# Programme: B.Tech

## Electrical Engineering

# Scheme and Syllabi

**w.e.f. Academic Session 2020-2021**

# BUEST

**SCHOOL OF ENGINEERING & EMERGING TECHNOLOGIES**

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

# Baddi University of Emerging Sciences & Technology

**Schemes of Electrical Engineering**

**Batch 2020-onwards**

## (Common Curriculum for B. Tech I year – All Branches)

| Semester-I, Group-A | | | | | | |
|---|---|---|---|---|---|---|
| **Sr.No** | **Course Code** | **Course Title** | **L** | **T** | **P** | **Credit** |
| 1 | UMA-101 | Engineering Mathematics-I | 3 | 1 | 0 | 3.5 |
| 2 | UPY-101 | Engineering Physics | 3 | 1 | 2 | 4.5 |
| 3 | UCS-101 | Fundamentals of Computer and C programming | 3 | 1 | 2 | 4.5 |
| 4 | UHU-101 | Communication and Professional skills in English | 3 | 0 | 2 | 4 |
| 5 | UEC-105 | Principles of Electronics Engineering | 3 | 1 | 2 | 4.5 |
| 6 | UME-105 | Principles of Mechanical Engineering | 3 | 1 | 2 | 4.5 |
| 7 | UPD-101 | Personality Development Programme | 0 | 0 | 2 | 1 |
| | | **Total** | **18** | **5** | **12** | **26.5** |
| | | **Total Contact Hours:** | **35** | | | |

| Semester-I, Group-B | | | | | | |
|---|---|---|---|---|---|---|
| **Sr.No** | **Course Code** | **Course Title** | **L** | **T** | **P** | **Credit** |
| 1 | UMA-101 | Engineering Mathematics-I | 3 | 1 | 0 | 3.5 |
| 2 | UCH-101 | Engineering Chemistry & Chemistry Lab | 3 | 1 | 2 | 4.5 |
| 3 | UCS-101 | Fundamentals of Computer & C programming | 3 | 1 | 2 | 4.5 |
| 4 | UEE-105 | Principles Electrical Engineering | 0 | 0 | 6 | 4.5 |
| 5 | UEG-101 | Engineering Graphics Drawing | 3 | 0 | 0 | 3.0 |
| 6 | UEN-101 | Environmental Science | 3 | 0 | 0 | 3.0 |
| 7 | UWP-110 | Workshop Practice | 0 | 0 | 3 | 1.5 |
| | | **Total** | **15** | **3** | **13** | **24.5** |
| | | **Total Contact Hours:** | **32** | | | |

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

| Semester-II, Group-A | | | | | | |
|---|---|---|---|---|---|---|
| **Sr.No** | **Course Code** | **Course Title** | **L** | **T** | **P** | **Credit** |
| 1 | UMA-102 | Engineering Mathematics II | 3 | 1 | 0 | 3.5 |
| 2 | UCH-101 | Engineering Chemistry | 3 | 1 | 2 | 4.5 |
| 3 | UCS-102 | Advanced C Programming | 3 | 1 | 2 | 4.5 |
| 4 | UEE-105 | Principles of Electrical Engineering | 3 | 1 | 2 | 4.5 |
| 5 | UEG-101 | Engineering Graphics Drawing | 0 | 0 | 6 | 3.0 |
| 6 | UEN-101 | Environmental Science | 3 | 0 | 0 | 3.0 |
| 7 | UWP-110 | Workshop Practice | 0 | 0 | 3 | 1.5 |
| | | **Total** | **15** | **4** | **15** | **24.5** |
| | | **Total Contact Hours:** | **34** | | | |

| Semester-II, Group-B | | | | | | |
|---|---|---|---|---|---|---|
| **Sr.No** | **Course Code** | **Course Title** | **L** | **T** | **P** | **Credit** |
| 1 | UMA-102 | Engineering Mathematics II | 3 | 1 | 0 | 3.5 |
| 2 | UCS-102 | Advanced C Programming | 3 | 1 | 2 | 4.5 |
| 3 | UHU-101 | Communication & Professional skills in English | 3 | 0 | 2 | 4.0 |
| 4 | UEC-105 | Principles of Electronics Engineering | 3 | 1 | 2 | 4.5 |
| 5 | UME-105 | Principles of Mechanical Engineering | 3 | 1 | 2 | 4.5 |
| 6 | UPD-101 | PDP | 2 | 0 | 0 | 2.0 |
| 7 | UPY-101 | Engineering Physics | 3 | 1 | 2 | 4.5 |
| | | **Total** | **20** | **5** | **10** | **27.5** |
| | | **Total Contact Hours:** | **35** | | | |

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

## Third Semester

| Sr. No. | Course Code | Course Name | L | T | P | Cr |
|---|---|---|---|---|---|---|
| 1. | UMA-201 | Numerical Analysis & Computer Programming | 3 | 1 | 2 | 4.5 |
| 2. | UEE-201 | Power Electronics-I | 3 | 1 | 2 | 4.5 |
| 3. | UEE-202 | Circuit Theory | 3 | 1 | - | 3.5 |
| 4. | UEE-203 | Electrical Machines-I | 3 | 1 | 2 | 4.5 |
| 5. | UEC-201 | Digital Electronics | 3 | 1 | 2 | 4.5 |
| 6. | UMG-200 | Principles of Engineering Economics and Management | 3 | 1 | 0 | 3.5 |
| 7. | UPD-201 | Personality Development Program | 2 | 0 | 0 | 2.0 |
| 8. | UTR-201 | Industrial Training (Under Taken During Summer Vacations) | 0 | 0 | 0 | 4.0 |
| **Total** | | | **20** | **6** | **8** | **31** |

**Total Hours: 34**

## Fourth Semester

| Sr. No. | Course Code | Course Name | L | T | P | Cr |
|---|---|---|---|---|---|---|
| 1 | UEE-250 | Transmission & Distribution of Electrical Power | 3 | 1 | 2 | 4.5 |
| 2 | UEE-251 | Power Electronics-II | 3 | 1 | 2 | 4.5 |
| 3 | UEE-252 | Electrical Machines-II | 3 | 1 | 3 | 5.0 |
| 4 | UEE-255 | Electrical and electronics Measurements & Measuring Instruments | 3 | 1 | 2 | 4.5 |
| 5 | UEE-254 | Electrical Simulation Lab-I | - | - | 2 | 1.0 |
| 6 | UEC-258 | Communication Engg | 3 | 1 | - | 3.5 |
| 7 | UGP-251 | General Proficiency | - | - | - | 2.0 |
| 8 | UPD-251 | Personality Development Program | 2 | - | - | 2.0 |
| | | | **17** | **5** | **11** | **27** |

**Total Hours: 33**

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

## Fifth Semester

| Sr. No. | Course Code | Course Name | L | T | P | Cr |
|---|---|---|---|---|---|---|
| 1 | UEE-301 | Electrical Power Generation | 3 | 1 | - | 3.5 |
| 2 | Xxxx | Elective –I | 3 | 1 | - | 3.5 |
| 3 | UEE-303 | High Voltage Engineering | 3 | 1 | - | 3.5 |
| 4 | UEE-304 | Linear Control Systems | 3 | 1 | 2 | 4.5 |
| 5 | UEE-305 | Microprocessors & Applications | 3 | 1 | 2 | 4.5 |
| 6 | UEC-302 | Electromagnetic Field Theory | 3 | 1 | - | 3.5 |
| 7 | UTR-301 | Industrial Training (Under Taken During Summer Vacations) | 0 | 0 | 0 | 4.0 |
| 8 | UPD-301 | Personality Development Program | 2 | - | - | 2.0 |
| **Total** | | | **20** | **6** | **4** | **29** |

**Total Hours: 30**

## Sixth Semester

| Sr. No. | Course Code | Course Name | L | T | P | Cr |
|---|---|---|---|---|---|---|
| 1 | UEE-352 | Biomedical Engineering | 3 | 1 | 2 | 4.5 |
| 2 | UEE-351 | Switchgear & Protection | 3 | 1 | 2 | 4.5 |
| 3 | Xxxxx | Elective –II | 3 | 1 | - | 3.5 |
| 4 | UEE-353 | Power System Operation & Control | 3 | 1 | - | 3.5 |
| 5 | UEE-354 | Advanced Microprocessors / Microcontrollers & Applications | 3 | 1 | 2 | 4.5 |
| 6 | UEE-355 | Electrical Simulation Lab-II | - | - | 3 | 1.5 |
| 7 | UGP-351 | General Proficiency | - | - | - | 2.0 |
| 8 | UPD-351 | Personality Development Program | 2 | - | - | 2.0 |
| **Total** | | | **17** | **5** | **9** | **26** |

**Total Hours: 31**

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

## Seventh Semester

| Sr. No. | Course Code | Course Name | L | T | P | Cr |
|---|---|---|---|---|---|---|
| 1 | UEE-401 | Computer Applications in Power System Analysis | 3 | 1 | 2 | 4.5 |
| 2 | Xxxx | Elective –III | 3 | 1 | - | 3.5 |
| 3 | UEE-402 | Digital Signal Processing | 3 | 1 | 2 | 4.5 |
| 4 | UEE-404 | Electrical Energy Utillisation | 3 | 1 | - | 3.5 |
| 5 | Xxxxx | Open Elective – I | 3 | 1 | - | 3.5 |
| 6 | UTR-401 | Industrial Training (Under Taken During Summer Vacations) | 0 | 0 | 0 | 4.0 |
| 7 | UPD-401 | Personality Development Program | 2 | - | - | 2.0 |
| **Total** | | | **17** | **5** | **4** | **25.5** |

**Total Hours: 26**

## Eight Semester

| Sr. No. | Course Code | Course Name | L | T | P | Cr |
|---|---|---|---|---|---|---|
| 1 | Xxxx | Elective –IV | 3 | 1 | - | 3.5 |
| 2 | UEE-451 | Electrical power quality | 3 | 1 | 2 | 4.5 |
| 3 | Xxxx | Open Elective –II | 3 | 1 | - | 3.5 |
| 4 | Xxxx | Open elective III | 3 | 1 | - | 3.5 |
| 5 | UEE-454 | Project | - | - | 9 | 4.5 |
| 6 | UGP-451 | General Proficiency | - | - | - | 2.0 |
| 7 | UPD-451 | Personality Development Program | 2 | - | - | 2.0 |
| **Total** | | | **14** | **4** | **11** | **23.5** |

**Total Hours: 29**

**Total Credits:214**

**Total Hours: 250**

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

## Departmental Elective I(Semester5)

| S. NO | Basket 1 | | Basket 2 | | Basket 3 | | L | T | P | C |
|---|---|---|---|---|---|---|---|---|---|---|
| | Course Code | Course Title | Course Code | Course Title | Course Code | Course Title | | | | |
| 1 | UEE-309 | Smart Grid Technologies | UEE-307 | Advance electrical machines | UEE-306 | Advance power electronics | 3 | 1 | - | 3.5 |
| 2 | UEE-307 | Advance electrical machines | UEE-308 | Power Semi Conductor Devices | UEE-306 | Advance power electronics | 3 | 1 | - | 3.5 |

## Departmental Elective II(Semester6)

| S.NO | Basket 1 | | Basket 2 | | Basket 3 | | L | T | P | C |
|---|---|---|---|---|---|---|---|---|---|---|
| | Course Code | Course Title | Course Code | Course Title | Course Code | Course Title | | | | |
| 1 | UEE-350 | Flexible AC transmission system | UEE-357 | Electrical drives | UEE-350 | Flexible AC transmission system | 3 | 1 | - | 3.5 |
| 2 | UEE-356 | Solar Power | UEE-358 | Deregulation of power system | UEE-359 | Power Electronic Control of AC Drives | 3 | 1 | - | 3.5 |

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

## Departmental Elective III (Semester 7)

| S.NO | Basket 1 | | Basket 2 | | Basket 3 | | L | T | P | C |
|---|---|---|---|---|---|---|---|---|---|---|
| | Course Code | Course Title | Course Code | Course Title | Course Code | Course Title | | | | |
| 1 | UEE-403 | Energy management | UEE-405 | Advance Control System | UEE-412 | Soft Computing | 3 | 1 | - | 3.5 |
| 2 | UEE-411 | Direct energy conversion | UEE-408 | Illumination engineering | UEE-410 | Power System Stability | 3 | 1 | - | 3.5 |

## Departmental Elective IV(Semester 8)

| S.NO | Basket 1 | | Basket 2 | | Basket 3 | | L | T | P | C |
|---|---|---|---|---|---|---|---|---|---|---|
| | Course Code | Course Title | Course Code | Course Title | Course Code | Course Title | | | | |
| 1 | UEE-452 | Non Conventional Electrical Power Generation | UEE-456 | Hydro Power Station Design | UEE-455 | Power Electronics for renewable energy system | 3 | 1 | - | 3.5 |
| 2 | UEE-450 | Neural Networks & Fuzzy Logic | UEE-457 | Transformer Engineering | UEE-457 | Transformer Engineering | 3 | 1 | - | 3.5 |

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

## Open Elective I (Semester 7)

| Sr.No | Course Code | Course Title | L | T | P | Credit |
|---|---|---|---|---|---|---|
| 1 | UMG-476 | Human values and professional Ethics | 3 | 1 | 0 | 3.5 |
| 2 | UEC-462 | Biomedical instrumentation | 3 | 1 | 0 | 3.5 |
| 3 | UEC-463 | Television engineering | 3 | 1 | 0 | 3.5 |
| 4 | UCS 480 | Software Project Management | 3 | 1 | 0 | 3.5 |
| 5 | UCS_481 | Distributed operating system | 3 | 1 | 0 | 3.5 |
| 6 | UCE-312 | Advance construction technique and project management | 3 | 1 | 0 | 3.5 |
| 7 | UCE-365 | Advance environmental engineering | 3 | 1 | 0 | 3.5 |
| 8 | UME-410 | Basic Manufacturing Technology | 3 | 1 | 0 | 3.5 |
| 9 | UME-411 | Measurement Techniques | 3 | 1 | 0 | 3.5 |

## Open Elective II (Semester 8)

| Sr.No | Course Code | Course Title | L | T | P | Credit |
|---|---|---|---|---|---|---|
| 1 | UMG-450 | Entrepreneurship Development & Enterprise Management | 3 | 1 | 0 | 3.5 |
| 2 | UEC-464 | Satellite communication | 3 | 1 | 0 | 3.5 |
| 3 | UEC-465 | Digital signal processing and its application | 3 | 1 | 0 | 3.5 |
| 4 | UCS-482 | Grid computing | 3 | 1 | 0 | 3.5 |
| 5 | UCS-483 | Software reliability | 3 | 1 | 0 | 3.5 |
| 6 | UCE-311 | Advance concrete technology | 3 | 1 | 0 | 3.5 |
| 7 | UCE-409 | Geographic information systems for resources management | 3 | 1 | 0 | 3.5 |
| 8 | UME-464 | renewable Energy Resources | 3 | 1 | 0 | 3.5 |
| 9 | UME-466 | Automation and robotics | 3 | 1 | 0 | 3.5 |

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

## Open Elective III (Semester 8)

| Sr.No | Course Code | Course Title | L | T | P | Credit |
|---|---|---|---|---|---|---|
| 1 | UMG-475 | Total Quality Management | 3 | 1 | 0 | 3.5 |
| 2 | UEC-466 | Optical Communication | 3 | 1 | 0 | 3.5 |
| 3 | UEC-467 | Principle of Digital Communication | 3 | 1 | 0 | 3.5 |
| 4 | UCS-484 | E-Commerce & ERP | 3 | 1 | 0 | 3.5 |
| 5 | UCS-485 | Data ware Housing & Data Mining | 3 | 1 | 0 | 3.5 |
| 6 | UCE-412 | Building Project & Estimates | 3 | 1 | 0 | 3.5 |
| 7 | UCE-476 | Disaster Management | 3 | 1 | 0 | 3.5 |
| 8 | UME-459 | Engineering in industry and Entrepreneurship | 3 | 1 | 0 | 3.5 |
| 9 | UME-458 | Emerging Automotive Technologies | 3 | 1 | 0 | 3.5 |

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

# SEMESTER I & II

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: ENGINEERING MATHEMATICS-I**
**Course Code: UMA 101**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

**L T P Cr**
**3 1 0 3.5**

**Unit–I**

Calculus of one variable

Differential Calculus**:** Successive Differentiation, Leibnitz Theorem, Expansion of Function Maclaurin's and Taylor's expansion, Indeterminate forms, Approximation of errors.

**Unit-II**

Calculus of two variables

Partial Differentiation Partial Derivatives, Euler's Theorem Total Differentiation, Jacobians and their properties. Maxima and Minima of two variables, Lagrange's Method of Undetermined multipliers. Multiple integrals, Change of order, Area, length, volume and surface area.

**Unit – III**

Vector Calculus

Gradient, divergence and curl of a vector and their physical interpretations, Line, surface and Volume integrals, statement and Theorem of Green, Stoke and Gauss and their applications.

**Unit-IV**

Complex Analysis

Brief Review of Complex Number,Functions of Complex Variable,Analytic Functions,Cauchy Reimann Equations,Milne Thompson Method,Singularities,Cauchy Integral Theorem,Cauchy Residue Theorem.

**Text Book:**

1. P.K. Mittal, "Engineering Mathematics" , Vrinda Prakashan
2. Complex Analysis, R.V. Churchill and Brown,Fifth Editon and Mc Graw Hill Series.

**Reference Books:**

1. Calculus, Anton, Bivens & Davis, John wiley & Sons, New York.
2. Advanced Engg. Mathematics, Erwin Kreyszig, John Wiley & Sons, NewYork.
3. Advanced Engg. Mathematics, Michael D. Greenberg, Pearson Education.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: ENGINEERING CHEMISTRY**
**Course Code: UCH 101**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 2 | 4.5 |

**Unit-I**

Polymers and Polymerization- organic polymers, polymerization, various types of polymerization, effect of structure on properties of polymers, preparation properties and technical application of thermo-plastics (PVC, PVA, Polyamides), thermosets (PF,UF), and elastomers (SBR,GR-M), Silicones . Inorganic Engineering Materials. Introduction and applications of glass, cement gypsum, lime, plaster of paris, Composites- Classification, advantages & application of composites. Refractories- Introduction, classification, properties & important refractory materials & applications.

**Unit – II**

Water Chemistry: Introduction, Sources of water, Impurities, Hardness, Units, Chemical analysis of water-free chlorine, alkalinity, Estimation of hardness by EDTA method, Analysis by EDTA method, Oxidations (BOD & COD), Boiler Corrosion, Carry Over- Priming and foaming, Scales and Sludges, Caustic embrittlement. Sewage & Treatment, Drinking water treatment, Desalination of water, Softening methods and related numerical problems. Corrosion -A Threat: Introduction, Types of corrosions, Electrochemical Theory, Pitting, Water Line, Differential Aeration corrosions, Stress Corrosion, Factors affecting Corrosion, Preventive measures.

**Unit-III**

Lubricants: Introduction, Functions of Lubricants, Mechanism of Lubrication, Additives, Greases and Emulsions, Properties of Lubricants - Viscosity Index, Fire & Flash point, Pour & Cloud point, Aniline point, saponification number, acid number. Fuels and Combustion: Introduction, class of fuels ( Solid, Liquid and Gases) Coal and its origin, Analysis of Coals, Petroleum fuels, Crude Petroleum and its refining, Cracking, Synthetic petrol, knocking, octane number Reforming Hydro finishing and Diesel, cetane number Kerosene, Gasoline.: Coal gas, Oil Gas, Bio- Gas, Nuclear Fuel.

**Unit - IV**

Stereo Chemistry: structures, types, applications and stereochemistry of natural products like alkaloids, steroids, quininoids terpenoides including, allenes and biphenyls

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

Soil Chemistry: Soil pH, Inorganic & organic components in soils, Acid base & Ion exchange reactions in soils, Micronutrients and macronutrients, soil testing, Nitrogen pathways and NPK in soil.

**Text Books:**

1. Engineering Chemistry: By P.C.Jain & Monika Jain, Dhanpat Rai and Sons.
2. A Text Book of Engineering Chemistry: By Shashi Chawla, Dhanpat Rai & Sons.
3. Physical Chemistry: By R.P.Verma, Pardeep Publishers Jallandhar.
4. Industrial Chemistry by B.K. Sharma

**Reference books:**

1. Chemistry in Engineering & Technology, Vol.I & Vol.II, Rajaram, Kuriacose (TMH).
2. Physical Chemistry, P.W.Atkin (ELBS, Oxford Press)
3. Chemistry of Natural products by OP Aggarwal.
4. Engineering Chemistry- by A.K. Tripathi Satya Prakashan, New Delhi.
5. Stereo Chemistry of Organic Compounds by P.S. Kalsi.
6. Environmental Chemistry by A.K. De , New Age International Publishers
7. Organic Chemistry Vol-2 by I.L. Finar.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: CHEMISTRY LAB**
**Course Code: UCH – 101**

| **Evaluation Components for Practical Courses**<br><br>**(Students are required to perform atleast 8 practical mandatorily from the given list of practical)** | |
|---|---|
| Lab Performance | 10 |
| Lab file work | 10 |
| Viva – Voce | 10 |
| **Total** | **30** |

**LIST OF EXPERIMENTS**

1. To determine the solid carbon, volatile matter, ash content and percentage of moisture in given sample of coal by proximate analysis method and classify the coal.
2. To determine the total alkalinity in a given sample of water using a standard acid.
3. To determine the percentage of Chlorine in a given sample of CaOCl 2 which has been dissolved in one litre of solution.
4. To determine the surface tension of the two given unknown liquids by using Stalgmometer and identify the given liquid.
5. To determine the coefficient of viscosity of the given unknown liquids by using Ostwald's Viscometer and identify the given liquid.
6. To determine the coefficient of viscosity of the given lubricating oil using Red Wood Viscometer
7. To determine the surface tension of the given liquid by drop number method by using Stalgmometer and identify the given liquid.
8. To determine the flash point and fire point of given sample of oil using Pens key Marten's apparatus.
9. To determine the amount of Chlorine in given sample of water approximate N/20 sodium Thiosulphate solution. Ask for your requirement.
10. Estimation of calcium as CaO volumetrically in cement.
11. To determine the chemical oxygen demand of waste water.
12. To prepare phenolformaldehyde resin.
13. To prepare Hexamethylenediamine Adipic acid (Nylon 66) polymer.
14. Determine of total hardness of water by EDTA method.
15. To determine cloud and pour point of lubricating oil.
16. Preparation of Urea Formaldehyde resin.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: FUNDAMENTALS OF COMPUTER & C PROGRAMMING**
**Course Code: UCS-101**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 2 | 4.5 |

**Unit-I**

An Overview of Computer System: Anatomy of a digital Computer, various kinds of registers in CPU and their roles, Classification of Computers, Generations of computers, hardware, software, firmware, von Newman and Harvard Architecture. Memory: Classification of memory- Main, Auxiliary memory and Cache memory, Memory Hierarchy. Secondary storage devices: Hard disk, Floppy disk. Input Devices: Keyboard, Mouse, Joystick, etc.
Output Devices: Monitors (CRT, TFT, Plasma panels) Printers (Dot-Matrix, Inkjet, Laser), plotters, Optical mark readers Radix number system: Decimal, Binary, Octal, Hexadecimal numbers and their inter-conversions; Representation of information inside the computers.

**Unit-II**

Programming Languages: Machine, Assembly, and High Level Language, introduction to Assembler, Compiler, Interpreter, seven phases of compilers, symbol Table, Debuggers, Linker and Loader. Programming fundamentals: Algorithms, pseudo codes and Flowcharts, Debugging, testing and documentation, structure-programming concepts, top down and bottom-up design approaches. Operating System Basics: Introduction and Functions of Operating System, Types of OS and case studies on NT, XP, 2000 and Linux. 13. Operating System: Revision of functions of O.S., Windows installation, NT, 2000, XP and Linux Case Studies.

**Unit-III**

Networking: Introduction to network, LAN, WAN, MAN, Internet and WWW, Introduction to e-mail. Introduction: Structure of a C Program, C Compilers, Editing, Compiling & Running of a C program, Data types, Constants and Variables, Operators and Expressions, Different types of expressions and their Evaluation, Conditional Expression, Assignment statement, Library functions, typecasting.

**Unit-IV**

Decision Control Structure: Decision making using if, if-else, elseif and switch statements Iterative Statements: Looping using for, while and do-while statements, Transferring Program control using break, continue and goto statements.

**Reference Books**

1. Computer fundamentals P. K. Sinha BPB
2. Teach yourself all about computers Barry Press and Marcia Press IDG Books India

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

3 Spirit of C Mullis Cooper Jacob Publications

**Text Books**

1. Let us C Yashwant Kanetkar BPB
2. The C Programming Language Kerninghan B.W. & Ritchie D. M PHI
3. Programming in C Gotterfied B Tata McGraw Hill
4. C programming a Practical Approach Ajay Mittal Pearson Education

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: COMPUTER LAB**
**Course Code : UCS-101**

| **Evaluation Components for Practical Courses**<br>**(Students are required to perform atleast 8 practical mandatorily from the given list of practical)** | |
|---|---|
| Lab Performance | 10 |
| Lab file work | 10 |
| Viva – Voce | 10 |
| **Total** | **30** |

**LIST OF EXPERIMENTS**

**DOS**:

1. Study of internal commands of DOS
2. Study of external commands of DOS.

**C Programming:**

1. Write a program to find the largest of three numbers (if-then-else).
2. Write a program to find the largest number out of ten numbers (for statement).
3. Write a program to find the average male height & average female heights in the class (input is in form of sex code, height).
4. Write a program to find roots of quadratic equation using functions and switch statement.
5. Write a program using arrays to find the largest and second largest no.
6. Write a program to produce ASCII equivalent of given number
7. Write a program to find divisor or factorial of a given number.
8. Write a recursive program for Factorial of a number.
9. WAP to print Fibonacci sequence of numbers is 0, 1, 1, 2, 3, 5, 8……
10. Write a program that takes two operands and one operator from the user perform the operation and then print the answer
11. WAP to find sum of digits of a number.
12. WAP to find reverse of a number.
13. WAP to check if a number is Armstrong number
14. WAP to check if an entered number is palindrome.
15. Write a program to print the following outputs:

```
    1
2   2
3   3   3
```

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

| | | | | |
|---|---|---|---|---|
| 4 | 4 | 4 | 4 | |
| 5 | 5 | 5 | 5 | 5 |

**Note:** - Record to be maintained both electronically and hard copy for evaluation.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: PRINCIPLES OF ELECTRICAL ENGINEERING**
**Course Code: UEE-105**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

**L T P Cr**
**3 1 2 4.5**

**Unit-I**

D.C. circuits: Ohm's law, Kirchoff's Laws, Thevenin's, Norton's, superposition theorem, Maximum power transfer theorem, Nodal and Mesh analysis. A.C. circuits: Sinusoidal signal, instantaneous and peak values, RMS and average values, phase angle, polar and rectangular, exponential and trigonometric representations RL and C components, behavior of these components in A.C. circuits, concept of complex power, power factor. Transient Response: transient response RL, RC and RLC circuits with step input.

**Unit-II**

Series and Parallel A.C. circuits: Series and Parallel A.C. circuit, Series and Parallel resonance. Q factor, cut off frequency and bandwidth. Three phase circuits: Phase and line voltages and currents, balanced star and delta circuits, power equation, measurement of power by 2-wattmeter method, importance of earthling.

