Function
- Derivatives of The Exponential Function
  - Higher Order Differentiation
  - Logarithmic Differentiation
  - Implicit Differentiation
  - Differentiation and First Derivative of Implicit Function
  - Second Derivative of Implicit Function
- Parametric Differentiation
- First Derivative of Parametric Equations
  - Second Derivative of Parametric Equations
  - Applications of Differentiation
  - Velocity and Acceleration
  - Rates of Change
  - Minimum and Maximum Values
- Points of Inflexion

CHAPTER 3: Integration
- Introduction
- Standard Integrals
- Indefinite Integrals
  - Integral of Polynomial Functions
  - Integral of Exponential Functions
  - Integral of Logarithmic Functions
  - Integral of Trigonometric Functions
- Definite Integrals
- Techniques of Integrations
  - Integration by Substitution
  - Integration by Parts
  - Integration by Partial Fractions
- Applications of Integration
  - Areas between Curves
  - Volumes

CHAPTER 4: Statistics & Probability
- Introduction
- Data Representation
  - Discrete and Continuous
  - Frequency Distribution
  - Histogram
  - Frequency Polygon
- Data Summaries
  - Averages (Mean)
  - Mode
  - Median
  - Standard deviation
- Probability
  - Sample Spaces and Probability
  - Basic Concept
  - Classical Probability

- Rounding Rule for Probabilities_
- Complementary Event
- The Addition Rules for Probability
- The Multiplication Rules and Conditional
  - Probability
- Permutations and Combinations
  - Permutation
  - Conditional Permutation
  - Combinations

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DQT203/3
MATHEMATICS III

Course Outcomes

By the end of the course, the student should be able to:

1. Justify the first order differential equations and solve using various methods
2. Understand and discuss the application of the first order differential equation
3. Understand the second order linear differential equations and solve using various methods.
4. Understand the basic concept of Laplace transforms as a solution of second order linear differential equations

Course Synopsis

This course introduces the classification and methods of solving first order differential equations and second order linear differential equations. Among the first order differential equations discussed are separable equations, homogeneous equations, linear equations and exact equations. While for the second order linear differential equations, topics on homogeneous linear equations and non-homogeneous linear equations are discussed. Application to initial and boundary value problem are also included. Students are also exposed to introduction to Laplace transform as an alternative to solve differential equations.

Course Syllabus

CHAPTER 1: INTRODUCTION TO DIFFERENTIAL EQUATIONS

- Background
- Common Terminology

CHAPTER 2: FIRST ORDER DIFFERENTIAL EQUATIONS

- Introduction
- Separable Equations
  - Separable Equations (Applications)
- Homogeneous Equations
  - Linear Equations
  - Linear Equations (Applications)
  - Exact Equations

CHAPTER 3: SECOND ORDER LINEAR DIFFERENTIAL EQUATIONS

- Introduction
- **Homogeneous Linear Equations: General Solution**
- Non-Homogeneous Equations:
  - **Undetermined Coefficient**
  - Non-Homogeneous Equations:
  - Variation of Parameter

CHAPTER 4: INTRODUCTION TO LAPLACE TRANSFORM

- Introduction
- Laplace Transform definition
- Derivation of transformation of some elementary functions
- Standard table of Laplace Transform

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1. Edward, C.H. & Penny, D. E. (2005). *Differential Equations & Linear Algebra*. N.J: Prentice Hall.
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27.0

Pusat

Bahasa Antarabangsa

PENGENALAN

Pusat Bahasa Antarabangsa, dahulunya dikenali sebagai Jabatan Bahasa Antarabangsa, ditubuhkan pada 1 Mac, 2013. Tujuan penubuhan pusat ini adalah untuk memberi peluang kepada para pelajar, kakitangan Universiti Malaysia Perlis, dan masyarakat tempatan untuk mempelajari bahasa.

