EN010 101 ENGINEERING MATHEMATICS – I

Teaching Scheme
2 hour lecture and 1 hour tutorial per week

Credits: 5

Objectives
- To impart mathematical background for studying engineering subjects.

MODULE 1 (18 hours) - MATRIX


MODULE 2 (18 hours) - PARTIAL DIFFERENTIATION

Partial differentiation: chain rules – statement of Eulers theorem for homogeneous functions – Jacobian – Application of Taylors series for function of two variables – maxima and minima of function of two variables (proof of results not expected)

MODULE 3 (18 hours) - MULTIPLE INTEGRALS


MODULE 4 (18 hours) - ORDINARY DIFFERENTIAL EQUATIONS

Linear differential equation with constant coefficients – complimentary function and particular integral – Finding particular integral using method of variation of parameters – Euler Cauchy equations – Legenders equations

MODULE 5 (18 hours) - LAPLACE TRANSFORMS

REFERENCES

1. Erwin Kreyszig ; Advanced Engineering Mathematics Wiley Eastern Ltd
3. N. P. Bali ; Engineering Mathematics , Laxmi Publications Ltd
4. Goyal & Gupta ; Laplace and Fourier Transforms
EN010 102 ENGINEERING PHYSICS

Teaching Scheme
I hour lecture and 1 hour tutorial per week

Objectives
- To provide students knowledge of physics of a problem and an overview of physical phenomena.

MODULE I (12 hours) LASERS AND HOLOGRAPHY


Holography- Basic principle -Recording and reconstruction- comparison with ordinary photography-Applications of Hologram

MODULE II (12 hours) NANOTECHNOLOGY AND SUPERCONDUCTIVITY

Introduction to nanoscale science and technology- nanostructures-nanoring, nanorod, nanoparticle, nanoshells- Properties of nanoparticles- optical, electrical, magnetic, mechanical properties and quantum confinement- Classification of nanomaterials- C_{60}, metallic nanocomposites and polymer nanocomposites- Applications of nanotechnology


MODULE III (12 hours) CRYSTALLOGRAPHY AND MODERN ENGINEERING MATERIALS

A. Crystallography – Space lattice- Basis- Unit cell- Unit cell parameters- Crystal systems- Bravais lattices- Three cubic lattices-sc, bcc, and fcc- Number of atoms per unit cell- Co-ordination number- Atomic radius- Packing factor- Relation between density and crystal lattice constants- Lattice planes and Miller indices-Separation between lattice planes in sc- Bragg’s law- Bragg’s x-ray spectrometer- Crystal structure analysis.

Liquid crystals- Liquid crystals, display systems-merits and demerits- Metallic glasses- Types of metallic glasses (Metal-metalloid glasses, Metal-metal glasses) – Properties of metallic glasses (Structural, electrical, magnetic and chemical properties)

Shape memory alloys- Shape memory effect, pseudo elasticity
MODULE IV (12 hours) ULTRASONICS

A. Ultrasonics - Production of ultrasonics - Magnetostriction method – Piezoelectric method - Properties of ultrasonics - Non destructive testing - Applications

B. Spectroscopy - Rayleigh scattering (Qualitative) - Raman effect – Quantum theory of Raman effect - Experimental study of Raman effect and Raman spectrum - Applications of Raman effect

C. Acoustics - Reverberation - Reverberation time - Absorption of sound - Sabine’s formula (no derivation) - Factors affecting acoustics properties

MODULE V (12 hours) FIBRE OPTICS

Principle and propagation of light in optical fibre - Step index (Single Mode and Multi Mode fibre) and graded index fibre - N.A. and acceptance angle - Characteristics of optical fibres (Pulse dispersion, attenuation, V-number, Bandwidth-distance product) –

Applications of optical fibres - Fibre optic communication system (Block diagram) - Optical fibre sensors (any five) – Optical fibre bundle.

REFERENCES

2) Nanomaterials - A.K.Bandhopadyaya – New Age International Publishers
3) Engineering Physics – A. Marikan
5) Engineering physics- Dr. M Arumugam - Anuradha Agencies
6) Nano ; The Essentials- T. Pradeep
7) Material Science-M Arumugham- Anuradha Agencies
8) Lasers and Non-Linear optics By B.B Laud - New Age International (P) Limited
EN010 103 Engineering Chemistry & Environmental Studies  
(Common to all branches)

Teaching scheme  
1hr lecture and 1hr tutorial per week (total 60 hrs)

Objectives

- To impart a scientific approach and to familiarize the applications of chemistry in the field of technology
- To create an awareness about the major environmental issues for a sustainable development.