**Unit-III**

Electromagnetism: Basic concepts of magnetic circuits, Series magnetic circuits, parallel magnetic circuits, series parallel magnetic circuits, analogy between electrical and magnetic circuits, magnetic circuit with air gap, Laws of electromagnetic induction, self inductance, mutual inductance, coefficient of coupling. Basic concepts of transformers and rotating electrical machines (operating principle, construction and applications).

**Unit-IV**

Measuring Instruments: Voltmeter, Ammeter, Wattmeter, Energy meter. Batteries: Storage batteries:- Types, construction, charging and discharging, capacity and efficiency of Lead-acid batteries.

**Text Books**

1. Kothari & Nagarath: Basic Electrical Engg. (2 nd Edition), TMH.
2. B.L. Theraja & A.K. Theraja, S.Chand: Electrical Technology(Vol-1).

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Reference books**

1. Deltoro: Electrical Engg Fundamentals, PHI.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: PRINCIPLES OF ELECTRICAL ENGINEERING**
**Course Code: UEE-105**

| **Evaluation Components for Practical Courses**<br><br>**(Students are required to perform atleast 8 practical mandatorily from the given list of practical)** | |
|---|---|
| Lab Performance | 10 |
| Lab file work | 10 |
| Viva – Voce | 10 |
| **Total** | **30** |

**List of Experiments**

1. To verify KCL and KVL.
2. To study frequency response of series RLC circuit and determine resonance frequency.
3. To study frequency response of parallel RLC circuit and determine resonance frequency.
4. To perform direct load test of transformer and plot efficiency v/s load characteristics.
5. To study and verify Thevenins, Norton's, superposition and maximum power theorems.
6. To perform O.C and S.C test of transformer.
7. To study various types of meters
8. Measurement of power by 3 voltmeter / 3 ammeter method.
9. Measurement of power in 3-phase system by 2-wattmeter method

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: ENGINEERING GRAPHICS DRAWING**
**Course Code: UEG-101**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

| L | T | P | Cr |
|---|---|---|---|
| 0 | 0 | 6 | 3 |

**Unit-I**

Introduction to Conventional Drawing Various types of lines, Principles of drawing, Size & Location as per IS code (SP-46) for general engg. Drawing, Dimensioning exercises Conventional exercise of Lettering Techniques, Drawing pertaining to symbols, Free hand lettering techniques (in letters & numerals in 3, 5, 8 & 12mm sizes), Vertical & Inclined Drawing at $75^0$. Instrumental lettering in single stroke, Linear, Diagonal & Vernier Scale, BIS

Conventions. Computer Aided drawing Computer Screen, Layout of software, std. tool bar/menus & description of most commonly used tool bars, navigation tool bars & tools. Co-ordinate system and reference planes. Definitions of HP, VP, RPP, & LPP. Creation of 2D/3D environment. Selection of drawing size and scale. Commands & creation of lines, Commands and creation of lines, Co-ordinate points, axes, poly lines, square, rectangle polygons, splines, circles, ellipse, text, move, copy, off-set, mirror, rotate, trim, extend, break, chamfer, fillet, curves, constraints viz. tangency, parallelism, inclination & perpendicularity, Dimensioning, Line convention, material conventions & lettering

**Unit-II**

Orthographic Projections Definition- Planes of Projection, reference lines & conventions employed, Projections of points in all four quadrants, Projections of straight lines (located in first quadrants/first angle only), true and apparent lengths, true & apparent indications to reference planes Orthographic Projections of Plane Surfaces & Engg. Objects (First Angle Projections only) Definitions-Projections of plane surfaces-triangle, square rectangle, rhombus, pentagon, hexagon & circle, planes in different positions by change of position method only (No problem on punched & composite plates), Engg. Objects projections.

**Unit-III**

Projections of Solids (First Angle Projections only) Definitions-Projections of right regular-tetrahedron, hexahedron (cube), prisms, pyramids, cylinders and cones in different positions

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

Isometric Projections (Using Isometric scales) Isometric scale & projection of simple plane figures, Isometric projections of tetrahedron, hexahedron (cube), right regular prisms, pyramids, cylinders, cones, spheres, cut spheres & combination of solids

**Unit-IV**

Sections & Development of lateral surfaces of solids Section planes, Sections, Section views, Apparent shapes, & true shapes of sections of regular prisms, pyramids, cylinders and cones resting with base on HP, Sectioning of Engg. Objects, Developments of lateral surfaces of trays, tetrahedrons spheres and transition pieces

**Reference Books**

1. P.S. Gill, Engg. Drawing & Engineering Graphics,
2. N.D. Bhatt, Elementary Engg. Drawing

**Text Books**

1. A primer on Computer Aided Drawing-2006, Published by VTU, Belgaum
2. Computer Aided Engg. Drawing-S.Trymbaka Murthy, I.K. International Publishing House Pvt. Ltd., New Delhi, 3rd revised edition-2006

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: ENVIRONMENTAL SCIENCE**
**Course Code: UEN -101**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

| L | T | P | Cr |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Unit-I**

The Multy disciplinary nature of environmental studies & Definition Scope & importance, Need for public awareness, Inter- relationship of technology growth. Natural Resources-Renewable & Non Renewable resources, Forest resources- use & over exploitation, deforestation, Timber extraction, Dams & their effects on forests & tribal people, Water Resources-Use & over utilization of surface & ground, water, floods, draughts-conflicts over water dams benefits &

problems, Mineral Resources- Use & over Exploitation, environmental effects of extracting & mineral resources, Food Resources- world food problems changes caused by agriculture & over grazing effects of modern agriculture fertilizer & pesticide problems, water logging, saliency, Energy Resources growing energy needs, renewable & Non-Renewable energy sources, use of alternate energy, Land resources- land as resource, land degradable, man induced land sleds, Soil erosim & desertifical, individual role in conservation of natural resources, Equatable use of resources for sustainable life style.

**Unit-II**

Ecosystems-Natural Ecosystems- Concept, Structure & Function, Ecological Succession, Flow of energy in Ecosystem, Ecological Succession, Brief Features of Forest, Grass Land, Desert & Aquatic ecosystem. Biodiversity-Different genetic & ecosystem diversity, Biogeography classification in it, Biodiversity at global, National & Local levels, Biosphere cycles, Carbon Dioxide Cycle, Eco-Imbalance system, Principles, effects

**Unit-III**

Environmental Pollution- Definition, Causes effects & Control measures of Air, Water, Soil, Marine, Thermal pollution, Nuclear Hazards, Industrial Hazard & safety, Solid Waste & E- waste management causes, effects & control measures of urban & industrial, Role of individual to prevent pollution, Disaster Management, Floods, Earthquakes cyclone & landslides, Brief introduction to safely Engineering.

**Unit-IV**

Human Population & Environment-Population growth, Variation among nations, Population

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

Explosion, Environment & Human Health, Human Rights, Value Education, Women Child Welfare, HIV/AIDS-its causes, effects, & control, Role of information Technology in Environment & Human Health, Environment Acts & Social Issues from unsustainable to sustainable development, Urban problems released to energy, water conservation, Rain Water harvesting, watershed management, Resettlement & Rehabilitation of people, its problems & concerns, Environmental Ethics- Issues & possible solutions, Climate change, Global Warming, Acid rain, Ozone layer depletion, Nuclear accidents & holocaust consumerism & waste products, Environment Protection Act Air (Prevention & Control of Pollution) Act-1981 Water (Prevention & Control of Pollution) Act – 1974 Forest Servation Act – 1980 Wildlife protection Act- 1972 , Issue involved in enforcement of environmental legislation.

**Text books**

1. Environment Education S.S. Randhawa S.Vikas & Co. Publications
2. E-Waste-Implications, management & regulations in India and current global
   Rakesh Johri TERI (The Energy & Resources Institute), best practices New Delhi
3. Environment Science Kaushik & Kaushik New Age International

**Reference Books**

1. Environmental Science & Engineering S.K. Dhameja S.K. Kataria & Sons Publications
2. Environmental Studies Smriti Sriwastava S.K. Kataria & Sons Publications
3. Introduction to Environmental Engineering and Science
4. G. M. Masters Prentice Hall of India Pvt. Ltd. , 1991
5. Environmental Science B. J. Nebel Prentice Hall Inc. , 1987

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name:WORKSHOP PRACTICE**
**Course CodeUWP-110**

| **Evaluation Components for Practical Courses**<br>**(Students are required to perform atleast 8 practical mandatorily from the given list of practical)** | |
|---|---|
| Lab Performance | 10 |
| Lab file work | 10 |
| Viva – Voce | 10 |
| **Total** | **30** |

**Fitting shop**: Study of tools and processes ; One Simple exercise involving fitting work.
**Carpentry Shop**: Study of tools and their use , carpentry joints, and Preparation of a half-lap corner joint or mortise and tennon joints. Study of woodworking lathe.
**Welding Shop**: Study of tools and their use, Simple butt joint, Lap joint, different welding processes and preparation of any one welding joint.
**Sheet metal shop**: Study of tools and operations, Making one job out of the following : funnel complete with soldering / Fabrication of tool box / tray / electrical panel box etc
**Machine Shop**: Study and demonstration of tools and operations on Lathe / Shaper / Milling machine / Grinding machine / Drilling machine
**Materials**: Study of different materials of engineering use, Ferrous & Non ferrous materials and their constituents, Properties and their applications. Heat treatment of ferrous metals and its importance, Microstructures of carbon steels
**Manufacturing Processes**: Study and demonstration of processes such as Rolling, Press working , wire drawing, Shearing and punching,& Plastic molding etc.
**Smithy shop & Forging shop**: Study of smithy process and forging process describing different methods of forging. and demonstration of a simple smithy job.
**Metal Casting**:
i) Study of Mold making process and with special emphasis on bench molding .
ii) Demonstration of Casting process of any simple job.

**Reference Books**:
1. Hajra, Bose, Roy: Workshop Technology Vol 1 & 2, Media Promotors
2. Raghuvanshi B.S.: Workshop Technology, Vol 1 & 2, Dhanpatrai

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: ENGINEERING MATHEMATICS-II**
**Course Code: UMA 102**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Unit-I**

Linear Algebra

Rank of a Matrix, consistency and inconsistency of a system of Linear equations, Elementary row and column transformations inverse of matrices, Eigen Values and eigen vectors. Cayley Hamilton Theorem, Diagonalization, Vector spaces $R^n$ over R, linear transformations $R^n$ to $R^m$

**Unit – II**

Differential Equations:

Solution of first order and first degree differential equations: variables separable, homogeneous, exact, linear and equation reducible to above types. Linear Differential equations of nth order with constant coefficients. Complementary functions and particular integrals, Ordinary simultaneous equations.

**Unit – III**

Laplace Transform

Laplace transform, existence theorem, Laplace transform of derivatives and integrals, Inverse laplace transform, Unit Step function, Dirac delta function, Laplace transform of periodic function, Convolution Theorem. Applications to solve simple linear and simultaneous diff equations.

**Unit-IV**

Fourier

Fourier series, Euler formulae, half range series, Fourier integral & Fourier Transform.

**Text Book**:

1. P.K. Mittal: Engineering Mathematics, Vrinda Prakashan

**Reference Book**:

1. Calculus, Anton, Bivens & Davis, John wiley & Sons, New York.
2. Advanced Engg. Mathematics, Erwin Kreyszig, John Wiley & Sons, NewYork.
3. Advanced Engg. Mathematics, Michael D. Greenberg, Pearson Education.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: ENGINEERING PHYSICS**
**Course Code: UPY-101**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

**L T P Cr**
**3 1 2 4.5**

**Unit-I**

Optics: Interference: Division of wave front & Division of amplitude – Fresnel's biprism , Thin film interference & Newton's rings. Michelson interferometer and its applications to determine λ and d λ. Diffraction: Fresnel and Fraunhofer diffraction, Half period zone, zone plate, diffraction at straight edge, plane transmission grating. dispersive power & resolving power of a grating .

Fiber Optics: Introduction ,acceptance angle, numerical aperture, type of optical fiber- step index and graded index fibers, applications of optical fibers in communication:

Laser: Spontaneous and stimulated emission of radiation, Population inversion and optical pumping, Principle and production of laser ,three and four level laser, Construction and working of Ruby and He-Ne laser

**Unit-II**

Electrostatics and Electrodynamics: Basic laws of electricity & magnetism, Gradient, Divergence and Curl and their physical meaning , Divergence and Stokes theorems, continuity equation, Maxwell's equations in integral and differential forms, Electromagnetic wave propagation in free space, Poynting vector.

Relativistic Mechanics: Inertial and non-inertial frames, Galilean transformations, Michelson–Morley experiment , Einstein's postulates of special theory of relativity, Lorentz transformation equations. Length contraction, time-dilation, Addition of velocities,Variation of mass with velocity and mass-energy relation, Relativistic energy-momentum transformation.

**Unit-III**

Quantum Mechanics: Quantum theory of light, photoelectric effect, Compton effect, pair production, matter waves and de-broglie hypothesis, particle diffraction, uncertainty principle and applications. Postulates of quantum mechanics and Schrödinger theory, time dependent and time independent Schrodinger wave equation, wave function, Born interpretation and normalization, expectation values. Applications to particle in a box (infinite potential well) finite potential step and barrier problems, tunneling, linear harmonic oscillator (one dimensional)

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Unit-IV**

Statistical physics: Classical and Quantum statistics:Maxwell –Boltzmann statistics, Bose- Einstein and Fermi- Dirac statistics, Fermi energy, free electron model and its applications

Super conductivity Occurrence, destruction of super conductivity, Meissner effect, type I and type II Super-conductors; applications of superconductors.

**Text Books:**

1. Concepts of Modern physics by Beiser (Tata Mc Grow Hill)
2. Fundamentals of Physics by Resnick, Halliday, and Walker (Wiley)
3. Principles of Physics by R.A. Serway and J.W. Jewett (Thomas Asia Pvt. Ltd.)
4. Optics by Jenkins & White.

**Reference Books:**

1. Introduction to special theory of Relativity by Robert Resnick (Wiley)
2. Quantum mechanics by Schiff.
3. Quantum mechanics by Pauling & Wilson.
4. Principle of Optics by B.K. Mathur.
5. Optics by A.G. Ghatak 3rd edition (Tata McGrow Hill – 2005)
6. Optics by Brij lal and Subramaniam (S. Chand)
7. Physics part I and II by Resnick, Halliday, and Krane , John Wiley – 2002).
8. Modern Physics by Kenneth Krane, (2nd Edition, John Wiley & Sons ) – 1998
9. Physics of the atom by Wehr, Richards and Adair (4th Edition, Addison- Weseley)
10. Elements of Electromagnetics by Mathew N.D., Sadiku S.A.D. (Oxford University press)
11. Electrodynamics by D.J. Giriffith.

12 Lasers by O. Svelto.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: ENGINEERING PHYSICS LAB**
**Course Code: UPY-101**

| **Evaluation Components for Practical Courses**<br>**(Students are required to perform atleast 8 practical mandatorily from the given list of practical)** | |
|---|---|
| Lab Performance | 10 |
| Lab file work | 10 |
| Viva – Voce | 10 |
| **Total** | **30** |

**LIST OF EXPERIMENTS**

1. To determine the wavelength of monochromatic light by Newton's ring.
2. To determine the wavelength of sodium light by using plane transmission grating.
3. To determine the wavelength of sodium light by using Michelson interferometer.
4. To find the refractive index of a prism by using spectrometer.
5. To determine the attenuation loss of a signal optical fiber.
6. To determine the numerical aperture of an optical fiber.
7. To determine the low resistance of the material of given wire using Carey Foster's bridge.
8. To draw hysteresis curve of a given sample of ferromagnetic material.
9. To find the capacitances of two capacitors (air and dielectric ) by De'sauty Bridge
10. To find the frequency of AC mains by using electric vibrator.
11. To find the value of high resistance by Substitution method.
12. To convert a galvanometer into an ammeter of a given range
13. To determine the variation of magnetic field along the axis of a current carrying coil and then to estimate the radius of the coil.
14. To study the Hall effect and determine Hall coefficient, carrier density and mobility of a given semiconductor material using Hall-effect set up.
15. To determine the wavelength of He-Ne laser by using single slit experiment.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: ADVANCED C PROGRAMMING**
**Course Code: UCS- 102**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

**L T P Cr**
**3 1 2 4.5**

**Unit-I**

Functions: Introduction to user defined functions, passing values between function, Function prototype and Recursion.

Arrays: Introduction to arrays, array initialization, array traversal, bound checking, passing array element to functions, passing entire array to a function, operations on arrays. Two dimensional Arrays: creating a 2D array, array operations (addition, subtraction, multiplication, transpose).

**Unit-II**

Pointers: Introduction to pointers, pointer operator, call by value and call by reference, pointer to array and array of pointers. Strings: Introduction to strings, string operations (strlen, strcpy, strupr, strlwr, strcat, strcmp), gets v/s scanf, puts v/s printf.

**Unit-III**

Structure: Use of Structures, Declaring a Structure, Accessing Structure Elements, Storing structure elements, Array of Structures, pointer to structure.

Union: Difference between union and structures, Introduction to enumerations.

**Unit: IV**

File Handling: Classification of files, file opening modes, Operations on text and binary files (reading, writing, copying, and concatenation).

**Text Books:**

1. Computer fundamentals P. K. Sinha BPB
2. Teach yourself all about computers Barry Press and Marcia Press IDG Books India
3. Spirit of C Mullis Cooper Jacob Publications
4. Let us C Yashwant Kanetkar BPB

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Reference books:**

1. The C Programming Language Kerninghan B.W. & Ritchie D. M PHI
2. Programming in C Gotterfied B Tata McGraw Hill
3. C programming a Practical Approach Ajay Mittal Pearson Education

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: COMPUTER LAB**
**Course Code: UCS- 102**

| **Evaluation Components for Practical Courses**<br>**(Students are required to perform atleast 8 practical mandatorily from the given list of practical)** | |
|---|---|
| Lab Performance | 10 |
| Lab file work | 10 |
| Viva – Voce | 10 |
| **Total** | **30** |

**LIST OF EXPERIMENTS**

1. Write a C program to enter N natural numbers in ascending order in 1-D array, and apply linear and binary search on it.
2. Reading N integers in 1-D array and sort them using Bubble sort and calculate their mean, median.
3. Write c program to evaluate polynomials like p(x)=a*x*x+b*x+c etc. using Horner's Rule.
4. Write a program to read two matrices A and B and compute A+B, A-B, A*B, A and B transpose.
5. Write a program to demonstrate call by value and call by reference (use swapping of two numbers), write function to calculate square and cube of a number.
6. Write program to read single and strings separated by space (using gets ()), perform strlen, contact, strup,strcmp on them using appropriate functions.
7. Create a Program using structures and Union which reads Name, Age and Salary of employee print them using dot and -> operators.
8. Using enum for name in place of integer values.
9. WAP to open a file and print its content on screen.
10. Write a program to edit and print the content of a pre written file.
11. Reading and Write file in Text and binary modes.
12. Write a program which prints its source code.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: COMMUNICATION & PROFESSIONAL SKILLS IN ENGLISH**
**Course Code: UHU 101**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

**L T P Cr**
**3 1 2 4.5**

**Unit- I**

Grammar and Reading skills:

1. Vocabulary building: parts of speech with usage, phraseology, idioms, one word substitution for a group of words, antonyms, synonyms.
2. Sentence formation, simple sentences of all six types.
3. Clauses.
4. Simple, Multiple and Compound sentences.
5. Verb Forms and Tenses.
6. Active Passive voice.
7. Narration.
8. Reading comprehension.
9. A text book containing short stories, plays and poems.
10. Newspaper reading.

**Unit- II**

Listening skills:

1. Familiarization with listening skills.
2. Phonetics: word accent, intonation.

**Unit- III**

Speaking skills:

1. Non Verbal Communications.
2. Phonetics: Consonants and vowel sounds, transcriptions, syllables.
3. Speech presentation, paper reading, extempore, self introduction.
4. Dialogues, debates, role play and quizzes.
5. Group discussion, Interview skills.
6. Public speaking skills.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Unit- IV**

Writing Skills:

1. Letter writing: personal, official and business and covering letters.
2. Resume' writing.
3. Essay writing.
4. Report writing.
5. Story writing.

**Text Books:**

An Exordium: Zeenat Khan &AkankshaVashisht.

1. English Grammar: Murphy

**Recommended Books:**

1. English Grammar and Composition: Prof. M. Krishna swami.
2. Patterns of English structures: A.S. Hornby. (Macmillian publications recommended)
3. A text book of English Poems: stories & essays (Macmillian publications recommended)
4. High school English Grammar: Wren & Martin.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

## Course Name: LANGUAGE LAB
## Course Code: UHU-101

| Evaluation Components for Practical Courses<br>(Students are required to perform atleast 8 practical mandatorily from the given list of practical) | |
|---|---|
| Lab Performance | 10 |
| Lab file work | 10 |
| Viva – Voce | 10 |
| **Total** | **30** |

1. Self introduction with one's name, family background, place of residence, one's educational qualifications and experiences and defining one's career objective and projecting ones strengths and skill-sets.
2. Interview Skills: Students will participate in mock interviews.
3. Presentation skills: Students will make presentations on given topics.
4. Group Discussion; Students will participate in group discussions.
5. Phonetics: Stress & intonation- Ear Training- Correct pronunciation- Sound recognition exercise- common Errors in English.
6. Conversation: Face to Face Conversation – Telephone conversation- Role play activities (Student will take on roles and engage in conversation).
7. Reading comprehension and vocabulary. Filling in the blanks- vocabulary building –Reading and answering question – News paper reading
8. Listening comprehension: Students will be excerpts of different conversational recordings and questions based on the respective excerpts will be given to them.
9. Pronunciation Training: Through language lab software.
10. Remedial grammar exercises: Through language lab soft ware.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: PRINCIPLES OF ELECTRONICS ENGINEERING**
**Course Code: UEC-105**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

**L T P Cr**
**3 1 2 4.5**

**Unit-I**

Brief review of Band Theory, Types of Semiconductors, Charge densities in semiconductor. Semiconductor Diode, Reverse and Forward bias conditions, Diode Characteristics and parameter, Equivalent circuit and frequency response, Ideal vs. Practical diode, Temperature Dependence of P-N junction diode, Diode Capacitance, Half and Full wave Rectifiers, Clipping and Clamping circuits, Avalanche diode, Zener Diode and its role as a voltage regulator.

**Unit-II**

Bipolar junction transistor (BJT) and their I/P and O/P characteristics in CE, CB mode, Transistor as a switch, Temperature variation of saturation parameters, h parameters. JFET and MOSFET, Equivalent circuit, Enhancement mode and Depletion mode MOSFETS, Unijunction
transistor (UJT), its characteristics, parameters and circuit operation, Photo transistor, its characteristics and applications.

**Unit-III**

Bias for transistor amplifier: fixed bias, emitter feed back bias. Feedback principles. Types of feedback, Stabilization of gain, reduction of non-linear distortion, change in resistance by negative feedback in amplifier. Amplifiers coupling, types of coupling, Amplifier pass band, RC-Coupled amplifiers at mid, low and high frequencies.

**Unit-IV**

Semi conductor processing, active and passive elements, Integrated circuits, bias for integrated circuits. Basic operational amplifier, applications of operational amplifier – adder, subtractor, Integrator, differentiator and comparator.

**Text Books:-**

1 Electronic Principles : A.P.Malvino : TMH
2 Electronic Fundamentals and Applications : J.D. Ryder : PHI

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Reference books:**

1. Electronic Circuits & Devices : J.Millman and C.C.Halkias : TMH
2. Integrated Circuits & Devices : J.Millman & C.C.Halkias : TMH
3. Basic Electronic & Linear Circuits : N.N.Bhargava & Kulshrestha : TMH

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: PRINCIPLES OF ELECTRONICS ENGINEERING LAB**
**Course Code: UEC-105**

| **Evaluation Components for Practical Courses**<br><br>**(Students are required to perform atleast 8 practical mandatorily from the given list of practical)** | |
|---|---|
| Lab Performance | 10 |
| Lab file work | 10 |
| Viva – Voce | 10 |
| **Total** | **30** |

**LIST OF EXPERIMENTS**

1. (a) To study the use and scope of using an oscilloscope as a measuring device in an electronic laboratory.
   (b) To study the use and scope of using a multimeter (digital and analog) as a measuring device in an electronics laboratory.
   (c) To study the use and scope of function generator as a signal source in an electronics laboratory.

**Set up an experiment to**:

1. Draw forward bias and reverse bias characteristics of a p-n junction diode and use it as a half wave and full wave rectifier.
2. Draw the characteristics of a Zener diode and use it as a voltage regulator.
3. Draw characteristics of common base configuration of p-n-p transistor.
4. Draw characteristics of common emitter configuration of an npn transistor.
5. Draw characteristics of common drain configuration of a MOSFET.
6. Find the voltage and current gain of single stage common emitter amplifier.
7. Draw the characteristics curve of UJT.
8. Find the voltage gain of single stage voltage series feedback amplifier.
9. Use operational amplifier as:

I) Inverting amplifier
II) Non-inverting amplifier
III) Comparator

10. Use operational amplifier as:

I) Integrator
II) Differentiator

11. Use operational amplifier as:

I) Adder
II) Precision amplifier

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

12. Find the overall voltage gain and current gain of a two stage RC coupled amplifier. Basic lectronics should stress on interfacing with real life devices and general-purpose linear units. Emphasis is on system design and not on discrete components, some of the component around which exercises can be built are

1. SCR as triacs and power control.
2. Power supplies using zener.
3. Opto couplers and isolations where photo diode, transistors, leds are used.
4. Laser diode (laser pointer)
5. Operation amplifiers.
6. Operation amplifiers as instrumentation amplifiers.

Note: - Record to be maintained in the laboratory record book for evaluation. Usage of breadboard approach to be encouraged.

**Text Books** :

1. Basic Electronic & Linear Circuits : N.N.Bhargava & Kulshrestha : TMH
2. Electronic Devices & Circuit Theory : Robert L.Boylestad & Louis Nashelsky : Pearson Edu

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: PRINCIPLES OF MECHANICAL ENGINEERING**
**Course Code: UME-105**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 2 | 4.5 |

**Unit-I**

First Law of Thermodynamics

Basic concepts of thermodynamics, systems -open and closed, equilibrium, Heat and work Essence and corollaries of the first law, analytical expressions applicable to a process and cycle, internal energy, enthalpy and specific heats, first law analysis of steady flow, applications of steady flow energy equation to engineering devices. Applications of first law of Thermodynamics Closed and open systems, analysis of non-flow and flow processes for an ideal gas under constant volume (Isochoric), constant pressure (Isobaric), constant temperature (Isothermal), adiabatic and polytropic conditions. Analysis of free expansion and throttling processes. Representation of these processes on P-V charts and analysis of property changes and energy exchange (work and heat) during these processes.

**Unit-II**

Second Law of Thermodynamics, Limitations of first law, various statements of second law and their equivalence, application of statements of second law to heat engine, heat pump and refrigerator. Philosophy of Carnot cycle and its consequences. Carnot theorem for heat engines and heat pump. Third law of thermodynamics. I. C. engine –basic engine components and nomenclature working principles of 4S and 2S engines, comparison of SI and CI engine, classification of IC engines, applications of IC engines. Lubricating, cooling and Fuel Circuits. Refrigeration and Air Conditioning: Vapor compression Refrigeration Cycles, working of domestic refrigerator, window type Air conditioner.