Kini, PBA menawarkan kursus-kursus bahasa keperluan Universiti kepada semua pelajar UniMAP pada peringkat diploma dan peringkat ijazah sarjana muda. PBA bukan sahaja memenuhi keperluan bilangan pelajar yang semakin meningkat, tetapi juga sentiasa berusaha untuk memenuhi keperluan pelajar-pelajar yang ingin mahir bukan sahaja dalam Bahasa Melayu dan Bahasa Inggeris, tetapi juga dalam bahasa ketiga pilihan mereka. Selain daripada Bahasa Melayu dan Bahasa Inggeris, bahasa-bahasa lain yang ditawarkan ialah Bahasa Arab, Bahasa Mandarin, Bahasa Thai, Bahasa Jepun, Bahasa German, Bahasa Korea dan Bahasa Rusia.

Di samping itu, PBA memberi penekanan untuk melengkapkan pelajar-pelajar UniMAP dengan kemahiran berbahasa dan kemahiran-kemahiran lain yang amat penting dalam era pengetahuan dan ekonomi berasaskan inovasi. Melalui kursus-kursus bahasa yang ditawarkan, PBA sedang berusaha untuk mengasah 'kemahiran berbahasa abad ke-21' dalam kalangan pelajar dan pelanggan untuk menyokong dan memupuk mereka supaya menjadi individu yang berdaya usaha yang dapat menyumbang secara positif dalam dunia pekerjaan. PBA juga menyokong pembelajaran pelajar melalui penyediaan khidmat nasihat bahasa dan sentiasa bersedia untuk memastikan pelajar-pelajar dan pelanggan-pelanggan memperoleh perkhidmatan yang terbaik daripada PBA.

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DVW112
ENGLISH I

Course Synopsis

This course is designed to strengthen students' use of English and to raise their proficiency level. It covers the major aspects of grammar, writing, reading, listening and speaking. This course prepares students for Diploma English II in UniMAP. The course will adopt a learner-centered and interactive approach in which students will be actively involved in various situations requiring communication in English.

Prerequisite: Compulsory for all Diploma students

References

1. Anthony A. et. al. (2011). Malaysian University English Test. Selangor, Malaysia: Local Publications.
2. Azar, B.S. (n.d.). Understanding and using English grammar. New York: Pearson Education Inc.
3. Paul, C. et. al. (2011). The complete text and guide MUET. Malaysia: Arah Pendidikan Sdn. Bhd.
4. Renn, D. & Cameron, S. (2008). Hemispheres 1. New York: McGraw Hill
5. Richards, C. et. Al. (2010). Text MUET a strategic approach. Malaysia: Pearson Malaysia Sdn. Bhd.

DVW212
ENGLISH II

Course Synopsis

This course is a continuation from DVW112 English I. The course will cover more complex grammatical structures and specific skills in grammar, writing, reading, listening and speaking skills at a more advanced level compared to English I. The course will require students to be involved in communicative situations and train them to become independent learners of English. The course will adopt a learner-centred approach and interactive approach in which students will be actively involved in various situations requiring communication in English.

Prerequisite: Students must pass DVW112 English I with minimum grade C.

References

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2. Kaur, H., & Jonas, F. (2013). Effective practice MUET. Shah Alam: Oxford Fajar Sdn. Bhd.
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DVW 410
BAHASA MELAYU

Sinopsis Kursus

Kursus ini memberi pengetahuan kepada para pelajar tentang sejarah perkembangan bahasa Melayu dan memberi pendedahan kepada keempat-empat kemahiran berbahasa (mendengar, membaca, menulis dan bertutur) dengan memberi tumpuan kepada kemahiran bertutur dan menulis. Komponen menulis difokuskan kepada ketepatan penggunaan aspek tatabahasa, struktur dan semantik (makna) dan dikukuhkan dengan tajuk-tajuk penulisan esei yang akan memberi peluang kepada pelajar untuk mempelajari proses-proses tatabahasa seperti penggunaan kata, analisis kesalahan bahasa dan sintaksis. Aspek kemahiran bertutur akan membantu pelajar untuk berkomunikasi dengan menggunakan sistem bahasa yang berkesan seperti dalam aspek sebutan dan juga pembinaan ayat dalam bahasa Melayu.

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