Module 1 Electrochemical Energy Systems (13 hrs)
Electrochemical cells - Galvanic cell - Daniel cell – EMF - determination by potentiometric method - Nernst equation – derivation- Single electrode potential-Types of electrodes-Metal/metal ion electrode, Metal/metal sparingly soluble salt electrode, Gas electrode and Oxidation/reduction electrode - Reference electrodes - Standard hydrogen electrode and Calomel electrode - Glass electrode – Determination of pH using these electrodes - Concentration cell – Electrolytic concentration cell without transfer - Derivation of EMF using Nernst equation for concentration cell - Cells and Batteries - Primary and secondary cells - Lead acid accumulator, Ni-Cd cell, Lithium–MnO₂ cell and Rechargeable Lithium ion cell – Polarization – Overvoltage - Decomposition potential - Numerical problems based on Nernst equations and pH determination.

Module 2 Corrosion and Corrosion Control (10 hrs)
Introduction - Types of corrosion – Chemical and Electrochemical corrosion – Chemical corrosion – Oxidation corrosion, By other gases and Liquid metal corrosion – Pilling-Bedworth rule - Electrochemical corrosion – Mechanism - absorption of O₂ and evolution of H₂ - Types of electrochemical corrosion- Galvanic corrosion, Concentration cell corrosion, Differential aeration corrosion, Pitting corrosion, Waterline corrosion and Stress corrosion - Factors influencing the rate of corrosion - Nature of the metal and Nature of the environment - Corrosion control methods – Selection of metal and proper design, Cathodic protection (Sacrificial anodic protection and Impressed current cathodic protection), Modifying the environment, corrosion inhibitors and Protective coating - Metallic coating – Anodic coating and cathodic coating - Hot dipping (Galvanizing and Tinning), Electroplating, Electroless plating, Metal spraying, Metal cladding Cementation- sheradizing - chromizing- calorizing and Vacuum metallization - Non-metallic coating - Anodization

Module 3 Engineering Materials (13 hrs)

High polymers – Introduction - Degree of polymerization – Functionality – Tacticity - Types of polymerization (mechanisms not required) – Addition, Condensation and Copolymerization - Glass transition temperature-(Tg) Definition only, Compounding and moulding of plastics - Compression, Injection, Extrusion, Transfer and Blow moulding.

Fiber Reinforced Plastics - Glass reinforced plastics (GRP) - Manufacturing methods - Hand lay up, Spray up and Filament winding - properties and uses.

Conducting Polymers – Polyacetylene and Polyaniline - Applications (mechanism not required)

Rubber - Natural rubber – Properties – Vulcanization - Synthetic rubber - Preparation, properties and uses of Polyurethane rubber, NBR and Silicone rubber.
Carbon Nanotubes - Single walled (SWCNT) and Multi walled (MWCNT) - Properties and uses.

Module 4 Environmental Pollution (12 hrs)
Pollution - Types of pollution – a brief study of the various types of pollution - Air pollution - Sources and effects of major air pollutants – Gases - Oxides of carbon, nitrogen and sulphur – Hydrocarbons – Particulates -Control of air pollution - Different methods - Water pollution - Sources and effects of major pollutants - Inorganic pollutants- heavy metals cadmium , lead, mercury - Ammonia, Fertilizers and Sediments (silt) - Organic pollutants – Detergents, pesticides, food waste, - Radioactive materials - Thermal pollutants - Control of water pollution - General methods
Eutrophication - Definition and harmful effects
Desalination of water - Reverse osmosis and Electrodialysis

Module 5 Environmental Issues (12 hrs)
Renewable energy sources - Solar cells – Importance - Photo voltaic cell - a brief introduction

Note: This course should be handled and examination scripts should be evaluated by the faculty members of Chemistry

Text Books

References
2. Polymer science –V. R. Gowariker, New Age International Ltd.
6. Nanotechnology - Er. Rakesh Rathi, S. Chand & Company Ltd.
8. Environmental Chemistry - Dr. B. K. Sharma, Goel publishers.
EN010 104 ENGINEERING MECHANICS
(Common to all branches)

Teaching Scheme
3 hour lecture and 1 hour tutorial per week

Credits: 6

Objective:
• To develop analytical skills to formulate and solve engineering problems.

Module I (23 hrs)

Module II (23 hrs)
Principle of Virtual work – Elementary treatment only – application of virtual work in beams, ladders
Centroid of Lines, Areas and Volumes – Pappus Guldinus Theorems
Moment of Inertia of laminas – Transfer theorems – radius of Gyration – problems
Centre of Gravity – Mass moment of Inertia of circular and rectangular plates – solid rectangular prisms – Cylinders – Cones

Module III (23 hrs)

Module IV (28hrs)
Kinematics – Rectilinear motion of a particle under Variable Acceleration
Relative Velocity - problems
Circular motion with Uniform and Variable Acceleration – Relations between Angular and Rectilinear motion – Normal and Tangential accelerations
Combined motion of Rotation and Translation – Instantaneous centre of zero velocity – Wheels rolling without slipping
Introduction to Mechanical Vibrations – Free vibrations – Simple Harmonic motion

Module IV (23 hrs)
References:

EN010 105: ENGINEERING GRAPHICS

Teaching Scheme
I hour lecture and 3 hour drawing per week

Objectives

- To provide students of all branches of engineering with fundamental knowledge of engineering drawing
- To impart drawing skills to students

MODULE 1 (24 hours)

Scales-Plain scales-Diagonal Scales-Forward and Backward Vernier Scales.