**Unit-III**

Simple Stresses & Strains, Concept & types of Stresses and strains, Poisson's ratio, stresses and strain in simple and compound bars under axial loading, stress strain diagrams, Hooks law, Elastic constants. Numerical problems. Automobile engineering- components of automobile- the basic structure- Frame, axles, Suspension, wheel {just an overview} transmission system (layout and brief description).Shear Force and Bending Moments Definitions, SF & BM diagrams for cantilevers, simply supported beams with or without over-hang and calculation of maximum BM and SF and the point of contraflexture under (i) concentrated loads, (ii) uniformly distributed loads Numerical Problems.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Unit-IV**

Bending Stresses in Beams Bending Stresses in Beams with derivation of Bending equation and its application to beams of circular, rectangular Torsion of Circular Members Torsion of Solid and hollow circular shafts, Numerical Problems. Fluid Machines: Impulse and reaction turbines construction and working of Pelton turbine, Francis turbine and Kaplan turbine, construction and working of centrifugal and reciprocating pumps.

**Text Books**

1. Nag, P.K., "Engineering Thermodynamics", Tata McGraw – Hill, New Delhi.
2. Yadav, R., Thermal Science and Engineering, Central Publishing House, Allahabad.
3. Strength of Materials – G.H.Ryder – Third Edition in S I units 1969 Macmillan India.
4. Mechanics of Materials – Dr. Kirpal Singh, Standard Publishers Distributors, New Delhi.
5. Internal Combustion Engines- V Ganeshan (Second addition) Tata McGraw- Hill, New Delhi.
6. Automobile engineering – Dr. Kirpal Singh (vol-1) standard Publishers Distributor, New Delhi.
7. Fluid mechanics & Fluid power Engineering. D. S. Kumar, S. K. Kataria & Sons.
8. Hydraulics and Fluid mechanics- Modi & Seth- Standard book house, Nai sadak Delhi.

**Reference Books**

1. Strength of Materials – Popoy, PHI, New Delhi.
2. Strength of Materials – Sadhu Singh, Khanna Publications.
3. Strength of Materials – A Rudimentary Approach – M.A.Jayaram, Revised Ed. 2001, Sapna Book House, Bangalore.
4. Strength of Materials – U.C.Jindal
5. Moran, M.J. and Shapiro, H.N., Fundamentals of Engineering Thermodynamics, John Wiley, New York.
6. Van Wylen, G.J., Fundamental of Classic Thermodynamics, John Wiley, New York.
7. Spalding, D.B. and Cole, E.H., Engineering Thermodynamics, ELBS, New Delhi.
8. Hibbeler, R.C. Engineering Mechanics – Statics, Addison Wesley Longman, New Delhi.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: PRINCIPLES OF MECHANICAL ENGINEERING**
**Course Code: UME-105**

| **Evaluation Components for Practical Courses**<br>**(Students are required to perform atleast 8 practical mandatorily from the given list of practical)** | |
|---|---|
| Lab Performance | 10 |
| Lab file work | 10 |
| Viva – Voce | 10 |
| **Total** | **30** |

**LIST OF EXPERIMENTS**

1. To study low-pressure boilers.
2. To study High-pressure boilers.
3. Calibration of thermometers.
4. Calibration of pressure gauges.
5. Study of discharge measuring devices.
6. To determine co-efficient of discharge of orifice meter.
7. To verify the Bernoulli's Theorem.
8. To find Young's Modulus of Elasticity using Searl's apparatus.
9. To find Young's Modulus of Elasticity of a beam with deflection beam apparatus.
10. To find Modulus of rigidity with the help of torsion apparatus.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

# SEMESTER III

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: NUMERICAL ANALYSIS AND COMPUTER PROGRAMMING**
**Course Code: UMA-201**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 2 | 4.5 |

**Unit- I**

Errors: Error in numerical calculations , Absolute, relative and Percentage errors, Round off and truncation errors, Error Propagation, Loss of significant digits, Error in series approximation, Speed of convergence.

Finite Differences & Interpolation: Forward and Backward difference operators. Newton's Forward and Backward interpolation formulae. Central Difference Interpolation formulae. Gauss's forward and Backward Interpolation formulae. Lagrange's interpolation formulae and Newton's Divided Difference formulae.

**Unit- II**

Solution Of Algebraic And Transcedental Eqations:

Bisection method, method of false position, secant method, Iteration method Newton-Raphson method, Generalized Newton-Raphson method, Acceleration of convergence using Aitkin's Method.

**Unit- III**

Solution Of Simultaneous Algebraic Equations :

Jacobi's method, Gauss-Seidal method, relaxation method, fixed point iteration & its convergence, Eigen values by iteration – Power and Jacobi's Method.

Numerical Differentiation And Integration:

Formulae for derivatives, Trapezoidal rule, Simpson's 1/3rd and 3/8th rules.

**Unit- IV**

Numerical Methods for Differential Equations:

Solution of first order differential equations using Taylor's series, Euler's, Picard's and Runge Kutta method upto 4th order, Predictor- Corrector methods (Adam's and Milne's method ), Simultaneous differential equations of first order, differential equations of second order; Error analysis, Convergence and Stability.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Text Books :**

1. Numerical methods in Engg.& : B.S.Grewal : Khanna Publishers sciences
2. Numerical methods for scientific:M.K.Jain : Wilel eastern Ltd. & Engg. Computations S.R.K.lyengar R.K.Jain

**Reference Books:**

1. Computer Oriented Numerical : U. Rajaramanm : Hall of India Methods Orebtuce
2. Introduction to Numerical : C.E. Froberg : Adison Wesley Analysis

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: NUMERICAL ANALYSIS AND COMPUTER PROGRAMMING**
**Course Code: UMA-201**

| **Evaluation Components for Practical Courses**<br><br>**(Students are required to perform atleast 8 practical mandatorily from the given list of practical)** | |
|---|---|
| Lab Performance | 10 |
| Lab file work | 10 |
| Viva – Voce | 10 |
| **Total** | **30** |

## WRITE DOWN AND EXECUTE FOLLOWING PROGRAMS USING C/C++ LANGUAGE

1. To find the roots of non-linear equation using Bisection method/Muller's method.
2. To find the roots of non-linear equation using Newton's method/Muller's method.
3. Curve fitting by least-squares approximations.
4. To solve the system of linear equations using Gauss-Elimination method.
5. To solve the system of linear equations using Gauss-Seidal iteration method.
6. To solve the system of linear equations using Gauss-Jordan method.
7. To solve integral equation numerically using Trapezoidal rule.
8. To solve integral equation numerically using Simpson's rule.
9. Find the largest Eigen value of a matrix by power – method.
10. To find numerical solution of ordinary differential equations by Euler's method.
11. To find numerical solution of ordinary differential equations by Runga-Kutta method.
12. To find numerical solution of partial differential equation/laplace equation/ wave equation/heat equation.
13. To find numerical solution of ordinary differential equations by Milne's method.
14. To solve a given problem using Newton's forward interpolation formula.
15. To solve a given problem using Lagrange's forward interpolation formula.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: POWER ELECTRONICS-I**
**Course Code: UEE-201**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 2 | 4.5 |

**Unit- I**

Power electronics devices: Role of power electronics, construction and characteristics of power diode, power transistor, power MOSFET, SCR, GTO, TRIAC & DIAC. SCR: two transistor model, methods of turn-on, R, RC and UJT firing circuit and other firing circuits based on ICs and microprocessors, commutation techniques, series and parallel operation.

**Unit- II**

Phase-controlled converters (AC to DC converters): one, two, three, six and twelve pulse converters, fully and half controlled converters, load voltage waveforms with different types of loads, output voltage equations, continuous and discontinuous modes of operation, input power factor of converter, reactive power demand, effect of source inductance, introduction to four quadrant/dual converter.

**Unit- III**

Cycloconverters (AC to AC converter): basic principle of frequency conversion, types of cycloconverter, non-circulating and circulating types of cycloconverter, principle of operation of step up and step down cycloconverter, single-phase to single-phase cycloconverter with resistive and inductive load. Three-phase to single-phase cycloconverter: half wave and full wave, three-phase to three-phase cycloconverter, output voltage equation of cycloconverter.

**Unit- IV**

Choppers (DC to DC converter): classification of choppers, principle of operation, steady state analysis of class-a choppers, step up chopper, steady state analysis, current commutated and voltage communicated copper, basic scheme, output voltage control techniques, one, two and four quadrant choppers, voltage commutated chopper, current commutated chopper.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Text Books:**

1. "Power Electronics: Circuits, Devices & Applications" by M.H. Rashid, Prentice Hall of India Ltd, 2004.
2. "Power Electronics" by P.S. Bimbhra, Khanna Publishers, 2006.

**Reference books:**

1. "Power Electronics" by M.D. Singh and K.B. Khanchandani, Tata MC Graw Hill Pub, 2005.
2. "Power Electronics: Converters, Applications and Design" by Ned Mohan, T.M. Undeland .

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: POWER ELECTRONICS-I LAB**
**Course Code: UEE-201**

| **Evaluation Components for Practical Courses**<br><br>**(Students are required to perform atleast 8 practical mandatorily from the given list of practical)** | |
|---|---|
| Lab Performance | 10 |
| Lab file work | 10 |
| Viva – Voce | 10 |
| **Total** | **30** |

## LIST OF EXPERIMENTS

1. Experiment to study characteristics of diode, SCR and TRIAC.
2. Experiment to study characteristics of transistor and MOSFET.
3. Experiment to study R and R-C firing circuits.
4. Experiment to study UJT firing circuit.
5. Experiment to study AC phase control.
6. To study three-phase full-wave uncontrolled rectifier operation with R and R-L load and observe its input/output characteristics.
7. Experiment to study dc chopper.
8. Experiment to study single-phase cycloconverter characteristics.
9. To study single-phase full wave controlled rectifier using SCR and UJT with R and R-L load and observe its input/output characteristics with and without freewheeling (commutating) diode.
10. Experiment to study Lamp-Dimmer circuit using Diac & Triac with lamp load.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: CIRCUIT THEORY**
**Course Code: UEE - 202**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Unit-I**

Laplace Transformation: Laplace transformation and its applications to circuit theory in obtaining steady state and transient response of linear RC and RL circuits.

Fourier Analysis: Fourier analysis of complex waveform, solution of linear circuit impressed with complex waveform, power and power factor associated with complex wave.

**Unit- II**

Two Port network: Network elements, classification of networks, symmetrical two port networks, Equivalent T and π representation in parameter form, ladder and lattice networks, Parameter representation: Z parameters (open ckt impedance parameters), Y parameters (short ckt admittance parameters), Hybrid parameters (h- parameter representation), ABCD parameter representation, condition of reciprocity & symmetry in two port networks.

**Unit-III**

Analysis of network using Graph Theory: Graph for given network, classification of graph and sub graphs, incidence , tie set and cut set matrices, terminology used in Network Graph, properties of tree in a graph, variable solution of network using graph theory and matrix from the concept of network function.

Coupling Circuit: Dot convention, coefficient of coupling, mutual inductances, loop and nodal equation for coupling circuits.

**Unit-IV**

Network Synthesis: Driving point functions, P.R functions , properties of P.R functions, Hurwitz polynomials, properties of Hurwitz polynomial functions, synthesis of reactive network by Foster & Cauer's method: Form-I & Form-II for LC networks,Synthesis of RC network by Foster & Cauer Form.

**Text Books:**

1. Circuit Theory By Chakravorty.
2. Network and Circuit: Synthesis and Analysis by A.Sudhakar,Tata Mc Graw Hill.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

3. Network Analysis by M.E Valkenburg.
4. Network Analysis by Sundaram Seshu & N Balbanian John

**Reference Books**.:

1. Network Analysis and Synthesis by D Roy Choudhary.
2. Network Analysis and Synthesis By Soni Gupta.
3. Network Analysis by Schaum Series.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: ELECTRICAL MACHINES-I**
**Course Code: UEE-203**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 2 | 4.5 |

**Unit-I**

Transformers: principle of transformer operation, emf equation, voltage ratio and turns ratio, construction of single-phase transformers, ideal transformer, transformer on no load, phasor diagram and equivalent circuit, practical transformer, phasor diagram and equivalent circuit, voltage regulation, losses, separation of hysteresis and eddy current losses, open circuit, short circuit, back to back tests, transformer efficiency, condition for maximum efficiency, per unit transformer values, all day efficiency, distribution transformers, power transformers, application of transformers. Single-phase auto transformer, volt ampere relation, step up auto transformer, auto transformer efficiency, saving in conductor material, conversion of a two winding transformer to an auto transformer, advantages & disadvantages of auto transformer, applications of auto transformer.

**Unit-II**

Three-phase transformer, advantages of three-phase unit transformer, advantages of a transformer bank of three-phase transformers, three-phase transformer construction, three-phase transformer groups, three-phase transformer connections, factors affecting the choice of connections, delta- delta connection, star-star connection, star- delta connection, delta-star connection, open delta connection, scott three-phase/ two phase connection, relationship between input and output currents, advantages, disadvantages and applications(star-star, delta-delta, star-delta, delta-star, open-delta, Scott connections) of these type of connections, Three-phase to six phase transformation, diametrical connection, 3-phase to 12-phase transformation, 3 winding transformers: equivalent circuit, determination of parameters, voltage regulation. polarity of the transformers, parallel operation, single-phase transformers and 3-phase transformers in parallel wave shape of no load (exciting) current, inrush of magnetizing current, harmonic phenomenon in 3- phase transformer, construction of current transformers and voltage transformers, transformer cooling.

**Unit-III**

Dc machines: basic structure of electric machine, dc generator construction, equivalent circuit of dc machine armature, type of dc machine, emf equation of dc machine, lap & wave winding,

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

armature reaction in dc generators, commutation, methods of improving commutation, demagnetizing and cross magnetizing ampere turns, characteristics of dc generator.

**Unit-IV**

Direct current motors: motor principle, back emf, equivalent circuit of a dc motor armature, torque of dc machine, types of dc motor, armature reaction in dc motor and interpoles, characteristics of shunt, series & compound motors, speed control of dc motors, starting of dc motors & starters, losses in dc machine, efficiency of a dc machine, testing of a dc machines, application of dc machines.

**Texts Books:**

1. " Electrical Machinery" by P. S.Bimbhra, Khanna Publishers, Delhi.

**Reference Books:**

1. "Generalized theory of electrical machines" by P. S.Bimbhra, Khanna Publishers, Delhi.
2. "Electric Machinery" by Fitzgerald & Kingsley, MGH.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: ELECTRICAL MACHINES-I LAB**
**Course Code: UEE-203**

| **Evaluation Components for Practical Courses**<br><br>**(Students are required to perform atleast 8 practical mandatorily from the given list of practical)** | |
|---|---|
| Lab Performance | 10 |
| Lab file work | 10 |
| Viva – Voce | 10 |
| **Total** | **30** |

**LIST OF EXPERIMENTS**

TRANSFORMERS

1. To find turns ratio & polarity of single-phase transformer.
2. To perform open & short circuit tests on single-phase transformer.
3. To perform Sumpner's (Back to Back) test on two identical 1-Φ transformers.
4. Parallel operation of two single-phase transformers & to study the load shared by each transformer.
5. To convert three-phase to 2-phase By Scott-connection of transformers.

DC MACHINES

6. To plot the magnetizing characteristics of a dc generator running at rated speed.
7. To obtain and plot the external characteristics of a dc shunt generators & to deduce the internal characteristics from the above.
8. To perform load test on DC shunt generator.
9. Speed control of DC shunt motor.
10. Swinburne's tests of DC shunt motor.
11. To obtain and plot the characteristics of DC series motor.
12. To perform load test on DC series motor.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: DIGITAL ELECTRONICS**
**Course Code: UEC-201**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 2 | 3.5 |

**Unit-I**

Binary, octal & Hexadecimal number systems and their inter conversion. Binary arithmetic (Addition & Subtraction, Multiplication & Division), 1's & 2's complements, 9's & 10's complement , BCD code, BCD Addition , Gray Code, Error Detection and Correction , Hamming code.

**Unit-II**

Logic functions (OR, AND, NOT, NAND, NOR, XOR), Elements of Boolean Algebra (Theorems truth tables and relation's) Negative & Positive logic, Saturated & non saturated logic , fan in, fan-out, Logic IC's, de Morgan's Theorem, minterms and maxterms. Karnaugh mapping, K-map representation of logical function for 2, 4 variable, simplification of Boolean equations with the help of K-map, Various minimization techniques, Quine's method and Quinnes Mc-Cluskey method, Half adder, full adder, half subtractor, full subtractor, serial and parallel binary adder.

**Unit-III**

Introduction and performance

criteria for logic families, various logic families - DCTL, RTL, DTL, TTL & EC working and their characteristics in brief, MOS Gates and GMOS Gates, comparison of various logic families.

**Unit-IV**

Various kinds of Flip-Flop: RS Flip-Flop, Clocked RS Flip-Flop, Edge triggered D Flip-Flop, Flip-Flop Switching time, J/K Flip-Flop, JK Master Slave Flip flop, lock waveforms. 555 timer as an astable multivibrator, shift registers: serial in serial out, parallel in parallel out, Ring counters, asynchronous counters, synchronous counters. D/A Converter, A/D Converter, clipping and clamping circuits, astable, monostable, bistable multivibrators using transistor.

**Texts Books:**

1. Digital Principles and Applications by Malvino and Leach,
2. Digital Integrated Electronics by Taub and Schilling.
3. Digital Circuits and Logic Design 4 by Samuel C Lee.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Reference Books:**

1. Pulse, Digital and Switching Waveforms by Millman and Taub.
2. Modern Digital Electronics by R.P.Jain.
3. Digital Fundamentals by Floydd.
4. Digital Electronics Principles by Malvino.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: DIGITAL ELECTRONICS LAB**
**Course Code: UEC-201**

| **Evaluation Components for Practical Courses**<br><br>**(Students are required to perform atleast 8 practical mandatorily from the given list of practical)** | |
|---|---|
| Lab Performance | 10 |
| Lab file work | 10 |
| Viva – Voce | 10 |
| **Total** | **30** |

**LIST OF EXPERIMENTS**

1. Verify truth tables of AND, OR, NOT, NAND, NOR and XOR gates.
2. Implement (i) half adder (ii) full adder using AND – OR gates.
3. Implement full adder using NAND gates as two level realization.
4. Implement full subtractor using 8 to 1 multiplexer.
5. Verify truth tables of RS & JK flip flops and convert JK flip fops into D type & T type flip flops.
6. Use 555 timer as (i) monostable (ii) astable multivibrator.
7. (a) Use of 4-bit shift register for shift left and shift right operations.
   (b) Use 4-bit shift register as a ring counter.
8. Implement mod – 10 counter and draw its output wave forms.
9. Implement 4-bit DAC using binary weighted resistance technique/R-2R ladder network technique.
10. Implement 8 – bit ADC using IC (ADC 0800/0801).
11. a) Implement (i) Single level clipping circuit (ii) Two level clipping circuit.
    b) Implement clamping circuit to clamp, at peak +ve voltage/peak –ve voltage of an input signal.

**ADDITIONAL EXERCISES:**

1. Construct bounce less switch.
2. Construct a pulser of 1 Hz and 10 Hz, 1kHz and manual.
3. Construct logic state detector.
4. Construct opto – sensor based.

a. Measurement rotational speed of motor.
b. Measurement time elapse between two events.
c. Measurement of linear velocity.
d. Measurement of acceleration.

5. Construct a memory using TTL Circuits. Read and write data onto a memory from bus.
6. Construct a security latch that can be operated by an identity card.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: PRINCIPLES OF ENGINEERING ECONOMICS AND MANAGEMENT**
**Course Code: UMG-200**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Unit-I**

Economics : Definitions, Nature & scope of Economics, Economics Systems-meaning of Capitalism, Socialism & mixed economy.

Demand And Supplies Analysis: Law of demand and supply, exception to the law of demand, Elasticity of demand and supply and their types, Methods of measuring elasticity of demand and supply.

**Unit-II**

Theory of Production: Scales of production, Law of returns, Break even analysis. MONETARY SYSTEM: Monetary policy – Meaning, objectives, methods, Fiscal policy – Meaning & objectives of fiscal policy in a developing country like India, Functions of Reserve Bank of India and commercial banks.

ECONOMICS & BUSINESS ENVIRONMENT: Privatization –Growth of private capitalism in India, Business/Trade Cycles – Meaning, Characteristics & classification, Foreign capital & economic development.

**Unit-III**

Management Principles: Meaning & types of Management, Concept of Scientific Management, Management By Objectives, System Approach to Management.

FINANCIAL MANAGEMENT: Meaning, functional areas of financial management, Sources of Finance, Meaning of financial accounting, accounting principles-concepts & conventions, Importance of final accounts – profit & loss a/c and balance sheet, Need and importance of capital budgeting.

Marketing Management: Introduction to marketing management, Market segmentation, Developing & managing advertising programs, Deciding on media & measuring effectiveness.

**Unit-IV**

Production Management: Procedure for production planning & Control, Plant Location & Lay-out, Routing, Scheduling, CPM & PERT,

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

Quality Management: Statistical Quality Control, Introduction, Control Charts, X Charts, R Charts, Control Charts for C (N. of defects per unit), Control chart for P( Fraction Defective), Advantages & Limitations of SQC, Quality Circles:- Structure, functions & Limitations.

**Texts Books:**

1. Marketing Management – Philip Kotler – Prentice Hall of India Pvt. Ltd.
2. Financial Management - I.M. Pandey - Vikas Publishing House Pvt. Ltd.
3. Indian Economic – Ruddar Dutt, K.P.M.Sundaram – S.Chand & Co.
4. Advanced Economic Theory – H.L.Ahuja – S.Chand & Co.

**Reference books:**

1. Production Operation Management.- Dr. B.S. Goel – Pragati Prakashan.
2. Statistical Quality Control – Grant, Leaven worth – Tata Mc. Graw Hill.
3. Personnel Management – Edwin B.Flippo – Tata Mc. Graw Hill.
4. Management – A Global Perespective – Harold Krontz – Tata Mc. Graw Hill.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

# SEMESTER IV

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: TRANSMISSION & DISTRIBUTION OF ELECTRICAL POWER**
**Course Code: UEE-250**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 2 | 4.5 |

**Unit-I**

Introduction: Structure of a power system, indoor and outdoor substations, equipment for substation layout, auxiliary supply.

Distribution Systems: Radial, ring mains and network distribution system, comparison of various types of ac and dc systems.

**Unit-II**

Transmission Lines Distribution Systems: Introduction: inductance of a conductor due to internal flux and external flux, inductance of a single phase two-wire line, inductance of three phase line, capacitance of three phase line, charging current due to capacitance, skin effect, Ferranti effect, proximity effect. Performance Of Lines: Models of short, medium and long transmission lines, performance of transmission lines, circle diagram, capacity of synchronous condenser, tuned lines, voltage control

**Unit-III**

Mechanical Design: Sag and stress calculations, effect of ice and wind, string chart, line supports, conductor material, dampers. Insulators: Types, insulating materials, voltage distribution over insulator string, equalizer ring, configuration of insulators for EHV AC & HVDC transmission systems, post insulators, insulator failures, testing of the insulators'

**Unit-IV**

Cables: Types of cables, construction of cables, grading of cables, capacitance, ratings, power factor in cables, thermal characteristics and applications.

Cables: Phenomenon, critical voltage, power loss, reduction in losses& radio-interference. HVDC Transmission- types of links, advantages and limitations, corona in HVDC lines.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Texts Books:**

1. Power System Engg: by I.J.Nagrath and D.PKothari (TMH)
2. A Course in Electrical Power by Gupta, Soni & Bhatnagar (Dhanpat Rai & Sons).
3. Power system by Aqshaf Hussain, Dhanpat Rai, Delhi
4. Elements of power system analysis by W.D.Stevenson (MGH)
5. Electric Power by S.L. UppaI (Khanna Pub.)

**Reference books:**

1. Electrical power by J.B.Gupta (S.K.Kataria & Sons).
2. Power System Engineering by B. R. Gupta.
3. Electric Power System by B.M.Weedy, John Wiley & Sons.
4. Transmission & Distribution of Electrical Engineering by H.Cotton.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: TRANSMISSION & DISTRIBUTION OF ELECTRICAL POWER LAB**
**Course Code: UEE-250**

| **Evaluation Components for Practical Courses**<br>**(Students are required to perform atleast 8 practical mandatorily from the given list of practical)** | |
|---|---|
| Lab Performance | 10 |
| Lab file work | 10 |
| Viva – Voce | 10 |
| **Total** | **30** |

## LIST OF EXPERIMENTS

1. To find out A, B, C, D parameters, hybrid parameters and image parameters of a given transmission line model.
2. To study the performance of a long transmission line under no load condition and under light load condition.
3. To study the performance of a long transmission line under load at different power factors.
4. Visit to substation and preparing layout of various equipments in the substation.
5. To study the performance characteristics of a typical DC distribution system (Radial Configuration)
6. To study the performance characteristics of a typical DC distribution system (Ring main Configuration)
7. To find out voltage distribution across the string of insulators without guard ring.
8. To find out voltage distribution across the string of insulators with guard ring.
9. To plot equipotential lines of paper model of single layer cable.
10. To plot equipotential lines of paper model of multi layer cable.
11. To measure the insulation resistance of cable.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: POWER ELECTRONICS-II**
**Course Code: UEE-251**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 2 | 4.5 |

**Unit-I**

Inverters (DC TO AC converters): classification, single-phase voltage source inverter, steady state analysis, half bridge and full bridge inverter, modified Mcmurray and modified Mcmurray-Bedford inverter, basic series and improved series inverter, parallel inverter, voltage control in single-phase inverters, PWM inverters, reduction of harmonics, three-phase bridge inverter, 120 degree mode and 180 degree mode conduction schemes.

**Unit-II**

Ac voltage controllers: principal of phase control, principal of integral cycle control, configurations of single-phase ac voltage controllers, ac voltage controller with R & R-L load, sequence control of ac voltage controllers, single-phase sinusoidal voltage controller.

**Unit-III**

Electrical drives: definition & classification of different type of drives, review of characteristics, components of electric drives, speed control methods of various AC and DC drives, advantages and applications, acceleration and retardation time, energy consideration. various methods of braking of AC and d.c drives, automatic control arrangement, characteristics and application.

**Unit-IV**

AC & DC drives: Induction Motor Drives:-Basic principle of induction motor drives, 3-phase a.c voltage controller fed I.M drive, variable frequency control, voltage source inverter (VSI) and current source inverter (CSI), cycloconverter fed IM drive, slip power control, static rotor resistance control. DC Drives: Rectifier controlled circuits, single-phase fully controlled and half controlled rectifier fed separately excited d.c motor, 3-phase fully and half controlled fed separately excited DC motor, performance and characteristics of single-phase and 3-phase rectifier controlled DC drives.

**Texts Books:**

1. "Power Electronics: Circuits, Devices & Applications" by M.H. Rashid,Prentice Hall of India Ltd, 2004.
2. "Power Electronics" by P.S. Bimbhra, Khanna Publishers, 2006.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

3. "A First Course on Electric drives" by S.K. Pillai, New Age International Publishers, 2004.

**Reference books:**

1. "Power Electronics" by M.D. Singh and K.B. Khanchandani, Tata MC Graw Hill Pub, 2005.
2. "Power Electronics: Converters, Applications and Design" by Ned Mohan, T.M.Undeland and W.P Robbins, Wiley India Ltd, 2008.
3. "Fundamentals of Electrical Drives" by Gopal K Dubey, Narosa Publications.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: POWER ELECTRONICS-II LAB**
**Course Code: UEE-251**

| **Evaluation Components for Practical Courses (Students are required to perform atleast 8 practical mandatorily from the given list of practical)** | |
|---|---|
| Lab Performance | 10 |
| Lab file work | 10 |
| Viva – Voce | 10 |
| **Total** | **30** |

## LIST OF EXPERIMENTS

1. Experiment to study series inverter.
2. Experiment to study ac phase control method.
3. Experiment to study the bridge inverter.
4. Experiment to study the parallel inverters.
5. Experiment to study speed control of induction motor using cycloconverter.
6. Experiment to study the speed control of dc motor using phase controlled rectifier.
7. Experiment to study the speed control of dc motor using chopper.
8. Experiment to study speed control of stepper motor.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: ELECTRICAL MACHINES-II**
**Course Code: UEE-252**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 3 | 5 |

**Unit-I**

Induction machines: Constructional features, production of torque, phasor diagram, equivalent circuit, performance analysis, torque slip characteristics, no-load and blocked rotor test, load test, effect of rotor resistance, deep bar and double cage induction motor, starting method of squirrel cage and wound rotor induction motor, various methods of speed control of squirrel cage and wound rotor induction motor, Effect of space harmonics, generator operation.

**Unit-II**

Single phase induction motors: Introduction, production of rotating fields, principle, double revolving field theory, rotor slip, equivalent circuit, determination of equivalent circuit parameters, starting methods, types of single-phase induction motors, characteristics and applications of single-phase motors.

**Unit-III**

Synchronous generators: Introduction, advantages of rotating field alternators, speed and frequency, construction of 3-phase synchronous machines. Excitation system, emf equation, armature winding, coil span factor, distribution factor, actual voltage generated, armature leakage reactance, armature reaction, synchronous impedance, equivalent circuit & Phasor diagram, voltage regulation, measurement of synchronous impedance. Magnetic axis of the rotor, two reaction theory, salient pole synchronous machine- two reaction model, torque angle characteristic of salient pole synchronous machine, maximum reactive power for a synchronous generator, determination of Xd and Xq, parallel operation of alternators, synchronizing power and synchronizing torque coefficient, transient conditions of alternators, constant flux linkage theorem with proof, symmetrical short circuit transients, short circuit ratio, cooling of synchronous generators.

**Unit-IV**

Synchronous motors: Introduction, construction, principle of operation, main features, equivalent circuit and phasor diagram of a cylindrical rotor synchronous motor, different torques in synchronous motor, power flow equation for a synchronous motor, phasor diagram of salient pole

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

synchronous motor, effect of varying field currents, effect of load changes, synchronous motor V curves and inverted V curves, starting of synchronous motors, hunting, synchronous condenser, applications of synchronous motors.

**Texts Books:**

1. "Electrical Machinery" by P.S. Bimbhra, Khanna Publishers, Delhi.
2. "Generalized theory of electrical machines" by P.S. Bimbhra, Khanna Publishers, Delhi.

**Reference books:**

1. "Electric Machinery" by Fitzgerald & Kingsley, MGH.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: ELECTRICAL MACHINES-II LAB**
**Course Code: UEE-252**

| **Evaluation Components for Practical Courses (Students are required to perform atleast 8 practical mandatorily from the given list of practical)** | |
|---|---|
| Lab Performance | 10 |
| Lab file work | 10 |
| Viva – Voce | 10 |
| **Total** | **30** |

**LIST OF EXPERIMENTS:**

INDUCTION MOTORS

1. To perform no load test & block rotor test on three-phase squirrel cage induction motor.
2. To perform no load test & block rotor test on three-phase slip ring induction motor.
3. To study the starting methods of three-phase induction motors.
4. To study the cascading of two induction motors.
5. To conduct the load test to determine the performance characteristics of the induction motor.
6. To study speed changing by pole changing method.

SYNCHRONOUS MACHINES

1. To draw characteristics of alternator under different loading condition.
2. To find out regulation by synchronous impedance method.
3. To find out regulation by ZPF method.
4. To draw characteristics of alternator under different loading condition.
5. To plot V-Curves of a synchronous motor.
6. To measure steady state reactances (X d , X q ) of a synchronous machine.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: ELECTRICAL AND ELECTRONICS MEASUREMENTS & MEASURING INSTRUMENTS**

**Course Code: UEE-255**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 2 | 4.5 |

**Unit-I**

Measuring System fundamentals: Input-Output Configurations of Measuring Instruments and Measuring Systems- Desired Inputs, Interfering Inputs, Modifying Inputs, Methods of Correction for Interfering and Modifying Inputs. Classification of Instruments (Absolute & Secondary Instruments; Indicating, Recording & Integrating instruments; Based upon Principle of operation).

Measuring instruments: Construction, operating principle, Torque equation, Shape of scale, use as Ammeter or as Voltmeter (Extension of Range), Use on AC/DC or both, Advantages & disadvantages, Errors (Both on AC/DC) of PMMC types, Electrodynamics Type, Moving iron type (attraction, repulsion & combined types), Hot wire type, Induction type & Electrostatic type Instruments. Wattmeters & Energy Meters: Construction, operating principle, Torque equation, Shape of scale, Errors, Advantages & Disadvantages of Electrodynamics & Induction type Wattmeters & single phase induction type Energy meter, Compensation & Creep in energy meter.

**Unit-II**

Power Factor & Frequency Meters: Construction, operation, principle, Torque equation, advantages & disadvantages of Single-phase power factor meters (Electrodynamics & Moving Iron types) & Frequency meters (Electrical Resonance , Ferrodynamic & Electrodynamic types)Low & High Resistance Measurements: Limitations of Wheat stone bridge; Kelvin's double bridge method, Difficulties in high resistance measurements, Measurement of high resistance by direct deflection, loss of charge method, Megohm bridge & Meggar.

A.C. Bridges: General balance equation, Circuit diagram, Phasor diagram, advantages, disadvantages, applications of Maxwell's inductance, inductance-capacitance, Hays, Anderson, Owens, De-Sauty's, Schering & Weins bridges, Shielding & earthing.

**Unit-III**

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

Transducer: Definition of a transducer, basic requirements of a transducer, Electrical transducers and their classification, Transducers for measuring displacement, strain, vibration, force, torque, pressure, flow, temperature ( including Strain Gauge and L.V.D.T.)
Signal Conditioning: Basic characteristics of instrumentation amplifier, sample and hold circuits, Digital to Analog and Analog to Digital conversion. Analog Instruments: Electronic analog instruments for measurement of direct and alternating quantities,VTVM, Electronic Voltmeter, Electronic ohmmeter, Electronic multimeter. Digtal Instruments: Comparison between Digital and Analog instruments, Digital voltmeter, Digital frequency meter, Digital display methods.

**Unit-IV**

C. R.O: Construction and synchronization of CRO , measurement of Voltage, current, phase angle and frequency using CRO, Dual trace and Dual beam oscilloscopes. Signal Analysers: Harmonic Distortion Analysers, Spectrum Analysers and their applications.
Recorders: Magnetic Tape recorders, X-Y recorders, Strip- Chart recorder.
Telemetry: Principle of Telemetry, Multiplexers, Wire Link Channels and Data Acquisition systems.

**Texts Books**

1. A Course in Elect. & Electronic Measurement & Instrumentation by A. K Sawhney; Khanna Pub.
2. Electronic & Elect.Measurement & Instrumentation by J.B.Gupta; Kataria & Sons.
3. Electrical Measurements by E.W. Golding
4. Electronic Measurement and Measuring technique by W.D. Cooper & A.D. Helfrick.
5. Measuring Systems by E.O. Doeblin; TMH Publishers.

**Reference Books:**

1. A course in Electrical and Electronic Measurements and Instrumentation by A.K. Sawhney.
2. Modern Electronic Instrumentation and measuring Techniques by Albert D.Helfrick and William D.Cooper, PHI.
3. Electronic Measurements and Instrumentation by Oliver and Cage.
4. Digital Instrumentation by A.J.Bouwens, TMH, N.Delhi.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: Electrical and Electronics Measurements & Measuring Instruments Lab**
**Course Code: UEE-255**

| **Evaluation Components for Practical Courses (Students are required to perform atleast 8 practical mandatorily from the given list of practical)** | |
|---|---|
| Lab Performance | 10 |
| Lab file work | 10 |
| Viva – Voce | 10 |
| **Total** | **30** |

**LIST OF EXPERIMENTS**

**Part-I**

1. To identify meters from the given lot.
2. To calibrate an energy meter with the help of a standard wattmeter & a stop watch.
3. To measure power & power factor by 3-Ammeter method.
4. To measure power & power factor by 3-Voltmeter method.
5. To measure power & power factor in 3-phase circuit by 2-Wattmeter method.
6. To measure capacitance by De Sauty's bridge.
7. To measure inductance by Maxwell's bridge.
8. To measure frequency by Wein's bridge.
9. To measure the power with the help of C.T & P.T.
10. To measure low resistance by Kelvin's double bridge.

**Part-II**

1. To study LVDT and plot its response to an application.
2. To study Strain Gauge and plot its response to an application.
3. To plot the characteristics of a Thermistor and calibrate it for temperature measurement.
4. To plot the characteristics of a Thermocouple and calibrate it for temperature measurement.
5. (a) To observe waveform of a signal on CRO and measure its amplitude and frequency.
   (b) To measure frequency of an unknown signal using Lissajous patterns on CRO.
6. To study the working of a general purpose Spectrum Analyser.
7. To study an angular potentiometric transducer and measure its sensitivity and linearity.
8. To study the working of a Digital Multimeter.
9. To study the working of a Data Acquisition System.
10. To study an Instrumentation Amplifier and plot its response to an application.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: ELECTRICAL SIMULATION LAB-I**
**Course Code: UEE-254**

| **Evaluation Components for Practical Courses**<br>**(Students are required to perform atleast 8 practical mandatorily from the given list of practical)** | |
|---|---|
| Lab Performance | 10 |
| Lab file work | 10 |
| Viva – Voce | 10 |
| **Total** | **30** |

| **L** | **T** | **P** | **Cr** |
|---|---|---|---|
| **0** | **0** | **2** | **1** |

**Software to be used: SimPower Systems and (or) (MATLAB Simulink)**

**LIST OF EXPERIMENTS**

1. To verify Kirchhoff's Current and Voltage laws in ac circuit.
2. To verify Superposition and Maximum-Power transfer theorem for a linear electrical system.
3. To study voltage and current relations in a balanced three-phase electrical system for star and delta load.
4. To simulate no-load and open circuit tests of a two-winding transformer.
5. To simulate speed-torque characteristics of a dc shunt motor.
6. To simulate variation of power factor and efficiency of a 3-phase induction motor with load.
7. To simulate ABCD constants of a transmission line.
8. To simulate performance of a long line at various loading conditions.
9. To study the dynamic characteristics of an SCR.
10. To simulate string efficiency of series and parallel connected SCRs.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: COMMUNICATION ENGINEERING**
**Course Code: UEC-258**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Unit-I**

Frequency Bands And Signals: Various frequency bands used for communication and their special features, Need for wireless communication, Types of communication based on modulation systems, types of various signals. MODULATIONTION TECHNIQUES: Introduction to AM, FM, PM, PCM, PPM, DSBSC, Frequency spectrum of AM Waves, Representations of AM, need and descriptions of SSB, suppression of carrier, suppression of unwanted side bands, vestigial side band system. Mathematical representation of FM, Frequency spectrum of the FM waves, Phase modulation, comparison between analog and digital modulation, wide band and narrow band FM. Sampling theorem, frequency division multiplexing and time division multiplexing.

**Unit-II**

Am Transmitters and Receivers: Am Transmitters: generation of AM,
Low Level and High-level modulation, Comparison of levels, AM transmitter block diagram,
collector class C modulator, and Base modulator, DSB S/C Modulator. AM RECEVIER: Tuned radio frequency (TRF) receiver, Super heterodyne receiver, RF section and characteristics, mixers, frequency changing and tracking, IF rejection and IF amplifiers, detection and automatic
gain control (AGC), AM receiver characteristics.

**Unit-III**

Fm Transmitters and Receivers: Fm Transmitters: Basic requirements and generation of FM, FM Modulation methods: Direct methods, varacter diode methods, FET reactance modulator, Transistor reactance modulation, Pre-emphasis, direct FM modulator, AFM in reactance modulation, RC Phase Shift modulation, Armstrong FM systems. FM RECIVERS: Limiters, single and double tuned demodulator, balanced slope detector, foster seely of phase discriminator, de- emphasis, ratio detector, block of FM receiver, RF amplifiers, FM receiver characteristics.

**Unit-IV**

Broad overview of PCM, DM, and ADM. Review of sampling, flat top sampling, quantization, Analog to digital conversion, overview of performance of anlong modulation scheme in presence of noise.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

Digital modulation techniques (ASK, FSK, BPSK, QPSK, M-ary PSK). An introduction to satellite Communication.

**Reference Books:**

1. Electronic communications systems by Kennedy/TMH

2. Communications systems by Taub&Schilling/TMH

**Text Books:**

1. Communication systems by Simon Haykins/John Wiley &sons

2. Communication systems by Bruce Carlson

6. Communication systems by Singh & Sapre/TMH

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

# SEMESTER V

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: ELECTRICAL POWER GENERATION**
**Course Code: UEE-301**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Unit-I**
Load Curves: Energy requirements, connected load, maximum demand, demand factor, diversity factor, types of load, variation in demand, Chronological load curve, load duration curve, Energy load curve, Mass curve, load factor, Capacity factor, utilization factor.

**Unit-II**
Conventional Methods of Generation: Hydro Stations- location, layout, types and selection of prime mover, calculation of energy generated. Thermal stations- Location, layout, calculations of energy generated. Nuclear stations-Principle of nuclear generation, location, layout and calculation of energy generated.

**Unit-III**
Classification of Plants: Base load, peak load and stand by stations, stand by capacity in power plants, selection of number and size of units for different types of stations. Power Station Auxiliaries: Ash handling in thermal plants, necessity of condensers in thermal and nuclear plants, Radiation protection in nuclear plants, station batteries and their maintenance, Fire fighting equipment.

**Unit-IV**
Economic Operation of Steam Plants: Methods of loading turbo alternators, input output curve, heat rate, incremental cost, optimum generator scheduling neglecting transmission loss, sequence of adding units, load dispatching.

**Texts Books:**
1. A Course in Electrical power by Soni, Gupta, Bhatnagar.
2. Power System by J B Gupta.

**Reference books:**
1. Power Plant Engineering by Arora and S.Domkundwar

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: HIGH VOLTAGE ENGINEERING**
**Course Code: UEE-303**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Unit-I**
Discharges in Gases: General characteristics of gaseous insulation, basic processes of ionization in a gas, discharges in uniform and non-uniform fields, Paschen's law, Corona discharges due to direct and alternating voltage, commonly used gases for insulation and their properties.

**Unit-II**
Breakdown of Solids and Liquids: Different mechanisms of breakdown of solids, Intrinsic breakdown, theories of intrinsic breakdown, different theories of breakdown in liquids, commonly used solid and liquid insulating materials and their properties. Lightning Phenomenon: Charge accumulation in clouds – formation of lightning stroke, characteristics of lightning stroke, current and voltage magnitudes, protection of transmission lines and substations against lightning, lightning arrestors, switching surges, Insulation co-ordination.

**Unit-III**
High Voltage Testing Equipment: Cascade connection of transformers, generation of high direct voltage by voltage doubler circuit and Cockrort Walton circuit. Impulse Generator: Definition of impulse wave, single stage and multistage impulse generators and equivalent circuits, determination of front and tail resistance to produce a given wave shape. High Voltage Measurements: Measurement of ac, dc and impulse voltage, sphere gap, resistance and capacitance potential dividers, standard capacitors, High voltage measurements by measuring rectified current of a standard capacitor, Electrostatic voltmeter, Impulse voltage measurement by Cathode Ray Oscillograph.

**Unit-IV**
HVDC: Merits and demerits of HVDC transmission systems, types of HVDC systems, bipolar, monopolar, back-to-back, Normal operation of an H.V.D.C link, Energy considerations in breaking direct current in H.V.D.C. circuit breakers, HVDC system requirement, Typical layout of an HVDC substation.

**Reference Books:**
1. High Voltage Engineering by M.S.Naidu & V.Kamaraju.
2. Power System Transients and High Voltage Principles – by B.Thapar, B.R.Gupta & L.K.Khera.

**Texts Books:**
1. High Voltage Engineering – by C.L.Wadhwa.
2. A course in Electrical power by Soni, Gupta, Bhatnagar.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: LINEAR CONTROL SYSTEM**
**Course Code: UEE-304**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 2 | 4.5 |

**Unit-I**
Introduction: Open loop and closed loop control systems, feedback, effects of feedback, linear and non-linear control systems, Servomechanism.
Modelling: Mathematical models of linear electrical, mechanical, translational, rotational and thermal systems, electrical and mechanical analogies. Laplace transforms and transfer function, block diagram representation, signal flow graphs, characteristic equation.

**Unit-II**
Time Domain Analysis: Standard test signals, transient response of the first order, second order systems, steady state error and error coefficients.
Stability: Concept of absolute and relative stability, Necessary conditions for stability, pole - zero location, Routh – Hurwitz criterion.

**Unit-III**
Frequency Domain Analysis: Closed loop frequency response, correlation between time and frequency response, Bode diagram, polar plots, log magnitude vs. phase plot.
Stability In Frequency Response: Nyquist stability criterion, stability analysis, relative stability , Gain margin and phase margin.

**Unit-IV**
Compensation Design: Necessity of compensation, compensating network, phase lag compensation, phase lead compensation, phase lag and lead compensation.
Control System Components: Error detectors – potentiometers and synchros, stepper motor, servo motor, ac and dc tachogenerators.

**Texts Books:**
1. Control System Engineering by I.J.Nagrath & M.Gopal.
2. Modern Control Engineering by K.Ogata (PHI)

**Reference Books:**
1. Automatic Control System by B.C.Kuo (PHI)
2. Control System Components by J.F.Gibsen (MGH)

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: LINEAR CONTROL ENGINEERING LAB**
**Course Code : UEE-304**

| **Evaluation Components for Practical Courses (Students are required to perform atleast 8 practicals mandatorily from the given list of practicals)** | |
|---|---|
| Lab Performance | 10 |
| Lab file work | 10 |
| Viva – Voce | 10 |
| **Total** | **30** |

**LIST OF EXPERIMENTS**

(1) To Study the step response of a second order system for different damping factors.
(2) To plot the speed torque characteristics of a 2 phase AC servomotor.
(3) To plot the torque speed characteristics of a DC servomotor.
(4) To study the closed loop control of a three phase AC motor.
(5) To study the performance characteristics of a D.C. motor angular position control system.
(6) To study the magnetic amplifier.
(7) To Study the synchro transmitter rotor position versus stator voltages for three phase.
(8) To Study the microcontroller based stepper motor controller circuit.
(9) To Study various lag-lead compensation networks.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: MICROPROCESSORS & APPLICATIONS**
**Course Code: UEE-305**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 2 | 4.5 |

**Unit-I**
Introduction to microprocessors, microprocessor general architecture and its basic operations, microcomputer system : memory and input-output devices, code conversion, BCD arithmetic and 16 bit data operations, BCD to binary and binary to BCD conversion, Binary to ASCII and ASCII to binary conversion.

**Unit-II**
8085 Microprocessor: Pin diagram, architecture, Instruction set and timing diagrams, Instruction format and addressing modes, Assembly language programs, debugging of programs, Interrupts and memory interfacing.

**Unit-III**
Programming techniques: Looping, counting, indexing, counters and time delays, Illustrative programs, stacks and subroutines.

**Unit-IV**
Programmable peripheral interfaces-8255 A, programmable interval timer-8253, programmable interrupt controller 8259, Direct-memory access (DMA) and 8257 DMA controller, Microprocessor applications.

**Texts Books:**
1. Microprocessor Architecture, Programming and application with 8085/8080 A by Ramesh S.Gaonkar, Wiley Eastern.
2. Introduction to microprocessors by Aditya P.Mathur, Tata Mc Graw Hill.

**Reference books:**
1. Industrial Electronics and control by S.K.Bhattacharya, S.Chatterjee-Tata Mc Graw Hill.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: MICROPROCESSORS & APPLICATIONS LAB**
**Course Code: UEE-305**

| **Evaluation Components for Practical Courses (Students are required to perform atleast 8 practicals mandatorily from the given list of practicals)** | |
|---|---|
| Lab Performance | 10 |
| Lab file work | 10 |
| Viva – Voce | 10 |
| **Total** | **30** |

**LIST OF EXPERIMENTS**

(1) Study of 8085 Trainer Kit and awareness of its use along with user manual.
(2) Execution of Assembly language programs using the user manual and verification of the programs given in the user manual.
(3) Programming practices for various architectural and logical exercises using assembly language on 8085 Kit.
(4) Development of delay generating programs using 8085 μP Kit and verification of the delay generated with the help of CRO.
(5) Generation of pulse trains using 8085 μP kit and its verification on a CRO.
(6) Development of μP based traffic controller.
(7) Development of μP based stepper motor controller.
(8) Development of μP based temperature controller.
(9) Development of μP based Firing circuit for triggering a thyristor.
(10) Development of μP based thyristorised speed controller of a dc shunt motor.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: ELECTROMAGNETIC FIELD THEORY**
**Course Code: UEC-302**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Unit-I**

Introduction: Review of vector analysis, scalar and vector product, gradient, divergence and curl of a vector and their physical interpretation, transformation amongst rectangular, cylindrical and spherical co-ordinate system

Electrostatic Field: Coulomb's law, electric field intensity from point charges, Electric field due to continuous field distribution of charges, gauss's law, electric displacement and displacement density, potential functions, potential field of a charge, laplace's and poission's equation, capacitance and electrostatic energy.

**Unit-II**

Steady Magnetic Fields: Faraday Induction law, Ampere's Work law in the differential vector form, Ampere's law for a current element, magnetic field due to volume distribution of current and the Dirac-delta function, Ampere's Force Law, magnetic vector potential, vector potential (Alternative derivation), equation of continuity.

**Unit-III**

Time Varying Fields: Equation of continuity for time varying fields, inconsistency of Ampere's law, Maxwell's field equations and their interpretation; solution for free space conditions, electromagnetic waves in a homogeneous medium, propagation of uniform plane-wave, relation between E & H in a uniform plane-wave, wave equations for conducting medium, Maxwell's equations using phasor notation, wave propagation in a conducting medium, conductors, dielectrics, wave propagation in good conductor and good dielectric, depth of penetration, polarization: linear, circular and elliptical.

**Unit-IV**

Reflection And Refraction Of Em Waves: Reflection and refraction of plane at the surface of a perfect conductor & perfect dielectric (both normal incidence as well as oblique incidence), Brewster's angle and total internal reflection, reflection at the surfaces of a conductive medium, surface impedance, transmission-Line analogy, poynting theorem, interpretation of E x H, power loss in a plane conductor.

Transmission Line Theory: Transmission line as a distributed circuit, transmission line equation, traveling & standing waves, characteristic impedance, input impedance of terminated line, reflection coefficient, VSWR, Smith's chart and its applications.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Texts Books:**

1. Electro-magnetic Waves and Radiating System by Jordan & Balmain, PHI.
2. Electromagnetic field theory by PV Gupta.
3. Engineering Electromagnetic by Hayt; TMH

**Reference books:**

1. Electro-Magnetics by Krauss J.DF; Mc Graw Hill.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

# SEMESTER VI

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: SWITCHGEAR AND PROTECTION**
**Course Code: UEE-351**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 2 | 4.5 |

**Unit-I**
Relays: Operating Principles, constructional features and characteristics of relays. Relay classification, principal types of electromagnetic relays, theory of Induction relays, relay design, general equation for electromagnetic relays, general equation of comparators, Over current relays, instantaneous over current relay, Directional relays, Distance relays, Differential relays. Feeder Protection: Over current protection, Distance protection, Pilot protection.

**Unit-II**
Apparatus Protection: Transformer protection, C.T.s, P.T.s and their application in protective schemes. Static Relays: Basic concepts, Input Output devices and circuits, Phase and amplitude comparator, general organization of static relays.

**Unit-III**
Protection Against Over Voltages: Ground wire, shielding angle, rod gap, horn gap, impulse gap, valve type and non linear arrestors, surge absorbers. Fuses: Types, ratings, theory and characteristics, characteristics and construction of HRC fuses.

**Unit-IV**
Theory of Circuit Interruption: Physics of arc interruption, maintenance of arc, arc interruption theories. Circuit Constants In Relation To Circuit Breaking: Circuit breaker rating, circuit constants and circuit conditions, Restriking voltage.
Theory Of Circuit Breakers: Air break circuit breaker, oil circuit breaker, Air blast circuit beaker, Vacuum circuit breaker, SF 6 circuit breaker, circuit breaking in HVDC systems, Testing and maintenance of circuit breakers. Introduction to gas insulated switchgear.

**Texts Books:**
1. A course in Electrical Power by Soni, Gupta, Bhatnagar.
2. Power System Protection and Switchgear by B.Ravinder Nath & M.Chander, Willy Eastern.
3. Switchgear and Protection by Sunil S.Rao.

**Reference books:**
1. Art and Science of Protective relaying by C.R.Mason, John Wiley.
2. Electrical Power Systems by C.L.Wadhwa.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: SWITCHGEAR AND PROTECTION LAB**
**Course Code: UEE-351**

| **Evaluation Components for Practical Courses (Students are required to perform atleast 8 practicals mandatorily from the given list of practicals)** | |
|---|---|
| Lab Performance | 10 |
| Lab file work | 10 |
| Viva – Voce | 10 |
| **Total** | **30** |

**LIST OF EXPERIMENTS**

(1) Symmetrical fault level analysis on a d.c. network analyser.
(2) Unsymmetrical fault level analysis on a d.c. network for various type of faults.
(3) Symmetrical fault level analysis on an a.c network analyzer.
(4) Unsymmetrical fault level analysis on an a.c network for various types of faults.
(5) To plot time current characteristics of Electromagnetic type over-current relay.
(6) To plot time-current characteristics of an IDMT relay.
(7) Performance and study of Merz-Price protection.
(8) Study of the performance and operation of a three phase over-current and earth fault static relay.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: BIOMEDICAL ENGINEERING**
**Course Code: UEE-352**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 2 | 4.5 |

**Unit-I**

Fundamentals of Medical Instrumentation: Anatomy and physiology, physiological systems of the body, sources of biomedical signals, basic medical instrumentation system, performance requirements of medical instrumentation systems, General constraints in design of medical instrumentation systems, regulation of medical devices. Bioelectric Signals and Electrodes: Origin of bioelectric signals, Recording electrodes, Silver- Silver chloride electrodes, Electrodes for ECG, Electrodes for EEG, Electrodes for EMG, Electrical conductivity of electrode jellies and creams, Microelectrodes.

**Unit-II**

Physiological Transducers: Introduction, classification of transducers, performance characteristics of transducers, Displacement, position and motion transducers, Pressure transducers, Transducers for body temperature measurement, Photoelectric transducers, optical fibre sensors, Biosensors, Smart sensors. Recording Systems: Basic recording systems, General considerations for signal conditioners, pre ampliers, sources of noise in low level measurements, Biomedical signal analysis techniques, main amplifier and driver stage, Writing systems, Direct writing recorders, inkjet recorder, potentiometric recorders, Digital recorders, Instrumentation tape recorders.

**Unit-III**

Biomedical Recorders: Electrocardiograph, Vector cardiograph(VCG), honocardiograph (PCG), Electro encephalograph (EEG), Electromyograph (EMG), other biomedical recorders, Biofeedback instrumentation. X-RAY Computed Tomography: Computed Tomography, system components, Gantry geometry, patient dose in CT scanners.

**Unit-IV**

Basis of Diagnostic Radiology, Nature of X-rays, production of X-rays, X-ray machine, visualization of X-rays, Dental X-ray machines, portable and mobile X-ray units,physical parameters for X-ray detectors, Digital radiography.

**Reference Books:**

1. Handbook of Biomedical Instrumentation - By R.S.Khandpur( TMH)
2. Principles of Applied Bio-medical Instrumentation by L.A. Geddes & LE.Baker (Wiley Inter Science Publication)
3. Bio-medical Instrumentation and Measurements by Laslie Cromell, Fred J.Weibell, Erich A Pfeiffer (PHI).

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: BIOMEDICAL ENGINEERING LAB**
**Course Code: UEE-352**

| **Evaluation Components for Practical Courses (Students are required to perform atleast 8 practicals mandatorily from the given list of practicals)** | |
|---|---|
| Lab Performance | 10 |
| Lab file work | 10 |
| Viva – Voce | 10 |
| **Total** | **30** |

**LIST OF EXPERIMENTS**

(1) To study ECG Machine, pick-up ECG Signal, display it on CRO and find duration of P, R and T Wave.
(2) To Study various lead positions of ECG and observe the difference in ECG waveforms for different positions.
(3) To plot experimentally the relationship between the surface EMG and muscular force.
(4) To study various parts of an EEG Machine.
(5) To pick up EEG signals and study their wave patterns.
(6) To study the frequency spectrum of ECG signal on a display device using a movable band pass filter.
(7) To study the frequency spectrum of EMG on a display device using a movable band-pass filter.
(8) To study a C.T. Scan system available in the field.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: POWER SYSTEM OPERATION AND CONTROL**
**Course Code: UEE-353**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Unit-I**
Characteristics of Power Generation Units: Characteristics of steam units, characteristics of hydro-units, Input Output and incremental fuel cost characteristics.
Unit Commitment: Constraints in unit commitment, solution of the unit commitment problem by Priority list method and Forward Dynamic Programming Approach.

**Unit-II**
Economic Dispatch Of Thermal Units: Economic dispatch problem, thermal system dispatching with network losses considered, Base point and participation factors, Line loss formula (derivation not included), Solution of co-ordination equations by iteration method and Newton– Raphson method.

**Unit-III**
Hydro-Thermal Co-Ordination: Short term hydro – thermal scheduling problem, solution of co-ordination equations by iteration method, Dynamic programming, dynamic programming application to hydro-thermal problem.

**Unit-IV**
Power System Controls: Generator voltage control, Turbine governer control, load frequency control, co-ordination of economic dispatching with load frequency control.

**Text Books:**
1. Power generation operation and control by A.J.Wood and B.F.Wollenberg, John Wiley & Sons.
2. Power System Engineering by Nagrath & Kothari, TMH.

**Reference books:**
1. Power System Analysis and Design by B.R.Gupta, Wheeler.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: ADVANCED MICROPROCESSOR / MICROCONTROLLER & APPLICATION**
**Course Code UEE-354**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 2 | 4.5 |

**Unit-I**
Introduction to microprocessors, microcomputers and computers, batch processing, multiprocessing, multiprogramming, Time sharing and multitasking system, classification of microprocessors-8086, 80186, 80286, 80386 and 80486.

**Unit-II**
Introduction of 16-bit micrprocessors,8086 architecture, programming model, segmented memory, memory map, segment registers, Addressing modes, data transfer instructions, string instructions, logical instructions, Arithmetic instructions, Transfer of control instructions, process control instructions.

**Unit-III**
8051 Series microcontrollers-architecture,pin diagram, basic instruction set, applications of micro controllers as dedicated controllers.

**Unit-IV**
Architecture of programmable logic controllers(PLCs), Input – output modules, programming of PLC using ladder logic.

**Text Books:**
1. The 8086/8088 family design, programming and interfacing by John Uffenbeck, Prentice Hall of India.
2. Microcomputer system-The 8086/8088 family architecture, programming and design-by Y.C.Lin, G.A.Gibson, Prentice of India.

**Reference Books:**
1. Programmable logic controller by J.R.Hackworch-Jr Pearson Education.
2. Introduction to programmable logic controller by G.Dunning (Delmer publications)

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Title: ADVANCED MICROPROCESSOR / MICROCONTROLLER & APPLICATIONS LAB**
**Course Code: UEE-354**

| **Evaluation Components for Practical Courses (Students are required to perform atleast 8 practicals mandatorily from the given list of practicals)** | |
|---|---|
| Lab Performance | 10 |
| Lab file work | 10 |
| Viva – Voce | 10 |
| **Total** | **30** |

**LIST OF EXPERIMENTS**

(1) Program practice on 8086 kit.
(2) Interfacing of 8086 with PC and downloading programming using compilers.
(3) Application of 8086 for temperature control.
(4) Simple programming on8051 microcontrollers.
(5) Interfacing of 8051 with PC and downloading of program.
(6) Application of 8051 as a stand alone (dedicated) controller.
(7) PLC Programming practices using ladder logic.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Title: ELECTRICAL SIMULATION LAB-II**
**Course Code: UEE-355**

| **Evaluation Components for Practical Courses (Students are required to perform atleast 8 practicals mandatorily from the given list of practicals)** | |
|---|---|
| Lab Performance | 10 |
| Lab file work | 10 |
| Viva – Voce | 10 |
| **Total** | **30** |

| **L** | **T** | **P** | **Cr** |
|---|---|---|---|
| **0** | **0** | **3** | **1.5** |

**LIST OF EXPERIMENTS**

(1) To simulate open circuit and short circuit tests on 3-Φ induction motor.
(2) To simulate the torque-speed characteristic of slip ring induction motor with varying rotor Resistances.
(3) To simulate distribution system of a typical industrial plant.
(4) To simulate the improvement of power factor of a plant by using shunt capacitor of suitable rating.
(5) To simulate v-curves of a synchronous motor.
(6) To study voltage and current waveforms of a Variable Frequency Drive (VFD).

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

# SEMESTER VII

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: COMPUTER APPLICATIONS TO POWER SYSTEM ANALYSIS**
**Course Code: UEE-401**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 2 | 4.5 |

**Unit-I**
Representation of Power System components : Per unit System, Representation of Power System Components, Regulating Transformers (Tap changing & Phase Shifting), Generators, Transmission line and loads, Single line diagram and the impedance diagrams, Z-bus and Y-Bus formulation, building algorithm.

**Unit-II**
Load Flow Study: Load Flow Problem, Power Flow Equations, Load Flow solution using Gauss-Siedel and Newton-Raphson methods, Decoupling between real and reactive Power, Decoupled and Fast Decoupled load flow Methods, Comparison of Load Flow Methods, Reactive Power compensation and voltage control.

**Unit-III**
Symmetrical Components Symmetrical component transformation, power invariance, significance of positive, negative and zero sequences, phase shift in star-delta transformer, Sequence Impedance of Transmission line, Transformer and Generators, Sequence Networks of power systems.

**Unit-IV**
Unsymmetrical Fault Analysis: Symmetrical component analysis for unsymmetrical faults, single line to ground fault, line to line fault, and double line to ground fault, Open conductor fault, Bus Impedance matrix method for the analysis.

**Texts books:**
1. "Modern Power System Analysis" by Nagrath & Kothari, Tata Mcgraw Hill (2001).
2. " Power System Analysis" by Hadi & Sadat Tata McGraw Hill. (2002).
3. "Power System Analysis", by Grainger J.D McGraw-Hill, Inc, Singapore.

**Reference books:**
1. Power Generation, Operation and Control by Wood A.J. and Wollenberg B.F., John Wiley & Sons, New York, USA.
2. Power System Analysis & Design by Glover J.D. and Sarma,PWS Publishing Company, Boston,USA.
3. Computer Methods in Power System Analysis by Stagg G. W. and Elabiad A. H., McGraw Hill, New York.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: COMPUTER APPLICATIONS TO POWER SYSTEM ANALYSIS LAB**
**Course Code: UEE-401**

| **Evaluation Components for Practical Courses (Students are required to perform atleast 5 practicals mandatorily from the given list of practicals)** | |
|---|---|
| Lab Performance | 10 |
| Lab file work | 10 |
| Viva – Voce | 10 |
| **Total** | **30** |

**LIST OF EXPERIMENTS**

APPLICATION OF STANDARD COMPUTER SOFTWARE FOR:

(1) Determination of sequence impedances of a transmission line.
(2) Fault calculation of power systems.
(3) Power Flow Studies.
(4) Power Flow control.
(5) Transient Stability Studies.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: DIGITAL SIGNAL PROCESSING**
**Course Code: UEE-402**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Unit-I**

Introduction to Signals And Systems

Signals and classification of signals, Basic continuous time signals, Basic discrete time signals, Systems and classification of signals, Basic signals - Impulse function, Unit step function, Unit ramp function, Sinusoidal and exponential signals, Signum function.

Linear Time Invariant (LTI) Systems

Introduction, Response of continuous time LTI systems and its convolution integral, Response of discrete time LTI systems and its convolution integral, Properties of continuous time and discrete time LTI systems, Systems described by differential equations of continuous time and discrete time LTI systems.

**Unit-II**

Z–Transforms

Introduction to Z transform, Region of convergence for the Z transform of discrete time signals, Properties of Z-transform, Inverse Z-transform, Relationship between and Z transform and Laplace transform

Sampling and Reconstruction of Signals

Digital processing of continuous time signals- sampling, anti-aliasing, sample and hold process, reconstruction of signals ,Multirate signal processing ,Quantization noise introduced by analog-to-digital conversion.

**Unit-III**

Discrete Fourier Transform (DFT)

Review of Fourier series and Fourier transform of continuous time and discrete time signals, Properties of DFT, inverse Discrete time Fourier Transform: properties – circular convolution. Fast Fourier Transform (FFT), Various algorithms of FFT, Decimation-in-time (DIT) algorithm-decimation-in-frequency algorithm ,Radix-2 DIT and DIF implementation

**Unit-IV**

Design of Digital Filters

Introduction of digital filters, Magnitude response and phase response of digital filters, Design techniques of FIR Filters: Fourier deries method, Frequency Sampling method, Windowing techniques, Design of IIR Filter: Impulse invariant system, Bilinear transformation, Filter approximations: butterworth, chebyshev, Bessel, elliptic.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

Realization of Digital Linear Systems:
Introduction, basic realization block diagram and the signal flow graph, basic structures for IIR and FIR systems ( direct form –I, direct form – II, Cascade and Parallel)

**Text Books:**

1. Digital Signal Processing by David.K.Defatta, Joseph G, Lucas and William S.Hodgkiss John Wiley & sons, 1988.
2. Digital Signal Processing by Sanjit K and Mitra,Tata McGraw Hill, 1998.

**Reference Books:**

1. Digital Signal and Processing by A.V.Oppeheim and R.W.Schaffer, Prentice Hall.
2. Digital Signal and Processing by Farooq Hussain, Prentice Hall.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: DIGITAL SIGNAL PROCESSING LAB**
**Course Code: UEE-402**

| **Evaluation Components for Practical Courses (Students are required to perform atleast 8 practicals mandatorily from the given list of practicals)** | |
|---|---|
| Lab Performance | 10 |
| Lab file work | 10 |
| Viva – Voce | 10 |
| **Total** | **30** |

**LIST OF EXPERIMENTS:**

**Perform the experiments lab using MATLAB :**

(1) To represent basic signals (Unit step, unit impulse, ramp, exponential, sine and cosine)
(2) To develop program for discrete convolution.
(3) To develop program for discrete correlation.
(4) To understand stability test.
(5) To understand sampling theorem.
(6) To design analog filter (low-pass, band-pass, band-stop).
(7) To design digital IIR filters (low-pass, high pass, band-pass, band-stop )
(8) To design FIR filter using windows technique.
(9) To design a program to compare direct realization values of IIR digital filter.
(10) To develop a program for computing parallel realization values of IIR digital filter.
(11) To develop a program for computing cascade realization values of IIR digital filter.
(12) To develop a program for computing inverse Z-transform of a rational transfer function.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: ELECTRICAL ENERGY UTILIZATION**
**Course Code: UEE-404**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Unit-I**
Electric traction: Different systems of traction – their comparison, types of motors for traction, systems of track electrification, speed time curves, energy consumption. Current collection system: Conductor rail system, overhead equipment system – Pole collector, bow collector, Pantograph collector. Control of dc motors: Series parallel control, drum controller, contactor type controller, energy saving with series parallel starting. Mechanics of braking: Mechanical brakes, Electric braking – Plugging, rheostatic braking, regenerative braking. An idea of Traction System such as tram, Metro Trains and Magnetic Lavitation.

**Unit-II**
Electric energy as light: Production of light by different methods, units of quantities used in study of light, Laws of illumination, different light sources – their construction and operating principle, design of lighting schemes and equipment used, Indoor, roadway, industrial and flood lighting.

**Unit-III**
Electric heating: Different methods of electric heating, Constructional details and performance of resistance heating furnaces, heating elements design, direct and indirect induction and arc furnaces, estimation of power and energy requirement, power supply problems.

**Unit-IV**
Electrical welding: AC and DC welding, resistance arc and atomic hydrogen welding, electron beam welding, ultrasonic welding, laser welding, different types of control equipment used for controlling temperature and pressure in arc and resistance welding, welding transformer.

**Texts Books:**
1. "Art and Science of Utilization of Electrical Energy" by H. Partab, Dhanpat Rai & Co., Delhi, 2001
2. "Utilization of Electrical Energy" by Openshaw Taylor Orient Longman Pub. 2000

**Reference Books:**
1. "Utilization of Electrical Energy & Electric Traction" by J.B. Gupta, S.K. Kataria, Delhi. 2004

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

# SEMESTER VIII

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: ELECTRICAL POWER QUALITY**
**Course Code: UEE-451**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 2 | 4.5 |

**Unit-I**
Introduction of Power Quality: General classes of power quality problems, effects of poor power quality on power system devices, standards and guidelines referring to Power Quality.

**Unit-II**
Voltage sags and interruptions: Sources of sags and interruptions, motor starting sags.
Transient Over voltages- Sources of transient over voltages, principles of over voltage protection, devices for over voltages protection.

**Unit-III**
Harmonic distortions: Power system quantities under non sinusoidal conditions, harmonic indices, harmonic sources from commercial and industrial loads, system response characteristics, effects of harmonic distortions, harmonic distortion evaluations, principles for controlling harmonics, IEEE-519 Standard on harmonics.

**Unit-IV**
Power Quality Monitoring: Monitoring considerations, Power Quality measurement equipments, assessment of power quality measurement data.

**Texts books:**
1. Electrical power systems quality- by Roger Dugan, Mc Granaghan, Santoso, Mc Graw Hill Publisher.
2. Power quality in power systems and electrical machines- by Ewald F Fuchs, M.A.S. Masoum, Elsevier Publisher.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: NEURAL NETWORKS AND FUZZY LOGIC**
**Course Code: UEE-450**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Unit-I**
Structure of Human Brain, Perceptron models, Types of activation functions, Feed forward and feedback networks.

**Unit-II**
Learning – Supervised and Unsupervised, Error correction learning, Hebbian learning, Competitive Learning, Boltzman's learning. Multilayer Perceptron (MLP) model, Back propagation algorithm, Applications of ANN models in Electrical
Engineering.

**Unit-III**
Fuzzy vs. classical set theory, Membership functions, Properties of Fuzzy sets, Fuzzy arithmetic (addition, multiplication, union, intersection etc.), Fuzzification techniques.

**Unit-IV**
Defuzzification methods: Max-min, Average, Centroid method etc. for defuzzification, Advantages of Centroid method over other methods of defuzzification.

**Texts books:**
1. Fuzzy Logic with Engineering applications-By T.R.Joss
2. Neural Networks – By Haykins
3. Introduction to Artificial Neural Networks – by Jacek M. Zurada, Galgotia Publications

**Reference books:**
1. Genetic Algorithms – by D. Goldberg.
2. Neural Networks, Fuzzy Logic and Genetic Algorithms – Synthesis & Applications- By Rajasekran

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: NEURAL NETWORKS AND FUZZY LOGIC LAB**
**Course Code : UEE-450**

| **Evaluation Components for Practical Courses (Students are required to perform atleast 8 practicals mandatorily from the given list of practicals)** | |
|---|---|
| Lab Performance | 10 |
| Lab file work | 10 |
| Viva – Voce | 10 |
| **Total** | **30** |

**List of MATLAB Programs to be done**

1) Write a MATLAB program to compute determinant and inverse of a square matrix A defined by:

$$A = \begin{bmatrix} 5 & 2t & t \\ 3 & 6 & 2t-1 \\ 2 & t-1 & 3t \end{bmatrix}$$

At different values of t.

(2) Write MATLAB script to plot the waveform defined by:

$$y - f(x) = 3e^{-4t}\cos 5t - 2e^{-3t}\sin 2t + \frac{t^2}{t+1}$$

(3) Write a MATLAB function to obtain conversion table from Celsius to Fahrenheit temperatures. The input of the function should be two numbers: ti and tf, specifying the lower and upper range of the table in Celsius. The output should be a two-column matrix: the first column showing the temperatures in Celsius from ti to tf in the increments of $1^0$C and the second column showing corresponding temperatures in Fahrenheit.

(4) Write MATLAB Program to defuzzify the fuzzy values by Centroid method for Trapezoidal and Triangular membership functions.

(5) Write MATLAB Program to create a Fuzzy Inference System for water heating control using newfis.

(6) To develop Fuzzy Inference System (FIS) comprising of two-input, one-output and rule-base for a Washing Machine using FIS editor of Fuzzy Logic toolbox.

(7) Write MATLAB Program to create a Perceptron model using newp command and apply it on linearly separable classification problems.

(8) Write MATLAB Program to create a 2-layer Feed forward Neural Network to approximate the function y=f(x) using command newff.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

# DEPARTMENTAL ELECTIVE I
# SEMESTER 5

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: ADVANCED POWER ELECTRONICS**
**Course Code: UEE- 458**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Unit I**
AC to DC Converters
Harmonic analysis of output voltage and input current for 2-pulse and 6 pulse controlled rectifiers and methods of reducing these harmonics, Multi-pulse rectifiers.
DC to AC Converters
Analysis of output voltage waveforms of single phase and three phase voltage source inverters. Methods of reducing output harmonics.

**Unit II**
Resonant Converters
Classification, basic resonant converter, loads resonant converter, resonant switch converter and zero voltage switching.

**Unit III**
Power Conditioners and UPS
Power line disturbances, generation of harmonics, harmonic standards and recommended practice, power conditioners and uninterruptible power supplies, EMI & EMC related issues, mitigation methods

**Unit IV**
Motor Drive Applications
Converters for adjustable speed DC motor and induction motor drives. Methods of improving voltage, current profile of an electric drive, latest trends in the drive performance control.

**Texts books:**
1. Power Electronics by Nedmohan, Undeland and Riobbins, John Wiley India, publishers,Delhi,3rd edition,2006
2. Thyristorised Power Controllers by G.K.Dubey, Wiley Eastern, 1986
3. Modern Power electronics & Drives by B.K.Bose, Prentice Hall, PJR

**Reference books:**
1. Power Electronics by P.S.Bhimbra, Khanna Publishers, Delhi (4th edition)
2. Control of Electrical Drives by Werner Leonhard, Springer, International Publication,3rd Edition,2001.
3. An introduction to thyristors and their applications by M. Ramamoorty, Macmillan, 1978

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: ADVANCED ELECTRICAL MACHINES**
**Course Code: UEE-307**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Unit I**

Introduction

Review of Transformers, Induction Machines, Synchronous Machines, DC machines and their applications.

Stepper Motors

Introduction, Construction and Principle of Stepper Motors, Step Angle Types of Stepper Motors –Variable Reluctance Stepper Motors, Multi-stack VR Stepper Motor, Permanent-Magnet Stepping Motor, Hybrid Stepper Motor, Summary of the Stepper Motors, Applications.

**Unit II**

Permanent-Magnet DC Motor

Construction and Principle, Performance and Speed Control, Low-inertia DC Motors, Shell-type Low-inertia DC Motor, Printed-circuit (Disc) DC Motor- Main features, Advantages, Disadvantages and Applications.

**Unit III**

Permanent-Magnet Synchronous Motors

Construction and Performance, Applications, Synchros, Types of Synchros- Control Transmitter, Control Receiver, Control Transformer, and Control Differential, Voltage Relations, Applications of Synchros, Torque Transmission and Error Detection.

**Unit IV**

Switched Reluctance Motor

Construction and Working Principle of Switched Reluctance Motor, Advantages and Disadvantages, Applications, Comparison between VR Stepper Motor and SR Motor.

**Servomotors**

DC Servomotors, AC servomotors, Two-phase AC servomotor, Three-phase AC servomotors

**Texts books:**

1. Electrical Machinery by P.S. Bhimbra, Khanna Publishers, Delhi,7th Edition,2004
2. Electric Machinery by A.E.Fitzerald, C.Kingsley and S.D.Umans, Tata McGraw Hill.

**Reference books:**

1. Electrical Machines by AshfaqHussian, DhanpatRai& Company,2nd Edition,2002.
2. Electrical Machinery Fundamentals by S. J. Chapman, McGraw Hill,New York,2nd Edition,1991

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: POWER SEMICONDUCTOR DEVICES**
**Course Code: UEE-308**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Unit I**

Overview of Power Switching Devices: Introduction to power switching devices, classification of devices, controlled and un-controlled devices, i-v characteristics of ideal and real switching devices, Power diode: Device structure and i-v characteristics, ratings & specifications, switching characteristics, reverse recovery, classification of various diodes: Schotky diode, line frequency diodes, fast recovery diodes.

**Unit-II**

Power Transistors & MOSFETS: Device structure and i-v characteristics, ratings & specifications, switching characteristics, ON to OFF and OFF to ON state transitions, ON/OFF transition loss analysis, driver circuit.

Power MOSFETs**:** Device structure and i-v characteristics, ratings & specifications, switching characteristics, ON to OFF and OFF to ON state transitions, ON/OFF transition loss analysis, driver circuit.

**Unit-III**

IGBT: Device structure and i-v characteristics, ratings & specifications, switching characteristics, ON to OFF and OFF to ON state transitions, ON/OFF transition loss analysis,. Comparison of all the above devices with reference to power handling capability, frequency of operation, driver circuit, .emerging power switching devices.

**Unit-IV**

Operation and Protection of Switching Devices: Device protection against over voltage/currents, di/dt and dv/dt; safe operating area, design of snubbers for power devices.

Thermal Management: Conduction and transition losses computation, thermal model of the device, steady-state temperature rise, electrical equivalent circuit of thermal model, sizing of the heat sink.

Passive Components**:** Magnetic circuit, review of design of line frequency inductors and transformers, design of high frequency inductors and transformers.

**Text book:**

**1.** Power Electronics Circuits- B. W. Williams
**2.** Power Electronics Circuits, Devices and Applications – M. H. Rashid-PHI-

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Reference books:**

1. Power Electronics –Converters, Applications and Design – Mohan and Undeland-John Wiley & Sons
2. Power Electronics: L. Umanand

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: SMART GRID TECHNOLOGY**
**Course Code: UEE-309**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Unit-I**
Introduction to Smart Grid
Evolution of Electric Grid, Concept, Definitions and Need for Smart Grid, Smart grid drivers, functions, opportunities, challenges and benefits, Difference between conventional & Smart Grid, Concept of Resilient & Self Healing Grid, Present development & International policies in Smart Grid, Diverse perspectives from experts and global Smart Grid initiatives.

**Unit-II**
Smart Grid Technologies
Technology Drivers, Smart energy resources,Smart substations, Substation Automation, Feeder Automation ,Transmission systems: EMS, FACTS and HVDC, Wide area monitoring, Protection and control, Distribution systems: DMS, Volt/VAr control,Fault Detection, Isolation and service restoration, Outage management,High-Efficiency Distribution Transformers, Phase Shifting Transformers, Plug in Hybrid Electric Vehicles (PHEV).

**Unit-III**
Smart Meters and Advanced Metering Infrastructure
Introduction to Smart Meters, Advanced Metering infrastructure (AMI) drivers and benefits,AMI protocols, standards and initiatives, AMI needs in the smart grid, Phasor Measurement Unit(PMU), Intelligent Electronic Devices(IED) & their application for monitoring & protection.

**Unit-IV**
High Performance Computing for Smart Grid Applications
Local Area Network (LAN), House Area Network (HAN), Wide Area Network (WAN), Broadband over Power line (BPL), IP based Protocols, Basics of Web Service and CLOUD Computing to make Smart Grids smarter, Cyber Security for Smart Grid.

**Texts Books:**
1. Vehbi C. Güngör, DilanSahin, TaskinKocak, Salih Ergüt, Concettina Buccella, Carlo Cecati, and Gerhard P. Hancke, Smart Grid Technologies: Communication Technologies and Standards IEEE Transactions On Industrial Informatics, Vol. 7, No. 4, November 2011.
2. Xi Fang, Satyajayant Misra, Guoliang Xue, and Dejun Yang "Smart Grid – The New and Improved Power Grid: A Survey" , IEEE Transaction on Smart Grids.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Reference books:**

1. Stuart Borlase "Smart Grid :Infrastructure, Technology and Solutions",CRC Press 2012.
2. Janaka Ekanayake, Nick Jenkins, KithsiriLiyanage, Jianzhong Wu, Akihiko Yokoyama, "Smart Grid: Technology and Applications", Wiley.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

# DEPARTMENTAL ELECTIVE 2
# SEMESTER 6

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: FLEXIBLE AC TRANSMISSION SYSTEM**
**Course Code: UEE- 350**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Unit-1**
Facts concepts: Electrical Transmission Network, Necessity, Power Flow in AC System, Power Flow and Dynamic stability considerations of a transmission interconnection, relative importance of controllable parameter, opportunities for FACTS, possible benefits for FACTS Technology, FACTS Controllers: Types, brief description and definitions.

**Unit-2**
Static shunt compensators: SVC and STATCOM, Operation and Control of TSC and TCR, direct and indirect control of STATCOM. Decoupled control strategy, Compensators, Comparison between SVC and STATCOM, transient and dynamic stability enhancement using STATCOM. Principle and operation of Thyristor controlled dynamic brake.

**Unit-3**
Static series compensators: TSSC, TCSC and SSSC, Operation and Control, External System Control for Series Compensators, SSR and its damping, Static Voltage and Phase Angle Regulators, TCVR and TCPAR, Operation and Control, The Unified Power Flow Controller. Operation, Comparison with other FACTS devices, control of P and Q, Dynamic Performance.

**Unit-4**
Custom facts controllers: Principle and operation of Thyristor controlled dynamic brake. Introduction to DSTATCOM, DVR, UPQC, Custom Power Park. Load compensation using DSTATCOM, distributed generation and grid interconnection, standards, power quality issues, islanding issues.

**Texts Books:**
1. "Understanding FACTS – Concepts and Technology of Flexible AC Transmission Systems" by Narain G. Hingorani and Laszlo Gyugyi, Standard Publishers, New Delhi, 2001.
2. "Flexible AC Transmission Systems"by Y.H. Song and A.T. Johns(Ed), IEE Press, 2001.
3. "Thyristor Based FACTS Controller for Electrical Transmission Systems" by R. Mohan Mathur and Rajiv K. Varma, Wiley Interscience Publications, 2002

**Reference books:**
1. "Static Reactive Power Compensation" by T.J.E. Miller, John Wiley & Sons, New York, 1982.
2. "High Power Electronics in Flexible AC Transmission"by Narain G. Hingorani IEEE Power Engineering Review, 1998.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

3. “Energy Systems Theory” by Olle I Elgard, TMH, 1986.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: Solar Power**
**Course Code: UEE- 356**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| Total | **100** |

| L | T | P | Cr |
|---|---|---|---|
| **3** | **1** | **0** | **3.5** |

**Unit I**
Introduction : Climate Change & Energy Access, Benefits of Solar Electricity, Standalone photovoltaic applications Occupational Health & Safety Potential Hazards, Safety Equipment, Site Safety
Photovoltaic Technology overview Basic of Solar photovoltaic, Different types of Solar cells, Characteristics of Solar cell, STC & NOCT, Factors Affect the Output of Solar Module, Combining cells & Curves, Electrical Protection of PV Modules, Determining Module Energy Output, Module reliability

**Unit II**
Solar Radiation
Irradiation & Peak Sun hours, Sun path Diagram & Position Tilting of Solar Array, Solar Radiation Data Battery Technology Purpose, Types & Classification of Batteries in PV System, Lead Acid, Nickel-Cadmium, NiMH, Li-on, Vanadium Redox batteries, Battery Capacity , Charging, Parameter, Gassing, Over Charge, Efficiency, Selection Criteria & Auxiliary equipment , Combining Battery

**Unit III**
Charge Controller
Purpose, Terminology Functions & Configuration of Charge Regulator, Voltage regulation set point selection, Selecting charge regulator Inverter Technology Standalone vs Grid connected inverter power rating, Efficiency , Output Wave foam, Characteristics & Surge Power System Design General Skill, Design Process, Criteria, Configuration , Nominal Voltage & Load & Energy Demand Assessment System Sizing Basic Principles of System sizing over, Supply Co-efficient, Battery Sizing, Array Sizing, Charge regulator Sizing, Inverter Sizing System Wiring & Protection Selection of Cable & Sizing, Array & Battery Bank Wiring , Electrical Protection Lightning Protection & System Earthling

**Unit IV**
Installation Commissioning & Maintenance
Site Assessment , Planning, Visit & Analysis, Array Mounting & Foundation, Battery Location & Compartment Design, System Component Pre wiring & Testing, Tools for Installation & Processing, System Commissioning & Maintenance & Trouble Shooting

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Text Books:**

1. Solar Power Handbook edition 2014 by Mr Michael Boxwell Publisher: Greenstream Publishing Edition no. 8 (12/06/2013)
2. Solar Energy Engineering Processes and Systems by Soteris A. Kalogirou

**Reference Books:**

1. Solar Energy by Andy Walker

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: ELECTRIC DRIVES**
**Course Code: UEE-357**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Unit I**
Introduction
Introduction to an electric drive system, parts of electric drive system, choice criteria
Dynamics of Electric Drives
Dynamic equations of an electric drive, torque equations, multi-quadrant operation, type of loads, energy loss during transients and load equalization.

**Unit II**
Electric Drive Control
Control of electric drives, modes of operation, speed control, open &closed loop drives, current limit control, torque limit control, position, PLL and speed control.

**Unit III**
Selection of Motor Drive Rating
Selection of motor rating – thermal model of motor, classes of duty and determination of motor rating for different classes of drive operation duty.
DC motor drive – starting, braking, transient analysis, speed control, controlled rectifier converters for DC drives and chopper fed DC drives.

**Unit IV**
AC Motor Drives
Induction motor drive – starting, braking, transient analysis, speed control, ac controller fed induction motor, voltage source inverter, current source inverter and cycloconverter fed induction motor drive.
FHP Drives
Introduction to FHP electric drive system. Brushless DC, stepper and reluctance motor.

**Text Books:**
1. Electric Drives-Concept and Applications by Vedam Subrahmanyam, TMH Ltd.,1994.
2. A First Course in Electrical Drives by S.K.Pillai, New Age International (P) Limited,2nd Edition,2004.

**References Books:**
1. Fundamentals of Electrical Drives by G.K. Dubey, Alpha Science International Ltd.,2nd Edition,2001
2. Modern Power Electronics & Drives by B.K. Bose, Prentice Hall PJR,2002

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: DEREGULATION OF POWER SYSTEM**
**Course Code: UEE-356**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Unit I**

Introduction: Basic concept and definitions, privatization, restructuring, transmission open access, wheeling, deregulation, congestion management components of deregulated system, advantages of competitive system.

**Unit II**

Transmission Pricing: Marginal pricing of Electricity, nodal pricing, zonal pricing, embedded cost, postage stamp method, contract path method, boundary flow method, MW mile method, MVA-mile method, Comparison of different methods.

**Unit III**

Deregulation of Power Sector: Separation of ownership and operation deregulated methods, pool model, pool and bilateral tradesmodel, multilateral trade model, ancillary services.

**Unit IV**

Deregulation Scenario: England and Wales, Norway, China, California, New Zealand and Indian Power System.

**Texts books:**

1. Power system Restructuring and deregulation edited by Loi Lei lai John Wiley & Sons Ltd.
2. Understand Electric Utilities and Deregulation by LorrinPhilipson and H Lee willis,CRC PRESS, 2005

**Reference books:**

1. Restructured Electrical Power System operation, Trading and Volatility by Mohammad
2. Shahidehpour and MuwaffaqAlomoush, Marcel Dekker Inc, New Delhi.
3. Power System Restructuring Engineering and Economics by Marijallic, Francisco Galiana and
4. Lestor Fink, Kluwer Academic Publisher, USA, 2000

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: POWER ELECTRONIC CONTROL OF AC DRIVES**
**Course Code: UEE- 358**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Unit-I**

Introduction

Review of steady-state operation of Induction motor, Scalar control- Voltage fed Inverter control-Open loop volts/Hz control-Speed control with slip regulation-Speed control with torque and Flux control-Current controlled voltage fed Inverter Drive. Current-Fed Inverter control-Independent current and frequency control-Speed and flux control in Current-Fed Inverter drive-Volts/Hz control of Current-Fed Inverter drive-Efficiency optimization control by flux program.

**Unit II**

Slip power recovery schemes

Slip-power recovery Drives-Static Kramer drive-Phasor diagram-Torque expression-Speed control of a Kramer drive-Static scherbius drive-Modes of operation. Principles of vector control, Direct vector control, derivation of indirect vector control, implementation – block diagram; estimation of flux, flux weakening operation. Synchronous motor and its characteristics- Control strategies-Constant torque angle control- power factor control, constant flux control, flux weakening operation, Load commutated inverter fed synchronous motor drive, motoring and regeneration, phasor diagrams.

**UNIT-III**

PMSM and BLDC Drives:

Characteristics of permanent magnet, synchronous machines with permanent magnet, vector control of PMSM- Motor model and control scheme. Modeling of PM brushless dc motor, drive scheme -Three-phase full wave Brushless dc motor -Sinusoidal type of Brushless dc motor - current controlled Brushless dc motor Servo drive

**UNIT-IV**

Variable Reluctance Motor Drive

Variable Reluctance motor drives- Torque production in the variable reluctance motor -Drive characteristics and control principles - Current control variable reluctance motor servo drive

**Text Book:**

1. Electric Motor Drives Modeling, Analysis & control -R. Krishnan- Pearson Education
2. Modern Power Electronics and AC Drives –B. K. Bose-Pearson Publications-

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Reference books:**

1. Power Electronics control of AC motors – MD Murphy & FG Turn Bull Pergman Press - 1st edition-1998
2. Fundamentals of Electrical Drives – G.K. Dubey – Narosa Publications -1995
3. Power Semiconductor drives- G.K. Dubey-Prentice hall

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

# DEPARTENTAL ELECTIVE III
# SEMESTER 7

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: ENERGY MANAGEMENT**
**Course Code: UEE- 403**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Unit-I**
Introduction
Review of different Energy Sources Concept of Energy Management, supply side management, demand side management, Energy crisis, Energy Efficiency, Energy Scenario in India audits Conservation program, Computer Aided Energy Management System
Energy Conservation: Energy Conservation needs and Objectives, Energy Conservation in Domestic sector, Energy Conservation in Industrial sector.

**Unit-II**
Energy Audit
Need for Energy Audit, Types of Energy Audits, National Energy Plan and its impact on Energy Conservation, Energy audit team, Energy Audit Reporting format, Energy Audit Instruments.

**Unit-III**
Energy Efficient Technology
Life cycle assessment, Energy efficient Motors, BIS Specifications for Energy Efficient Motors, Energy Efficient lighting sources, Power Quality

**Unit-IV**
Energy Audits Practice
Energy Audits of building systems, electrical systems, maintenance and Energy Audits.

**Texts books:**
1. Handbook of Energy Audits by Albert Thuman – Fairman Press Inc.
2. Energy basis for man and nature by Howard T.Odum & Elisbeth C.Odum.

**Reference books:**
1. Energy Management by Umesh Rathore, Kataria Publications

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: DIRECT ENERGY CONVERSION**
**Course Code: UEE-411**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Unit-I**
Introduction: Conventional generation (Thermal, Hydro etc) alternative generation processes Thermionic Generation: The basic thermionic diode generator and its analysis, Cross held devices, Anode and cathode materials, Experimental thermionic generator.

**Unit-II**
MHD Generation: Principles of MHD generation, electrical conditions, Faraday generator, Hall generator, comparison of generators, choice of generator parameters, other generator configurations.
Experimental MHD Generation: Open cycle working, closed cycle operation, Liquid metal systems..

**Unit-III**
Thermoelectric Generation: Seeback effect, Peltier effect, Thomson effect, EMF relationship, Generator analysis, Material selection, Experimental thermoelectric generation.

**Unit-IV**
Fuel Cells: Principles of fuel cells, Thermodynamics of the fuel cell, Choice of fuels and operating condition, Polarization and its effect, Redox cell, Overall efficiency, Practical Fuel cells – various types.

**Texts Books:**
1. Direct Energy Conversion by R.A.Coombe.
2. Non-Conventional Energy Sources By –S.Rao.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: ADVANCED CONTROL SYSTEM**
**Course Code: UEE-405**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Unit-I**
Non-Linear Systems
Types of non-linearity, typical examples, singular points, Phase plane analysis, Limit cycles,linearization, Describing functions. Need for model reduction, Dominant pole concept. Modelreduction via partial realization. Time moment matching and pade approximation, Hankelnorm model reduction.

**Unit-II**
Model Reference Adaptive Control
Different configurations and classifications of MRAC - Mathematical description - Direct and indirect model reference adaptive control -MIT rule for continues time MRAC systems -Lypunov approach and hyper stability approach for continuous time and discrete time MRAC systems - Multivariable systems - Stability and convergence studies.

**Unit-III**
Self Tuning Regulators
Different approaches to self-tuning - Recursive parameter estimation Implicit and explicit STR-LQG self-tuning - Convergence analysis Minimum variance and pole assignment approaches to multivariable self tuning regulators.

**Unit-IV**
Recent Trends and Applications of Adaptive Control
Recent trends in self-tuning Robustness studies multivariable system. Model updating.
General-purpose adaptive regulator. Application to Process control components and systems.
Industrial Applications.

**Reference Books:**
1. Chalam, V.V., "Adaptive Control Systems", Techniques & Applications, Marcel Dekker, Inc. NY and Basel. 1987.
2. Eveleigh, V.W., "Adaptive Control and Optimisation Techniques".McGraw-Hill, 1967.
3. Narendra and Annasamy, "Stable Adaptive Control Systems", Prentice Hall,1989.

**Text Books:**
1. Astry, S. and Bodson, M., "Adaptive Control", Prentice Hall,1989.
2. M. Vidyasagar, "Nonlinear Systems Analysis", 2nd Ed., Prentice Hall,1993.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: ILLUMINATION ENGINEERING**
**Course Code: UEE-408**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Unit-I**
Introduction: Laws of illumination - Inverse Square law and Lambert's Cosine law, their application in lighting calculations. brief idea of methods of Lighting calculations. General Principles Of Illumination: Definitions, units of light, definitions of flux, solid angles, luminous intensity and brightness, glare, polar curves.

**Unit-II**
Colour: Nomenclature of colour, production of colored light and mixing colours, colours contrast, colour matching. Electric Light Sources: Brief description of characteristics of starting and application of the following lamps:a) Incandescent lamp. b) Sodium Vapour lamp. c) Mercury Vapour lamp d) Flourescent lamp e) Neon lamp

**Unit-III**
General Illumination Design (LUMEN METHOD): Room index and Utilization factor, Maintenance factor, types of lighting schemes, design of lighting schemes with practical examples. Minimum level of illumination required for:
(i) Domestic. (ii) Commercial (iii) Educational. (iv) Health (v) Industrial buildings. flood lighting of building, road lighting factory lighting.

**Unit-IV**
Maintenance and Economics: Maintenance of luminaire, luminaire depreciation caused by dust and dirt, Efficient light production, lighting economics. Instruments used in photometric measurements.

**Texts books:**
1. NPTEL Notes
2. Utilization Of Electric Power and Electric Traction by: J.B.GUPTA

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: SOFT COMPUTING**
**Course Code: UEE-412**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Unit-I**

Basic tools of soft computing – Fuzzy logic, neural network , evolutionary computing.

Fuzzy Logic System:Basic of fuzzy logic theory , crisp and fuzzy sets, Basic set operation like union , interaction , complement , T-norm , T-conorm , composition of fuzzy relations, fuzzy if-then rules , fuzzy reasoning. Fuzzy inference System: Zadeh's compositional rule of inference, defuzzification , Mamdani Fuzzy Model, Sugeno Fuzzy Model, Introduction to type –II Fuzzy System.

**Unit-II**

Neural Network:

Supervised NN:Single layer network, Perception , Activation function, Adaline , Gradient descent method, least square training algorithm, Multilayer perceptron , error back propagation, generalized delta rule, Radial Basis Function Network, interpolation and approximation RBFNS, comparison between RBFN and MLP, Support Vector Machines : Optimal hypeplane for linearly separable patterns, optimal hyperplane for non-linearly separable patterns. Inverse Modeling. Unsupervised NN and other NN:Competitive learning networks, kohonen self organizing networks, learning vector quantization, Hebbian Learning Hopfield Network: Content addressable nature, binary and continuous valued Hopfield network , simulated annealing NN. Recurrent Neural Network: NARX Model , Simple Neural Network , State – Space Model , Back Propagation Through Time (BPTT) Algorithm , Real-time Recurrent Learning (RTRL) Algorithm.

**Unit-III**

Neuro-Fuzzy Modeling: Adaptive Neuro-Fuzzy Inference System (ANFIS) , ANFIS architecture , Hybrid Learning Algorithm , modeling of a three input nonlinear function , simulation of on-line identification in control system.

Data Clustering Algorithms-k-means clustering, fuzzy c-means clustering , subtractive clustering.

**Unit-IV**

Evolutionary And Bio Inspired Computing

Evolutionary computing**:** Genetic algorithm: Basic concept , encoding , fitness function , Reproduction, Basic genetic programming concepts , differences between GA and Traditional optimization methods , Applications, Variants of GA.

Bio Inspired optimization Techniques: Particle Swarm optimization , Ant colony optimization, Bacteria foraging method , Applications.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Text Book:**

1. Neuro-Fuzzy and soft computing by J S R Jang, CT Sun and E.Mizutani , PHI PVT LTD.
2. Principles of soft computing –by sivandudam and Deepa publisher –John mikey India.
3. S.haykins- Neural Networks: A comprehensive foundation

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: POWER SYSTEM STABILITY**
**Course Code: UEE-410**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Unit-I**
Overview: Angular Stability, Transient stability, steady state stability, dynamic stability, Small Signal, Voltage Stability Modeling of power system components: Generators (Non-linear and linear models using d-q transformation, power capability curve); Excitation System (IEEE standard models); Turbine and Speed governing System; Loads (Induction motors and composite loads), Flexible AC Transmission system (FACTS) devic

**Unit-II**
Transient stability analysis: Single Machine - Infinite Bus System; Equal Area Criterion; Multimachine Stability; Network Reduction and Numerical Integration Methods, Methods of improvement.

**Unit-III**
Small signal stability analysis: Eigen Value and Participation Factor Analysis; Single machine - Infinite Bus and Multimachine Simulation; Effect of Excitation System and AVR; Improvement of Damping - Power System Stabilizer and SVS supplementary controls Sub synchronous oscillations: Sub Synchronous Resonance (SSR) Phenomenon; Counter measures to SSR
problems.

**Unit-IV**
Voltage stability: P-V and Q-V curves, Impact of Load and Tap-changer Dynamics; Static Analysis, Sensitivity and Continuation Methods; Dynamic Simulation, Introduction to Bifurcation Analysis; Proximity Indices, Methods to enhance Stability Margin.

**Reference Books:**
1. Power System Stability and Control by Kundur P., McGraw Hill.
2. "Power System Voltage Stability by Taylor C.W., McGraw Hill.
3. Power System Control and Stability, IEEE Press.

**Text Books:**
1. Kimbark E., Power System Stability by Anderson P.M. and Foud A. A., Vol. I, II & III, IEEE Press.
2. IEEE Committee Report on 'Voltage Stability of Power Systems: Concepts, Analytical tools and Industry Experience'

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

# DEPARTMENTAL ELECTIVE IV (SEMESTER 8)

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: POWER ELECTRONICS FOR RENEWABLE ENERGY SYSTEMS**
**Course Code: UEE-455**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Unit-I**
Introduction
Environmental aspects of electric energy conversion: impacts of renewable energy generation on environment (cost-GHG Emission) - Qualitative study of different renewable energy resources ocean, Biomass, Hydrogen energy systems : operating principles and characteristics of: Solar PV, Fuel cells, wind electrical systems-control strategy, operating area.

**Unit-II**
Electrical Machines for Renewable Energy Conversion
Review of reference theory fundamentals-principle of operation and analysis: IG, PMSG, SCIG and DFIG.

**Unit-III**
Analysis of Wind and PV Systems
Stand alone operation of fixed and variable speed wind energy conversion systems and solar system-Grid connection Issues -Grid integrated PMSG and SCIG Based WECS-Grid Integrated solar system.

**Unit-IV**
Hybrid Renewable Energy Systems
Need for Hybrid Systems- Range and type of Hybrid systems- Case studies of Wind-PV-Maximum Power Point Tracking (MPPT).

**Texts books**:
1. S.N.Bhadra, D. Kastha, & S. Banerjee "Wind Electricaal Systems", Oxford University Press, 2009
2. Rashid .M. H "power electronics Hand book", Academic press, 2001.
3. Rai. G.D, "Non conventional energy sources", Khanna publishes, 1993.

**Reference books:**
1. Rai. G.D," Solar energy utilization", Khanna publishes, 1993.
2. Gray, L. Johnson, "Wind energy system", prentice hall linc, 1995.
3. Non-conventional Energy sources B.H.Khan Tata McGraw-hill Publishing Company, New Delhi.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: NON CONVENTIONAL ELECTRICAL POWER GENERATION**
**Course Code: UEE-452**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Unit-I**
Energy situation and renewable energy sources: Global Energy scenario, World Energy consumption, Energy in developing countries, fire wood crisis, Indian energy scene, Non conventional renewable energy sources, potential of renewable energy sources.

**Unit-II**
Wind Energy: Origin of wind, Basic principle of wind energy, conversion, component of wind energy conversion system, type of windmills, Wind electrical Generations in India.
Solar Energy: Introduction, solar radiation, solar energy collector, solar thermal power generation, low temperature application of solar energy.

**Unit-III**
Geo-thermal Power Plants: Introduction, Geothermal sources, comparison of Geo thermal energy with other energy forms, development of Geothermal power in India. Physical and thermochemical methods of bioconversion: Introduction, biomass definition and potential, physical method of bio conversion, thermo chemical methods.

**Unit-IV**
Wave, Tidal and OTEC: Introduction, Basic principle of tidal power, Wave energy, component of Tidal power plant, Ocean Thermal Energy Conversions, advantages and disadvantages of tidal power generation. Small and Mini Hydro power System: Introduction, site development, generation and electrical equipment, system of regulation of Hydroelectric Power in India.

**Texts books:**
1. Renewable Energy Sources by Maheshwar Dyal.
2. Small and mini Hydropower system by Tata Mc Graw Hill.
3. An Introduction to power plant technology by G.D.Rai.

**Reference books:**
1. Solar Energy by Suhas.P.Sukhatma, Tata Mc Graw Hill.
2. Modern Power Plant Engg. by Joel

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: HYDRO POWER STATION DESIGN**
**Course Code: UEE-456**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Unit-I**
Introduction, Hydrology, Stream flow, Hydrographs, Flow duration curves, Mass curve, Storage, Investigation of site.

**Unit-II**
Types of dams, arrangement and location of hydro-electric station, types of hydroelectric plants and their fields of use, principle of working of a hydroelectric plant.

**Unit-III**
Power to be developed, size of plant and choice of units, Types of turbines and their characteristics, Design of main dimensions of turbines.

**Unit-IV**
Draft tubes, Turbine setting, penstock dimensions, scroll case, preliminary design of penstock, characteristics of generators. Various design aspects of mini and micro hydel plants.

**Texts books:**
1. Power Station Design by M.V.Deshpande.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: TRANSFORMER ENGINEERING**
**Course Code: UEE 457**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Unit I**

Introduction to Transformers

Transformer Types, Transformer Losses,Operating Principles, Instrument Transformers, Transformer Construction, Auto -Transformer,Transformer connections.

Transformer Maintenance

Insulation Testing, High Potential Testing, Turns Ratio Testing, Polarity Testing, Power Factor, Excitation Current, DC Winding Resistance, Polarization Recovery, Insulating Fluid, Dielectric, Dissolved Gas Analysis.

**Unit II**

Materials for Transformers

Insulating oil, insulating paper, pressboard, and wood, insulated copper conductor for windings, crepe paper, sealing materials, and cold – rolled grain oriented electrical steel sheet.

Winding and Insulation

Types of windings, surge voltage, heat transfer, insulation design.

**Unit III**

Cooling

Air Cooled Oil-Immersed,Water-Cooled, Forced-Oil Cooling,Self-Cooling with Air BlastTemperature Limits, Transformer loading.

Magnetic Circuit

Materials, design of magnetic circuit, optimum design of core.

**Unit IV**

Tap Changers

Off - circuit tap changer, on load tap changer, automatic control of tap changer.

Transformer Auxiliaries

Buchholz relay, temperature indicators, oil level indicators, oil preservation systems.

**Texts books:**

1. Transformers by BHEL, Bhopal, Tata McGraw Hill.
2. Transformer Engineering by SV Kulkarni and SA Khaparde Marcel & Dekks Inc.
3. Transformer Engineering design and practices, SV Kulkarni, SA Khaparde, Marcel Dekker IncNew york.
4. Electrical Machines byJ. Nagrath&D.P.Kothari, Tata McGraw Hill

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Reference books:**

1. Electrical Machines by Husain Ashfaq ,DhanpatRai& Sons
2. Electric Machine and Tranformers by Irving L.Kosow, Prentice Hall of India.
3. Fundamentals of Electrical Machines by B.R. Gupta &VandanaSinghal, New Age International
4. Electric Machinery by A.E. Fitggerald, C.KingsleyJr and Alexander Kusko, McGraw Hill, International Student Edition.
5. The Performance and Design of DC machines by A.E. Clayton, Pitman &Sons
6. The Performance and Design of AC machines by M.G. Say, Pitman & Sons
7. Theory of Alternating Current Machinery by Langsdorf , Tata McGraw Hill.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

# OPEN ELECTIVE 1
# SEMESTER 7

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: HUMAN VALUES AND PROFESSIONAL ETHICS**
**Course Code: UMG-476**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Unit –I**
Introduction –Need, Basic Guidelines and Content:
Understanding the need , basic guidelines, content and process for value Education Self Exploration – What is it? – its content and process: 'Natural Acceptance' and Experiential Validation – as the mechanism for self-explanation Continuous Happiness and Prosperity – A look at basic Human Aspirations

**Unit –II**
Process for Value Education:
Right Understanding, Relationship and Physical Facilities – basic requirements for fulfillment of aspirations of every human being with their correct priority Understanding Happiness and prosperity correctly – A critical appraisal of the current scenario Method to fulfill the above human aspirations; understanding and living in harmony at various levels

**Unit –III**
Understanding Harmony in the Human Being:
Understanding human being as a co-existence of the sentient 'I' and the material 'Body' Understanding the needs of Self ( 'I' ) and 'Body' – Sukh and Suvidha Understanding the Body as an instrument of 'I' ( I being the doer, seer and enjoyer)

**Unit –IV**
Harmony in Myself:
Understanding the characteristics and activities of 'I' and harmony in 'I' Understanding the harmony of I with the Body: Sanyam and Swasthya: correct appraisal of Physical needs, meaning of Prosperity in detail. Programs to ensure Sanyam and Swasthya – practice exercises and Case Studies will be taken up in Practice Sessions relationship.

Assessment Model:
(a) Average of best Four quizzes out of all Six quizzes(25 Marks) - 25%
(b) Average of Two Mid-Terms (50 Marks) - 20%1
(c) Attendance (5 Marks) - 5%.

(d) End-Term (100 Marks) - 50%
Total Assessment (Out of 100 Marks) – 100%

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: BIOMEDICAL INSTRUMENTATION**
**Course Code: UEC-462**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Unit-I**
Introduction to Biomedical Signals Tasks in Biomedical Signal Processing, Computer Aided Diagnosis, Examples of Biomedical signals: ECG, EEG, EMG etc., Review of linear systems, Fourier Transform and Time Frequency Analysis (Wavelet) of biomedical signals, Processing of Random & Stochastic signals, spectral estimation, Properties and effects of noise in biomedical instruments, Filtering in biomedical instruments

**Unit-II**
Cardio-logical Signal Processing Pre-processing, QRS Detection Methods, Rhythm analysis, Arrhythmia Detection Algorithms, Automated ECG Analysis, ECG Pattern Recognition, Heart rate variability analysis.

**Unit-III**
Adaptive Noise Canceling Principles of Adaptive Noise Canceling, Adaptive Noise Canceling with the LMS adaptation, Algorithm, Noise Canceling Method to Enhance ECG Monitoring, Fetal ECG Monitoring.

**Unit-IV**
Neurological Signal Processing Modeling of EEG Signals, Detection of spikes and spindles, Detection of Alpha, Beta and Gamma Waves, Auto Regressive (A.R.) modeling of seizure EEG, Sleep Stage analysis, Inverse Filtering, Least squares and polynomial modeling.

**Texts Books:**
1. D.C.Reddy,―Biomedical Signal Processing: Principles and techniques‖, Tata McGraw Hill, New Delhi, 2005.
2. Willis J Tompkins, Biomedical Signal Processing, Prentice Hall, 1993

**Reference books:**
1. R. Rangayan, ―Biomedical Signal Analysis‖, Wiley 2002.
2. Bruce, ―Biomedical Signal Processing & Signal Modeling,‖ Wiley, 2001.
3. K. Najarian and R. Splinter, ―Biomedical Signal and Image Processing‖, Second Edition, The CRC Press.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: TELEVISION ENGINEERING**
**Course Code: UEC-463**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Unit I**

Principles of TV:

Picture elements, Theory of line, frame and field frequencies Blanking, Synchronization, interfacing,resolution, vertical resolution, horizontal resolution and video bandwidth, Use of AM in video and FM in audio, Block Diagram of TV Transmitter and Receiver, Construction of composite video signal.

**Unit II**

Television Cameras and Picture Tubes:

Spectrum of light and eye response, Image orthicon, plumbicon, vidicon (Principles of operation, Construction and working),TV picture tube details, Modulation system used for sound and picture,VSB working, TV transmitter.

**Unit III**

TV Receiver:

Block Diagram of TV Receiver, Tuner Circuits, Choice of IF amplifier, A.M. & F.M. detectors, Receiver sweep circuits, Video Frequency amplifier, synch. Pulse representation, deflection circuits.

**Unit IV**

Colour TV:

Hue, Saturation and luminance, Luminance and colour signal generation, Types of colour picture tubes (Basic principles and construction), colour subcarrier and colour triangle, NTPC, PAL, SECAM systems, Colour TV transmission & reception, Block Diagram of digital TV with merits.

**Reference Books:**


- Monochrome & Colour TV : R.R Gulati : New Age Pub.
- Basic Television : G.M Grob : McGraw Hills
- T.V. Engg : Dhake : Tata McGraw Hills


**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: SOFTWARE PROJECT MANAGEMENT**
**Course Code: UCS-480**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Unit I**
Conventional Software Management The waterfall model conventional software Management performance. Evolution of Software Economics Software Economics pragmatic software cost estimation Improving Software Economics Reducing Software product size improving software processes improving team effectiveness improving automation Achieving required quality Peer inspections.

**Unit II**
The old way and the new The principles of conventional software Engineering principles of modern software management Transitioning to aniterative process Life cycle phases Engineering and production stages inception Elaboration construction transition phases Artifacts of the process The artifact sets Management artifacts Engineering artifacts programmatic artifacts.

**Unit III**
Model based software architectures A Management perspective and technical perspective Work Flows of the process Software process workflows Iteration workflows Checkpoints of the process Major mile stones Minor Milestones Periodic status assessments Iterative Process Planning Work breakdown structures planning guidelines cost and schedule estimating Iteration planning process Pragmatic planning.
Project Organizations and Responsibilities Line-of-Business Organizations Project Organizations evolution of Organizations Process Automation Automation Building blocks the Project Environment

**Unit IV**
Project Control and Process instrumentation The seven core Metrics Management indicators quality indicators life cycle expectations pragmatic Software Metrics Metrics automation. Tailoring the Process discriminants Future Software Project Management Modern Project Profiles Next generation Software economics modern process transitions Case Study The command Center Processing and Display system-Replacement (CCPDS-R)

**Reference Books:**
1. Course Notes by the Instructor
2. Walker Royce: Software Project Management
3. Bob Hughes and Mike Cotterell: Software Project Management
4. Joel Henry: Software Project Management
5. Pankaj Jalote: Software Project Management in practice

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Web Resources:**

1. http://en.wikipedia.org/wiki/Software_project_management
2. https://www.comp.glam.ac.uk/staff/dwfarthi/projman.htm
3. http://www.linkedin.com/skills/skill/Software_Project_Management

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: ADVANCE CONSTRUCTION TECHNIQUES AND PROJECT MANAGEMENT**
**Course Code: UCE-312**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Prerequisites:** Concrete Technology, Building Construction Technology
**Objective:** This course will help the student to have complete knowledge about the precast & prefabricated construction technology with emphases on the quality control especially on joints which are considered as the weakest section of any structure.

- **Unit I:** Introduction
  1. Materials - Modular co-ordination, standardization and tolerances-system for prefabrication.
  2. Pre-cast concrete manufacturing techniques
  3. Moulds –construction design, maintenance and repair
- **Unit II:** Construction Techniques:
  1. Pre-casting techniques - Planning, analysis and design considerations
  2. Handling techniques -Transportation Storage and erection of structures.
- **Unit III:**CPM
  1. Introduction
  2. Network techniques, work break down
  3. Classification of activities, rules for developing networks, network development-logic of network, allocation of time to various activities
  4. Fulkerson's rule for numbering events, network analysis ,determination of project schedules, critical path, ladder construction, float in activities, shared float, updating
  5. Resources allocation, sources smoothing and resources leveling.

Pert:

1. Probability concept in network, optimistic time, pessimistic time, most likely time, lapsed time, deviation, variance, standard deviation, slack critical path, probability of achieving completion time, central limit theorem.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

- **Unit IV:** Cost-Time Analysis:
    1. Cost versus time, direct cost, indirect cost, total project cost and optimum duration
    2. Contracting the network for cost optimization, steps in time cost optimization, illustrative examples.

  Inspection & Quality Control:
    1. Introduction
    2. Principles of inspection
    3. Enforcement of specifications
    4. Stages in inspection
    5. Quality control and testing of structures
    6. Statistical analysis.

Learning Outcomes:
At the end of this course the student will be conversant with

1. Properties and application of admixture
2. Mix Design
3. Properties of concrete
4. Awareness of modern technology
5. Knowledge of special type of concrete

**Assessment Model:**
(a) Average of best Four quizzes out of all Six quizzes(25 Marks) - 25%
(b) Average of Two Mid-Terms (50 Marks) - 20%
(c) Attendance (5 Marks) - 5%
(d) End-Term (100 Marks) - 50%
(e) Lab work – 30 Marks
Total Assessment (Out of 130 Marks) – 100%

**Reference Books:**

1. Krishnaraju, N., Advanced Concrete Technology, CBS Publishers, 1985.
2. Nevile, A.M., Concrete Technology, Prentice Hall, Newyork, 1985.
3. Construction Planning &Management by P.S. Gehlot&B.M.Dhir
4. PERT & CPM -Principles & Applications by L.S.Srinath

**Web Resources:**

- http://www.wickipedia.ac
- www.sciencedirect.com
- http://engineeringcivil.com

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: ADVANCED ENVIRONMENTAL ENGINEERING**
**Course Code: UCE-365**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Unit-I**

Advanced Wastewater Treatment: Need for advanced wastewater treatment, process selection, granular- medium filtration, micro screening, control of nutrients, combined removal of nitrogen and phosphorus by biological methods, removal of toxic compounds and refractory organics, removal of dissolved inorganic substances, natural treatment systems- floating aquatic plant treatment systems.

**Unit -II**

Air And Water Quality Montoring: Design of air monitoring survey network, siting criteria, models for monitoring site selection, principles and techniques for ambient and stack sampling, acquisition and analysis of monitored data, BIS methods. Monitoring of water quality, planning sampling networks and schedules, sample collection and analysis, presentation and interpretation of results, methods and instruments for monitoring water pollutants, standards.

**Unit -III**

Environmental Modelling And Simulation**:** Principles of modeling and simulation, classification, introduction to air quality models, air pollution meteorology, impact on local and global climate, atmospheric stability, Gaussian models and modifications. Introduction to river, estuaries and lake hydro dynamics, dissolved oxygen models, eutrophication and nutrient- phytoplankton models, toxic substance models, temperature models, models for management applications.

**Unit- IV**

Resources And Energy Recovery From Solid Waste: Processing techniques, material recovery systems, recovery of biological conversion products, recovery of thermal conversion products, recovery of energy from conversion products, materials and energy recovery systems.

**Learning Outcomes:**

At the end of this course the student will be conversant with

- The introduction of Waste Water and their treatment
- Advanced Treatments for Air and Water Pollution

**Assessment Model:**

(a) Average of best Four quizzes out of all Six quizzes(25 Marks) - 25%
(b) Average of Two Mid-Terms (50 Marks) - 20%
(c) Attendance (5 Marks) - 5%
(d) End-Term (100 Marks) - 50%

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

Total Assessment (Out of 100 Marks) – 100%

**Reference Books:**

1. Waste water Engineering- treatment and Reuse (Fourth Edition) : Metcalf & Eddy Inc: Tata McGraw Hill
2. Air Monitoring Survey Design K.E. Noll & T.L. Miller : Ann Arbor Science
3. Air Pollution Control Engineering (Second Edition): N.D. Nevers: McGraw Hill

**Web Resources:**

- http://www.wickipedia.ac
- www.sciencedirect.com
- http://engineeringcivil.com

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: BASIC MANUFACTURING TECHNOLOGY**
**Course Code: UME – 410**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Unit I**
Metal Casting Processes: Advantage and limitations, sand mold making procedure, Patterns and Cores. Pattern materials, pattern allowances, types of pattern, colour coding, Molding material, Molding sand composition, and preparation, sand properties and testing type of sand molds.
Cores: Types of cores, core prints, chaplets, chills, Gating systems, Gates and gaiting systems risers, Melting practice, Cupola, charge calculations. Casting cleaning and casting defects Fettling, defects in castings and their remedies, methods of testing of castings fore their soundness.

**Unit II**
Special Casting Processes: Shell molding, precision investment casting, permanent mold casting, die casting, centrifugal casting, continuous casting.
Metal forming Processes: Nature of plastic deformation, hot working and cold working. Principles of rolling, rolling mills Forging: Forging operations, smith forging, drop forging, press forging, forging defects.

**Unit III**
Extursion and other processes : Extrusion principle, hot extrusion, cold extrusion, wire drawing, swaging, tube making, Sheet metal operation, shearing action, drawing dies, spinning, bending, strech forming, embossing and coining.
Gas and Arc Welding: Classification: Oxy-acetylene welding equipment and techniques. Electric arc welding: Electrodes, manual metal arc welding, inert gas shielding arc welding, tungsten inert gas welding (TIG), metal inert gas welding (MIG), submerged arc welding (SAW)

**Unit IV**
Resistance Welding: Principles, resistance spot welding, resistance seam welding, upset welding, flash welding.
Other Welding Processes : Introduction thermit welding, electro slag welding, electron beam welding, laser beam welding forge welding, friction welding, diffusion welding, brazing and soldering.

**Text Books:**
1. Principles of Manufacturing Materials & Processes – Campbell J.S.Publisher – Mc Graw Hill.
2. Manufacturing Science – Ghosh A.Malik, A.K.Affiliated East-West Press Pvt. Ltd., New Delhi.
3. Foundary Technology – K.P.Sinha, D.B.Goel, Roorkee Publishing House.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

4. Welding and Welding Technology, Richard L.Little Tata McGraw Hill Ltd.

**Reference books:**

1. Principle of Metal casting- Rosenthal, Tata Mc Graw hill, New Delhi.
2. Production Technology – R.K.Jain, Khanna Publication Ltd., N D.
3. Manufacturing Processes and Systems : Ostwald Phillip F., Munoz Jairo, John Wiley & Sons (Asia) Pvt. Ltd.
4. Welding Technology – O.P.Khanna, Dhanpat Rai & Sons, Delhi.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: MEASUREMENT TECHNIQUES**
**Course Code: UME – 411**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Unit-I**

Standards of Measurements **:** Line standards, imperial standard yard, standard meter, sub-standards and standards, end bars, slip gauges, angular slip gauges, wave length standard**.**

Measuring Principles : Principle for mechanical measuring instruments – Lever method, vernier method, screw & screw nut method. Compound gearing method, helical strip method. Principles of optical measuring instruments. Reflection, refraction interference, optical prism, lenses, optical systems. Principle of electrical measuring instruments. Transformation of energy, variation of electric parameters,- Principles of pneumatic measuring instruments. Construction details of measuring instruments. Abbe principle, graduation lines and scale division, pivot & bearings. Measuring accuracy – dimensional & geometrical accuracy. Types of error, systematic error, compound error, random error.

**Unit-II**

Interchangeability **:** Concept and need of interchangeability. Systems of tolerances,system of fits. Limit gauges, Standardisation. Design standardisation. Manufacturing standardisation.

Linear and Angular Measurement **:** Use of slip gauges, dial indicators. Mechanical, optical and electrical comparators, pneumatic gauges, measuring machines, sinebars & angle, gauges, levels, clinometer, auto-collimator, tapper gauges.

**Unit-III**

Straightness, Flatness and Squareness testing : Straight edges, surface plates straightness testing, straight edge methods, level or auto-collimator method. Flatness testing – level or auto – collimator method, optical flatness testing, squareness testing, indicator method, auto – collimator methods, engineer's squares.

Screw Thread Measurement : Errors in threads, screw thread gauges, measurement of element of the external and internal threads, thread caliper gauges.

**Unit-IV**

Spur Gear Measurement **:** Geometry of spur gear, measurement of spur gea parameters, ram out, pitch, profile, lead, backlash, tooth thickness, composite elements.

Surface Finish Measurement : Definition measurement of surface, finishtaly surf, profilometer, tomilson recorder, compariscope, microscope interference methods.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

Miscellaneous : Acceptance tests for a lathe. Alignment of bearings

**Text Books:**

1. Gupta, I.C., "Engineering Metrology", Dhanpat Rai & Sons, New Delhi, 1994.
2. Hume, K.J., "Engineering Metrology", Mac Donald & Co. 1963.
3. R. K. Jain "Engineering Metrology", Khanna publisher, Delhi

**Reference books:**

1. Kumar, D.S., "Mechanical Measurements and Control", Metropolitan, New Delhi.
2. Doeblein, E.O., "Measurement Systems, Application Design", Mc GrawHill, 1990.
3. Beckwith Thomas G., "Mechanical Measurements", Narosa Publishing House, NewDelhi.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

# OPEN ELECTIVE II
# SEMESTER 8

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: ENTREPRENEURSHIP DEVELOPMENT & ENTERPRISE MANAGEMENT**
**Course Code: UMG-450**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Unit I**
Developing Entrepreneurship: Element for a program,
Developing Entrepreneurship competencies: Need & process of development, social determinants of Entrepreneurship growth.
Entrepreneurship development programs, Entrepreneurship orientation & awareness programme, New enterprise creation programme.

**Unit II**
Existing Entrepreneurship programmes for existing enterprising for survival & growth. Evolution of various EDP programme in India, Managing growth & transition, the organization life cycle, chasing Entrepreneurship roles.

**Unit III**
Entrepreneurship & new venture opportunities,Planning for new ventures.
Concept of planning paradigm – pre-startup, early growth & later growth stage.

**Unit IV**
Incentive & subsidies available for Entrepreneurship growth.Guidance for project report preparation, Location, Environmental and managerial problems of new enterprise management, Managing family business. Some case studies of family run business in India.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: SATELLITE COMMUNICATION**
**Course Code: UEC-464**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Unit-I**
Introduction to Satellite Communication Origin, Brief History, Current state and advantages of Satellite Communication, Active & Passive satellite, Orbital aspects of Satellite Communication, Angle of Evaluation, Propagation Delay, Orbital Spacing, System Performance

**Unit-II**
Satellite Link Design Link design equation, system noise temperature, C/N & G/T ratio, atmospheric & econospheric effects on link design, complete link design, interference effects on complete link design, earth station parameters, Earth space propagation effects, Frequency window, Free space loss, Atmospheric absorption, Rainfall Attenuation, Ionospheric scintillation, Telemetry, Tracking and command of satellites.

**Unit-III**
Satellite Multiple Access System FDMA techniques, SCPC & CSSB systems, TDMA frame structure, burst structure, frame efficiency, super-frame, frame acquisition & synchronization, TDMA vs FDMA, burst time plan, beam hopping, satellite switched, Erlang call congestion formula, DA-FDMA, DA-TDMA.

**Unit-IV**
Satellite Services INTELSAT, INSAT Series, VSAT, Weather forecasting, Remote sensing, LANDSAT, Satellite Navigation, Mobile satellite Service.
Laser & Satellite Communication Link analysis, optical satellite link Tx & Rx, Satellite, beam acquisition, tracking & pointing, cable channel frequency, head end equation, distribution of signal, n/w specifications and architecture, optical fibre CATV system.

**Texts books:**
1. Trimothy Pratt, Charles W. Bostian, ―Satellite Communications‖, John Wiley & Sons, 1986.
2. Dr. D.C. Aggarwal, ―Satellite Communications‖, Khanna Publishers, 2001.

**Reference Books:**
2. Dennis Roddy, ―Satellite Communications‖, McGraw Hill, 1996.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: DIGITAL SIGNAL PROCESSING&APPLICATIONS**
**Course Code: UEC-465**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Unit I**
Classification of signals, singularity functions, classification of system, manipulation of Discrete time signals: Signal analysis, signal characteristics, typical discrete time signals, operation on signals, properties of linear time-invariant digital systems, sampling of analog signals and sampling rate conversion. Z-transform; Properties of Z-transform. Inverse Z-transform – analysis of discrete time systems, convolution.

**Unit II**
System function, difference equation, IIR filter design: Analog filter approximation, Butter worth, Chebyshev and Elliptic filters, Bilinear transformations, Impulse invariance technique, Digital frequency band transformations. FIR filter design: Window technique, Equiripple approximation technique, Frequency sampling technique.

**Unit III**
Discrete Fourier Transform (DFT) and Inverse Discrete time Fourier Transform: properties of DFT (circular convolution). Fast Fourier Transform (FFT): Decimation-in-time (DIT) algorithm-decimation-in-frequency algorithm-FFT, Radix-2 DIT and DIF implementation.

**Unit IV**
Applications of DSP in Voice, RADAR and Image Processing.*TMS320CXX*SERIES Processors:Architecture, Memory, Interrupts, Addressing modes, Assembly language programming.

**Reference Books:**


| | | | |
|---|---|---|---|
| 1. | Digital Signal Processing | David.K.Defatta, Joseph G, Lucas & William S.Hodgkiss | John Wiley & sons |
| 2. | Digital Signal Processing | Sanjit K and Mitra | Tata McGraw Hill |
| 3. | Digital Signal Processing-Principles, Algorithms & Applications | John G. Proakis & Dimitris Manolakis | Pearson Education |
| 4. | Digital Signal Processing | A.V.Oppenheim & R.W.Schaffer | Prentice Hall |
| 5. | Digital Signal Processing | Farooq Hussain | Prentice Hall |
| 6. | Digital Signal Processing | Salivahanan, | Tata McGraw Hill |


**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

| | | | |
|---|---|---|---|
| 7. | Digital Signal Processing | Vallavaraj & Gnanapriya J.S. Chitode | Technical Publication Pune |

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: GRID COMPUTING**
**Course Code: UCS-482**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Objective:** Grid computing is the federation of computer resources from multiple administrative domains to reach a common goal. The grid can be thought of as a distributed system with non-interactive workloads that involve a large number of files. What distinguishes grid computing from conventional high performance computing systems such as cluster computing is that grids tend to be more loosely coupled, heterogeneous, and geographically dispersed.

**Course Description:**

- **Unit I :** Introduction
  - Grid Computing
  - Benefits of Grid Computing
  - VirtualOrganizations
  - Grid Architecture and its relationship to other distributed technologies
  - Grid Application Areas,
    - OGSA
    - OGSI
    - Introduction to Semantic Grids.
  - Building Blocks for Grid Systems
    - XML
    - SOAP
    - UDDI
    - Service Oriented Architecture
    - Web Services
    - Web Services Architecture
    - WSRF
    - Relationship between Grid and Web Services
    - Grid and Web Services Invocation**.**

- **Unit II :** Data Management
  - Overview of Data Management in GT4
  - Data Movement:
    - Grid FTP
    - RFT

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

    - Data Replication
    - RLS
    - Higher level data services.
- Resource Management and Scheduling
- Resource Management Concepts
- Generalized Resource Management Framework
- Grid Resource Management Systems
- Scheduling in Grids
- QoS
- Introduction to GRAM

- **Unit III**:Security
    - Security Issues in Grids
    - Authentication Issues
    - Trust and Privacy related Issues
    - Authorization Issues
    - Grid Security Frameworks
    - Standards
    - Web Services Security Specifications.
    - Monitoring and Discovery Services:
        - Index Services
        - Resource Discovery
        - UDDI
        - Introduction to MDS in GT4

- **Unit IV:** Grid Middleware and Programming Model
    - Study of Globus Toolkit 4 Components
    - Programming Model
    - Singleton and Multiple Resources
    - Logging
    - Lifecycle Management
    - Notifications
    - Study of important distributed systems like Legion,
    - CRISI

Learning Outcomes:

- Better equipped with the understanding of Grid Architecture and its relationship to other Distributed technologies.
- Introduction to Grid Resource Management Systems.
- Acquiring know how of Security Issues in Grids and Grid Middleware and Programming Model.

**Assessment Model:**

- Best 4 of 6 quizzes based on assignments- 25%
- One best out of TWO Mid-Terms (100 Marks) – 20%
- Attendance :5%

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

- End-Term (100 Marks) – 50%
- Total Assessment (Out of 100 Marks) – 100%

**Texts books:**

- Grid Computing, First Edition by Joshy Joseph, Craig Fellenstein , Pearson Education
- The Grid 2: Blueprint for a New Computing Infrastructure, Second Edition, by Ian Foster, Carl Kesselman , Morgan Kaufman

**Reference books:**

- Introduction to Grid Computing, First Edition by Bart Jacob, Michael Brown, Kentaro Fukul, Nihar Trivedi , IBM Red Books
- Grid Resource Management - State of the Art and Future Trends by Zarek Nabrzyski, Jennifer M. Schopf, Jan Weglarz , Kluwer Academic Publishers
- Grid Computing Security by Anirban Chakrabarti , Springer

**Web Resources:**

- en.wikipedia.org/wiki/Grid_computing
- www.gridcomputing.com/
- www.webopedia.com/grid_computing.html

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: SOFTWARE RELIABILITY**
**Course Code: UCS-483**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Unit I**
Introduction
Need and Concepts of Software Reliability, Failure and Faults – Prevention, Removal, Tolerance, Forecast, Dependability Concept – Failure Behaviour, Characteristics, Maintenance Policy, Reliability and Availability Modelling, Reliability Evaluation

**Unit II**
Software Reliability Models
Introduction ( Historical Perspective and Implementation, classification, limitations and issues, Exponential Failure Models – Jelinski(moranda model, Poisson, Musa, Exponential models, Weibull Model, Musa(okumoto Model, Bayseian Model – Littlewood verral Model, Phase Based Model

**Unit III**
Prediction Analysis
Model Disagreement and Inaccuracy – Short & Long Term Prediction, Model Accuracy, Analyzing Predictive Accuracy – Outcomes, PLR, U & Y Plot, Errors and Inaccuracy, Recalibration – Detecting Bias, Techniques, Power of Recalibration, Limitations in Present Techniques, Improvements.

**Unit IV**
The Operational Profile
Concepts and Development Procedures – Customer Type, User Type, System Mode, Functional and Operational Profile, Test Selection ( Selecting Operations, Regression Test, Special Issues – Indirect Input Variables, Updating, Distributed system, CASE STUDY ( Application of DEFINITY & FAST AR, Power Quality Resource System
TESTING FOR RELIABILITY MEASUREMENT
Software Testing – Types, White and Black Box, Operational Profiles – Difficulties, Eatimating Reliability, Time/Structure based software reliability – Assumptions,
Testing methods, Limits, Starvation , Coverage, Filtering, Microscopic Model of Software Risk.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Reference Books:**

1. Patric D. T.O connor, "Practical Reliability Engineering", 4th Edition, John Wesley & sons, 2003.
2. John D. Musa, "Software Reliability Engineering", Tata McGraw Hill, 1999.
3. Michael Lyu, "Handbook of Software Reliability Engineering", IEEE Computer Society

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: ADVANCE CONCRETE TECHNOLOGY**
**Course Code: UCE-311**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

## COURSE DESCRIPTION

- **Unit I:** : Introduction:

1. Structure of hydrated Cement
2. Special Cements
3. Chemical admixtures
4. Concept of Green Concrete using Mineral Admixtures
5. Corrosion protection
6. Fire resistance
7. Sulphate attack on concrete
8. Diffusion of chlorides in concrete
9. Evaluation of concrete strength
10. NDT Techniques

- **Unit II:** Concrete mix design:

1. Principles of Concrete mix design
2. Methods of Concrete mix design
3. Design of high strength concrete and
4. High performance concrete

- **Unit III:** Properties of concrete:

1. Rheological behavior of fresh Concrete
2. Properties of fresh concrete
3. Properties of hardened concrete
4. Strength
5. Elastic properties
6. Creep and Shrinkage
7. Variability of concrete strength

- **Unit III:** Modern Trends in concrete:

1. Modern trends in concrete manufacture
2. Placement techniques
3. Methods of transportation
4. Placing of concrete
5. Curing Techniques
6. Extreme whether concreting
7. Special concreting methods

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

8. Vacuum dewatering of concrete
9. Under water concreting

Special concrete:

1. Guniting
2. Shortcrete
3. Light weight Concrete
4. Mass concrete
5. Fly-ash Concrete
6. Fibre reinforced Concrete
7. Polymer Concrete
8. Ferro Reinforcement in concrete
9. Utilization of waste Material
10. Epoxy resins and screeds for rehabilitation- properties and application

**Learning Outcomes:**

At the end of this course the student will be conversant with

1. Properties and application of admixture
2. Mix Design
3. Properties of concrete
4. Awareness of modern technology
5. Knowledge of special type of concrete

**Assessment Model:**

(a) Average of best Four quizzes out of all Six quizzes(25 Marks) - 25%
(b) Average of Two Mid-Terms (50 Marks) - 20%
(c) Attendance (5 Marks) - 5%
(d) End-Term (100 Marks) - 50%
(e) Lab work – 30 Marks
Total Assessment (Out of 130 Marks) – 100%

**Texts books:**

1. Krishnaraju, N., Advanced Concrete Technology, CBS Publishers, 1985.
2. Nevile, A.M., Concrete Technology, Prentice Hall, Newyork, 1985.

**Reference books:**

1. A.R. Santhakumar, :Concrete Technology" Oxford University Press, 2006

**Web Resources:**

- http://www.wickipedia.ac
- www.sciencedirect.com
- http://engineeringcivil.com

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: GEOGRAPHIC INFORMATION SYSTEMS FOR RESOURCES MANAGEMENT**
**Course Code: UCE-409**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

## COURSE DESCRIPTION

**Unit-I**

Principles of GIS

Introduction to the basic Components and structure of GIS, Geographic concepts, Geographical Entities and Spatial data formats will be introduced.

**Unit-II**

Intorduction to ArcGIS

Introduction to ArcGIS Software and its Components(ArcMap, ArcCatalog and ArcToolbox).

**Unit-III**

Spatial data formats

Data Types, the differences between raster and vector formats, non-native data formats and metadata. Data analyses and function are highly dependent on these spatial data.

**Unit-IV**

Map Projection

Overview of geographic coordinate systems and Map projections. Essention to geo-reference spatial data and superimpose spatial datasets

Spatial data Analysis;

An overview of multiple vector-based and raster-based (local, Focal, Zonal, and Global) spatial operations will be provided. Queries, The Field calculator, raster calculator and model maker provide operational tools to conduct spatial analize within the Arc GIS Environment.

**Assessment Model:**

(a) Average of best Four quizzes out of all Six quizzes(25 Marks) - 25%
(b) Average of Two Mid-Terms (50 Marks) - 20%
(c) Attendance (5 Marks) - 5%
(d) End-Term (100 Marks) - 50%

Total Assessment (Out of 100 Marks) – 100%

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Texts Books:**

1. Heywood L, Comelius. S and S. Carver (2006) An Introduction to Geographic Information System, Dorling Kinderseley (India) Pvt. Ltd.
2. Burrough P A 2000 P A McDonnell (2000) Principles of Geographic Information Systems, London: Oxford University Press.

**Reference Books:**

1. Lo.C.P., Yeung. K.W Albert(2002) Concepts and Techniques of Geographic Information Systems, Prentice-Hall of India Pvt. Ltd. New Delhi.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: RENEWABLE ENERGY SOURCES**
**Course Code: UME –464**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Unit I**

Scenario of Renewable Energy (RE) Sources: Needs of renewable energy, advantages and limitations of RE, present energy scenario of conventional and RE sources

Wind Energy**:** Energy available from wind, basics of lift and drag, basics of wind energy conversion system, effect of density, angle of attack and wind speed, windmill rotors, horizontal and vertical axes rotors, drag, lift, torque and power coefficients, tip speed ratio, solidity of turbine, wind turbine performance curves, wind energy potential and site selection, basics of wind farm

**Unit II**

Bio Energy **:** Types of biogas plants, biogas generation, factors affecting biogas generation, advantages and disadvantages, biomass energy, energy plantation, gasification, types and applications of gasifiers

Ocean Energy: OTEC principle, open, closed and hybrid cycle OTEC system, Energy from tides, estimation of tidal power, tidal power plants, single and double basin plants, site requirements, advantages and limitations,

**Unit III**

Solar Energy**:** Energy available from the sun, spectral distribution, solar radiation outside the earth's atmosphere and at the earth's surface, solar radiation geometry, Instruments for solar radiation measurements, empirical equations for prediction of availability of solar radiation, radiation on tilted surface

solar energy conversion into heat, types of solar collectors, evacuated and non-evacuated solar air heater, concentrated collectors, thermal analysis of liquid flat plate collector, air heater and cylindrical parabolic collector, solar energy thermal storage, heating and cooling of buildings, solar pumping, solar cooker, solar still, solar drier, solar refrigeration and air conditioning, solar pond, heliostat, solar furnace

photovoltaic system for power generation, solar cell modules and arrays, solar cell types, material, applications, advantages and disadvantages

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Unit IV**

Economic Analysis:
Initial and annual cost, basic definitions, present worth calculations, repayment of loan in equal annual installments, annual savings, cumulative saving and life cycle cost, economic analysis of add on solar system, payback period, clean development mechanism
Demonstration of following equipment should be given to the students.

(a) Solar water heater (b) Solar air heater (c) Pyranometer (d) Pyrhelioemeter (e) Solar PV system (f) Wind mill (g) Biogas plant (h) Gasifier (i) Solar cooker

**Texts books:**

1. Solar Energy: Principles of Thermal Collection and Storage, S. P. Sukhatme and J. K. Nayak, McGraw-Hill Education
2. Solar Engineering of Thermal Processes, John A. Duffie, William A. Beckman, John Wiley, New York

**Reference Books:**

1. Non-conventional energy resources, Shobh Nath Singh, Pearson India
2. Solar Energy Engineering, Soteris Kalogirou, Elsevier/Academic Press.
3. Principles of Solar Energy, Frank Krieth & John F Kreider, John Wiley, New York

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: AUTOMATION & ROBOTICS**
**Course Code: UME – 466**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Unit-I**

Introduction to Automation:

Concept of Automation, reasons for Automating, Arguments for and against Automation, Automation Strategies, Economical Considerations.

Automation.

Fluid Control Components:

Fluid, power control elements, Hydraulic & Pneumatic valves, Flow and direction control valves,

Metering valve, Hydraulic Servo System, Fluid power symbols.

Control Systems:

Adaptive control, sequence control and programmable controllers, computer process control**.**

**Unit-II**

Transfer Device, Feeders & Material Handling:

Detriot- Type Automation, Analysis of Automated flow lines, Automated assembly System &

Automated Material Handling.

Automated Inspection & Testing:

Automated Inspection, Principles and Methods, sensor technologies for automated inspection,

co-ordinate measuring machines, other contact inspection methods, machine vision, optical

inspection methods, Non-Contact Inspection Methods.

**Unit-III**

Robotics*:* Basic Concepts

Definition and origin of robotics – different types of robotics – various generation of robots – degrees of freedom – Asimov's laws of robotics – dynamic stabilization of robots.

Power Sources and Sensors

Hydraulic, pneumatic and electric drives – determination of HP of motor and gearing ratio –

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

variable speed arrangements – path determination – micro machines in robotics – machine vision – ranging – laser – acoustic – magnetic, fiber optic and tactile sensors

**Unit-4**

Manipulators, Actuators and Grippers

Construction of manipulators – manipulator dynamics and force control – electronic and pneumatic manipulator control circuits – end effectors – Û various types of grippers – design considerations. **05**

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

Industrial Applications:
Applications of Robots: Welding, parts handling / transfer, assembly operations, parts sorting,

**Reference Books:**

1. Automation Production System & Computer Integrated Manufacturing. Mikell P. Grover
2. Robotics & Flexible Automation S.R. Deb
3. Pneumatic Control and Hydraulic Control S.R. Majundar
4. Ghosh, Control in Robotics and Automation: Sensor Based Integration, Allied Publishers, Chennai, 1998.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

# OPEN ELECTIVE III
# SEMESTER 8

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: TOTAL QUALITY MANAGEMENT**
**Course Code: UMG-475**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Objective**
Total Quality Management refers to an integrated approach by management to focus all the functions and levels of an organization on quality and continuous improvement. Over the years, total quality management has become very important for improving a firm's processing capabilities in order to sustain competitive advantages.

**Unit-I**
Introduction to TQM & ISO 9000, Total Quality Control, Customer Focus & Total waste Elimination (TWE), Quality Assurance
Quality of Design & Development, Inspection & Measurement workforce Teams,Benchmarking, TQM for Sales Marketing Management

**Unit-II**
Business Process Re-engineering & Information Technology, Quality control SQC/ SPC, Technology & Product Quality, Quality for After Sales Services Technology & Product Quality.

**Unit-III**
Organization for Quality, Reliability as quality characteristics, Quality leadership, Quality linked productivity, Total Quality, Culture, Quality and environment, Cost of Quality.

**Unit-IV**
Cost of Quality, Quality Control for Export Units, Quality Maturity and Discipline, Total commitment for Quality, TQM Implementation, ISOm 9000 series of standards, ISO 9000-1, ISO 9000-2, ISO 9000-3.

**Assessment Model:**
(a) Average of best Four quizzes out of all Six quizzes(25 Marks) - 25%
(b) Average of Two Mid-Terms (50 Marks) - 20%
(c) Attendance (5 Marks) - 5%
(d) End-Term (100 Marks) - 50%
Total Assessment (Out of 100 Marks) – 100%

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Text Books:**

1. TQM & ISO 14000: K.C.Arora.
2. Total Quality Control: Armand V. Feigenbaum.

**Reference books**:

1. Total Quality Management: Joseph.A.Patrick, Diana.S.Furr.
2. Total Quality Management – Text: Joel E. Ross Cases &Readin
3. Total Quality Control Essentials: Sarv Singh Soin

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: OPTICAL COMMUNICATION**
**Course Code: UEC-466**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Unit I**
Need for Fiber Optic Communications System, Role of Fiber Optic communication technology, Basic Block Diagram, Advantages & Disadvantages of Optical Fiber Communication, structure of optical wave guide, lightpropagation in optical fiber using ray theory, Electromagnetic Mode Theory, Step Index Fiber, Graded Index Fiber, Attenuation- Bending Loses, Scattering, Absorption, Dispersion – Intermodal, Chromatic, limitations & remedies.

**Unit II**
Light sources & Transmitters – Light Emitting Diodes,Hetero junction& DH structure, laser diodes, Principle of action, characteristics, efficiency, Block Diagram and typical circuits of Transmitter.

**Unit III**
Receivers, Photodiodes -Working, Power relationship,PIN photodiodes, Avalanche photodiode, Block Diagram & typical circuits of receiver.

**Unit IV**
Fiber Cable Connection– Splicing, Connectors, components of Fiber Optic Networks, Transceivers, Semiconductor, optical amplifiers - Principle of operation, Gain, Bandwidth, Cross talk, Noise, Applications, Advantages& Disadvantages.Erbium Doped Fiber Amplifiers (EDFAs) - Operation, gain, noise, Components of EDFA module.

**Reference Books:**


| | | | |
|---|---|---|---|
| 1 | Fiber Optic Comm. Systems | D.K.Mynbaev | Pearson Edu. |
| 2 | Optical Fiber Comm. | John M.Senior | PHI Publications |
| 3 | Optical Fiber Comm. | G.Keiser | TMH |


**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: PRINCIPLES OF DIGITAL COMMUNICATION**
**Course Code: UEC-467**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Unit-I**
Pulse Modulation:- Sampling process, pulse – amplitude modulation , other forms of pulse modulation, Bandwidth – noise trade off, quantization process, pulse code modulation, noise considerations in PCM system, ISI & Eye pattern in PCM, Time- division multiplexing, digital multiplexers, differential pulse code modulation , delta modulation, Adaptive Delta Modulation.

**Unit-II**
Digital Modulation Techniques: - Binary phase – shift keying, differential phase shift keying, differentially – encoding PSK (DEPSK), Quadrature phase shift keying (QPSK), M-ary PSK, Amplitude shift keying(ASK), Quadrature amplitude shift keying (QASK). Binary frequency shift keying, similarity of BFSK and BPSK, M-ary FSK, Minimum shift keying (MSK)

**Unit-III**
Data Transmission: - A base band signal receiver, probability of error, the optimum filter, white noise: the matched filter, probability of error of the matched filter, coherent reception: correlation, phase shift keying (PSK), frequency shift keying (FSK), Non coherent detection of FSK, differential PSK,).

**Unit-IV**
Spread Spectrum Modulation: - Pseudo-noise sequences, direct sequence spread spectrum, processing gain, frequency HOP spread spectrum, Linear Block Codes, Convolution codes.

**Texts Books :**


1. Communication System : Simon Haykins :John Wiley
2. Principles of Communication System : Taub and Schilling :TMH
3. Electronics Communication System : Wayne Tomasi : Pearson Edu.
4. Information Theory Coding and Cryptography : Ranjan Bose : TMH
5. Communication Systems : Sanjay Sharma : Katson Books


**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: E-COMMERCE & ERP**
**Course Code: UCS-484**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Course Description:**

- **Unit I:** Introduction and Concepts:
  - Networks and commercial transactions – Internet and other novelties;
  - networks and electronic transactions today, Model for commercial transactions;
  - Internet environment – internet advantage, worlds wide web and other internet sales venues
  - Online commerce solutions.
  - Security Technologies:
    - Insecurity Internet; A brief introduction to Cryptography;
    - Public key solution; Key distribution and certification;
    - Prominent cryptographic applications.
  - Electronic Payment Methods:
    - Updating traditional transactions; secure online transaction models;
    - Online commercial environments; digital currencies and payment systems;
    - Offline secure processing; private data networks.
  - Protocols for Public Transport of Private Information:
    - Security protocols; secure protocols; Secure hypertext transfer protocols;
    - Secure sockets layers; Integrating security protocols into the web;
    - Non technical provide.

- **Unit II:** Electronic Commerce Providers:
  - On-line Commerce options: Company profiles.
  - Electronic Payment Systems: Digital payment systems;
  - First virtual internet payment system; cyber cash model.
  - On-line Commerce Environments:
    - Servers and commercial environments; Netscape product line;
    - Netscape commerce server; Microsoft internet explorer and servers;
    - open market.
  - Digital Currencies:
    - Optional process of Digicash, Ecash Trail; Using Ecash; Smart cards,

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

- Electronic Data Interchange; Its basics;
- EDI versus Internet and EDI over Internet.

– Strategies, Techniques and Tools:
- Internet Strategies: Internet Techniques,
- Shopping techniques and online selling techniques;
- Internet tools. Electronic Commerce Online Resources and Guide to
- the CD-ROM.

- **Unit III:** ERP –
  - An Enterprise Perspective; Production Finance,
  - Personnel disciplines and their relationship, Transiting environment,
  - MIS Integration for disciplines, Case Study, Information / Workflow,
  - Network Structure, Client Server Integrator System, Virtual Enterprise. ERP –
  - Resource Management Perspective; Functional and Process of Resource. Management,
  - Basic Modules of ERP System-HRD, Personnel Management,
  - Training and Development, Skill Inventory,
  - Material Planning and Control, Inventory, Forecasting, Manufacturing,
  - Production Planning, Production Scheduling,
  - Production Control, Sales and Distribution,
  - Finance, Resource Management in global scenario,
  - dynamic data management in complex global scenario.

- **Unit IV:** ERP – Information System Perspective:
  - Evolution of Application Software Technology Management,
  - EDP, MIS, DBMS, DSS OLAP (Online Analysis and Processing),
  - TP, OAS, KBS, MRP, BPR, SCM, REP, CRM,
  - Information Communication Technology, E-Business, E-Commerce, EDI

– ERP-Key Managerial Issues:
  - Concept Selling, IT Infrastructure, Implication,
  - ERP Systems on Business Organization, Critical success factors in ERP System,
  - ERP Culture Implementation Issues, Resistance to change,
  - Public Service and Organizations (PSO) Project,
  - ERP Selection issues, Return on Investment, Pre and Post Implementation Issues

**Learning Outcomes:**

1. To demonstrate a clear and relevant understanding of the definitions, importance, potential business values, and relevant technologies of ERP systems;
2. To demonstrate the ability in learning the applications of ERP and using the up-to-date ERP systems (such as SAP) for business.
3. To demonstrate a clear understanding of the life-cycle model of the process that a firm goes through with ERP system.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Assessment Model:**

1. Best 4 of 6 quizzes BASED ON assignments- 25%
2. One best out of TWO Mid-Terms (100 Marks) – 20%
3. ATTENDANCE: 5%
4. End-Term (100 Marks) – 50%
5. Total Assessment (Out of 100 Marks) – 100%

**Texts books:**

- Frontiers of Electronics Commerce by Ravi lalakota, Andrew Whinston
- Enterprise Resource Planning – Concepts and practice by K. Garg and N.K. Venkita Krishna

**Referencs books:**

1. The SAP/3 Handbook by John Antonio, Fernandz

**Web Resources:**

1. http://www.practicalecommerce.com/articles/3264-12-Sites-for-Ebook-Publishing
2. http://www.ebooksdownloadfree.com/eCommerce/Free-eCommerce-Books-CI49P0.html

- http://blog.publishingtechnology.com/online/ebooks-ecommerce/

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: DATA WAREHOUSING & DATA MINING**
**Course Code: UCS-485**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Course Description**:

- **Unit I**: Introduction to Data Warehousing
  - Data Warehousing
    - Definition and characteristics
    - Need for data warehousing
    - DBMS vs. data warehouse
  - OLAP
    - Overall Architecture
  - Data Warehouse Database
  - Sourcing
  - Acquisition
  - Cleanup and Transformation Tools
  - Metadata Access Tools, Data Marts
  - Introduction to Data Mining
  - Data mining
    - Data mining functionalities
    - Kinds of patterns can be mined
    - Classification
    - Major issues
    - Functionalities
    - Classification data mining systems
  - Multidimensional data model
    - Data cubes
    - Schemas for multidimensional databases
  - OLAP operations
  - Metadata
- **Unit II**: Data Pre-Processing
  - Data cleaning
  - Data Integration and Transformation
  - Data Reduction, Discretization and concept hierarchy generation
  - Data mining primitives
    - Data mining Task

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

- A data mining query language
- Architecture of Data mining systems
- Characterization and comparison

– Concept Description
– Data mining techniques
  - Concept description attribute oriented induction
  - Analytical characterization
  - Mining class comparisons
  - Mining descriptive statistical measures

- **Unit III**: Association Rule Mining
  – Mining single dimensional
  – Boolean association rules from transactional databases
  – Apriori algorithm, efficiency
  – Mining rules without candidate generation
    - Mining multilevel association rules from transaction databases mining multidimensional association rules from Relational databases and Data warehouses
    - From association mining to correlation analysis
    - Constraint based association mining
- **Unit IV**: Applications and Trends in Data Mining
  – Data mining system products and Research prototypes
  – Additional themes on Data mining
  – Social Impacts of Data Mining
    - Trends in Data mining
    - Realization to data mining using SQL Server
  – Case studies in building
    - business environment
  – Application of data ware housing
  – Data mining in Government
  – National Data ware houses and case studies
  – Commercial Importance of DW
  – Applications of data mining
    - data mining in business process
    - embedded data mining

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: BUILDING PROJECT AND ESTIMATES**
**Course Code: UCE-412**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Unit I:** Procedure of Estimating Methods of Estimating ;Main item of work; Deduction for openings; Degree of accuracy. Methods of Building Estimates: Individual Wall Method; Center Line metho Arch masonary calculation.

**Unit II:** Estimate of RCC works Estimate of RC Slab ; RCC Beam; RCC T-beam slab and RC coloumn with foundation, Road Estimating: Estimate of Earthwork; Estimate of Pitching of Slope Estimate of Earthwork of road from longitudinal sections; Estimate of Earthwork in hill roads Can estimate : Earthwork in canals- Different cases; Breached sections/ Breach closures.

**Unit III**: Specifications Purpose and Method of writing specifications; Detailed Specifications for Brickwork; RCC; Plastering; Mosaic Flooring; R.R Stone Masonary; Analysis of Rates; Preparing analysis of rates for the following items works:1)Concrete 2)RCC Works 3) Brickwork in foundation and superstructure 4) Plastering preparing leed statements.

**Unit IV:** PWD accounts and procedure of works: Organization of Engineering department; work charged establishment; Contract ; Tender; Tender Notice; Tender Schedule; Plinth Area; FLOOR Area; Carpet Area; Approximate Estimate; Plinth Area estimate ; revised Estimate Supplementary estimate. Annual budgets of work, cash flow allocations yearly, TF Accounts of materials USR Valuation: Cost; Price & Value; Methods of Valuation; Out Goings: Depreciation; Methods for estimating cost depreciation; Valuation of Building.
Contracts ; Types of Contracts, Contract Law, EMD, Tenders, acceptance of contract, Branch of contract, Cancellation of contract, Re-tendering- work order , running pavement, Final Bill, Deviation orders, Completion Certificate

**Learning Outcomes:**

On successful completion of this course students will:

1. Estimate various types of structures
2. Able to make bill of various works

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Assessment Model:**

(a) Average of best Four quizzes out of all Six quizzes(25 Marks) - 25%
(b) Average of Two Mid-Terms (50 Marks) - 20%
(c) Attendance (5 Marks) - 5%
(d) End-Term (100 Marks) - 50%
Total Assessment (Out of 100 Marks) – 100%

**Texts books:**

1. Estimating & Costing in Civil Engineering by B.N. Dutta
2. Valuation of real properties by S.C. Rangwal, Charotar Publishing House
   Estimating and Costing by M. Chakraborty , S chand publishing House

**Web Resources:**

1. www.wikipedia.org
2. www.engineeringcivil.com

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: DISASTER MANAGEMENT**
**Course Code: UCE-476**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Unit I**
Understanding Disasters
Understanding the Concepts and definitions of Disaster, Hazard, Vulnerability, Risk, Capacity–Disaster and Development, Awareness During Disaster, Search and Rescue, needs Assessment and Disaster management.

**Unit II**
Types of Disaster and its Control
Geological Disasters (earthquakes, landslides, tsunami, mining);Hydro-Meteorological Disasters (floods, cyclones, lightning, thunder-storms, hail storms, avalanches, droughts, cold and heat waves);Biological Disasters (epidemics, pest attacks, forest fire); Technological Disasters (chemical, industrial, radiological, nuclear);Manmade Disasters (building collapse, rural and urban fire, road and rail accidents, nuclear, radiological, chemicals and biological disasters);Global Disaster Trends–Emerging Risks of Disasters–Climate Change and Urban Disasters.

**Unit III**
Disaster Management in India
Disaster Profile of India –Mega Disasters of India and Lessons Learnt Disaster Management Act 2005 –Institutional and Financial Mechanism National Policy on Disaster Management, National Guidelines and Plans on Disaster Management;

1. Role of Government (local, state and national),
2. Non-Government and Inter-Governmental Agencies

**Unit IV**
Applications of Science and Technology for Disaster Management Geo-informatics in Disaster Management (GIS, GPS and RS) Disaster Communication System (Early Warning and Its Dissemination) Land Use Planning and Development Regulations Disaster Safe Designs and Constructions in India

**Learning Outcomes:** Students will be able to understand,

- Behavior of building during earthquake
- Able to find the critical element of building

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

- Knowledge of repair of critical element

**Assessment Model:**
(a) Average of best 6 quizzes out of all the 4 quizzes(20 Marks) - 25%
(b) Average of Two Mid-Terms (50 Marks) - 20%
(c) Attendance – 5 %
(d) End-Term (100 Marks) - 50%
Total Assessment (Out of 100 Marks)

**Texts books:**
1. Pankaj Aggarwal and Manish Shrikande, "Earthquake resistant design of structures"
2. S.K.Duggal, "Earthquake resistant design of structures", Oxford University Press

**Reference books:**
1. Ulrich ranke, "Natural Disaster Risk Management: Geosciences and Social Responsibility"
2. Michael Beach , "Disaster Preparedness and Management"
3. Rajesh Anand,N.C.Jana,Sudhir Singh, "**Disaster Management and Sustainable Development** Emerging issues and concerns"
4. B C Bose, "Introduction to Disaster Management"
5. Relevant codes

**Web Resources:**
1. http://en.wikipedia.org/wiki/Civil_engineering
2. http://engineeringcivil.com

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: ENGINEERING IN INDUSTRY & ENTREPRENEURSHIP**
**Course Code: UME – 459**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

| L | T | P | Cr |
|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Unit-I**

Introduction and its Development:

Industrial Engineering: Concept; Functions; Fields of application; origin and development of factory system; Effects of Industrial Revolution; Principles of scientific management. Pioneers of Scientific Management- F.W.Taylor, Henry L.Gantt, Frank B. Gilberth, Henri Fayol etc.Administration and Organistion; Organisation Structure; Authority and Responsibility; Types of organization:-Line, Functional, Line and Staff and Committee.

Wage Incentive Plans: Concept; Characteristics of good wage incentive plan; Methods of Wage Payment; Classification of Wage Incentive Plans, Factors influencing wage rates**.**

**Unit-II**

Plant Location & Plant Layout: Factors effecting plant location, selection of plant site, quantitative techniques of plant location decision, plant layout, principles of layout design,

Product Development and Design: Product and its classification, Product design considerations, product development, product characteristics, Standardization, Product Simplification and Diversification; value engineering and its role in product design and cost rationalization.\Ergonomics:Role of ergonomics in industry, effect of physical environment on performance.

Production, Planning and Control:

Concept; Objectives, Need and functions of P.P.C., Functions of planning routing, scheduling, dispatching and follow up and progress report. Production control charts. Route and process charts. Operation charts, machine load charts, Gantt charts, Progress charts; Bar chart.

**Unit-III**

Inspection and Quality Control:

Defintion and functions of Inspection; Inspection methods; Definition, objectives and principles of Quality control; Statistical Quality Control (SQC) Economics of QualityControl. Introduction to statistical methods of quality control. Numericals.

Their importance in scientific management. Definition and objectives ; various time estimates, level of performance; Allowances ; time recording techniques, Procedure of method study, Various charts and diagrams, Classification of motion, Therbligs.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

Introduction to MRP,JIT and TQM: Definitions, objectives and benefits.

**Unit-IV**

Entrepreneurship Development:

Entrepreneurship, Role of entrepreneurship in Indian economy, Characteristics of entrepreneur, Types of entrepreneurs, some myths and realities about entrepreneurship. Role and scope of small scale industries, concept of small scale and ancillary industries undertaking, How to start a small scale industry, Steps in launching own venture. Infrastructure facilities available for entrepreneurship development in India. **06** Preparation of feasibility Project Report: Tools for evolution of techno economic feasibility project report, SWOT analysis.

**Text Books:**

1. Industrial Management: Spregiel. John Wiley & Sons. N.York, 1961.
2. Industrial Organisation: Kimball and Kimball. Vakils Feffer & Simsons Pvt. Ltd. Bombay, 1971.
3. Industrial Engineering & Operations Management by Dr. S K Sharma & Mrs Savita Sharma, S.K.Katarial & Sons, New Delhi

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

**Course Name: EMERGING AUTOMOTIVE TECHNOLOGIES**
**Course Code: UME – 458**

| Assessment and Evaluation Components | |
|---|---|
| Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study | 25 |
| Mid Term Tests (MTE) | 20 |
| Attendance Marks | 05 |
| End Term Examination | 50 |
| **Total** | **100** |

| L | T | P | Cr |
|---|---|---|---|
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**Unit-I**
Fuel Cell Technology for Vehicles**:** What is fuel cell, Type of fuel cell, Advantage of fuel cell. Current state of the technology. Potential and challenges. Advantages and disadvantages of hydrogen fuel.

**Unit-II**
Latest Engine Technology Features**:** Advances in diesel engine technology, Direct fuel injection Gasoline engine. Diesel particular emission control. Throttling by wire. Variable Valve Timing, Method used to effect variable Valve Timing. Electromagnetic Valves. Camless engine
42 Volt System: Need, benefits, potentials and challenges. Technology Implications for the Automotive Industry. Technological evolution that will occur as a result of the adoption of 42

**Unit-III**
Electrical and Hybrid Vehicles: Types of hybrid systems, Objective and Advantages of hybrid systems. Current status, Future developments and prospects of Hybrid Vehicles.
Integrated Starter Alternator: Starts stop operation, Power Assist. Regenerative braking.
Advanced lead acid batteries, Alkaline batteries, Lithium batteries, Development of new energy storage systems. Deep discharge and rapid charging ultra capacitors.

**Unit-IV**
X-By Wire Technology: What is X-By Wire, Advantage over hydraulic systems, Use of Automotive micro controllers, Types of censors. Use of actuators in an automobile environment Vehicle Systems: Constantly Variable Transmission, benefits, Brake by wire, Advantages over power Braking systems. Electrical assist. Steering, Steering by wire, Advantages of steering by wire. Semi-active and fully active suspension system. Advantages of fully active suspension system.

**Text Books:**
1. Advanced Vehicle technologies by Heinz Heisler – SAE International Publication.
2. Electric and Hybrid Electric Vehicles by Ronald K.Jurgen – SAE International Publication.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.

3. Batteries for Electric Vehicles by DAJ Rand, R.Woods and R.M.Dell – SAE International Publication.

**Reference books:**

1. Electronics Braking, Traction and Stability Control – SAE Hardboud papers.
2. Electronics steering and suspension systems – SAE Hardboud papers.
3. Volt systems by Daniel J. Holt – SAE International Publication.

**Note for End Term Examination:** Attempt five question in all, selection one question each from the section A,B,C and D Section E is compulsory.