Conic Sections:-Construction of conics when eccentricity and distance from directrix are given .Construction of ellipse (1) given major axis and foci (2) given major axis and minor axis (3)given a pair of conjugate diameters (4) by the four centre method. Construction of parabola given the axis and base. Construction of hyperbola-(1) given the asymptotes and a point on the curve. (2) Given ordinate, abscissa and transverse axis. Construction of rectangular hyperbola. Construction of tangents and normals at points on these curves.

Miscellaneous curves:-Cycloids, Inferior and superior Trochoids-Epicycloid-Hypocycloid-Involute of circle and plain figures-Archimedean Spiral and Logarithmic Spiral- Tangents and normals at points on these curves.

MODULE 2 (24 hours)
Orthographic projections of points and lines:-Projections of points in different quadrants- Projections of straight lines parallel to one plane and inclined to the other plane-straight lines inclined to both the planes-true length and inclination of lines with reference planes using line rotation and plane rotation methods – Traces of lines.

Orthographic projections of planes-Polygonal surfaces and circular lamina.

MODULE 3 (24 hours)
Orthographic projections of solids:-Projections of prisms , cones ,cylinders ,pyramids ,tetrahedron ,octahedron and spheres with axis parallel to one plane and parallel or perpendicular to the other plane-the above solids with their axes parallel to one plane and inclined to the other plane –axis inclined to both the reference planes-use change of position method OR auxiliary method.

Sections of solids:-Sections of prisms ,cones , cylinders ,pyramids ,tetrahedron and octahedron with axis parallel to one plane and parallel or perpendicular or inclined to the other plane with section planes perpendicular to one plane and parallel , perpendicular or inclined to the other plane –True shapes of sections.

MODULE 4 (24 hours)
Developments of surfaces of (1)simple solids like prisms ,pyramids , cylinder and cone (2) sectioned regular solids (3)above solids with circular or square holes with their axes intersecting at right angles.-Developments of funnels and pipe elbows.

Isometric Projections:-Isometric Scales-Isometric views and projections of plane figures,simple&truncated solids such as prisms, pyramids, cylinder, cone, sphere, hemisphere and their combinations with axis parallel to one the planes and parallel or perpendicular to the other plane.
MODULE 5 (24 hours)
Perspective projections:-Perspective projections of prisms, pyramids, cylinder and cone with axis parallel to one plane and parallel or perpendicular or inclined to the other plane by visual ray method OR vanishing point method
Intersection of surfaces:-Intersection of prism in prism & cylinder in cylinder-Axis at right angles only.

REFERENCES
4. Engineering Graphics-P S Gill
EN010 106: BASIC CIVIL ENGINEERING  
(Common to all branches)

Teaching scheme:  
1 hour lecture and 1 hour tutorial per week

Credits: 4

Objective:  
To familiarize all engineering students with the basic concepts of civil engineering so that they can perform better in this great profession “Engineering”.

Module 1 (12 hours)  

Module 2 (12 hours)  

Module 3 (12 hours)  
Building Components: Foundation: Bearing capacity and settlement - definitions only-footings- isolated footing, combined footing - rafts, piles and well foundation, machine foundation (Brief description only). Superstructure: Walls - brick masonry – types of bonds, English bond for one brick - stone masonry - Random Rubble masonry.

Module 4 (12 hours)  
Surveying: Classification – principles of surveying- chain triangulation- instruments used, field work – bearing of survey lines – WCB and reduced bearing - Leveling: field work - reduction of levels - height of instrument method. Introduction to total station- basic principles of remote sensing, GPS and GIS.

Module 5 (12 hours)  
Site plan preparation for buildings (Sketch only) – Kerala Municipal Building Rules (1999)- general provisions regarding site and building requirements – coverage and floor area ratio – basic concepts of “intelligent buildings” and “green buildings”- disposal of domestic waste water through septic tank and soak pit. Classification of roads- basics of traffic engineering – road markings, signs, signals and islands, road safety- accidents, causes and remedies– (brief description only)
Internal Continuous Assessment (Maximum Marks-50)

60% - Tests (minimum 2)
20% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
20% - Regularity in the class

References

1. Jha and Sinha, Construction and foundation Engineering, Khanna Publishers
2. Punmia B. C., Surveying Vol –I, Laxmi Publications
3. Rangwala, Building Materials, Charotar Book stall
6. B C Punmia.,Basic Civil Engineering, Khanna Publishers
Objective

To impart basic knowledge in mechanical engineering

Module 1 (12 hours)

Thermodynamics: Basic concepts and definitions, Gas laws, specific heat –Universal gas constant- Isothermal, adiabatic and polytrophic processes, work done, heat transferred, internal energy and entropy - Cycles: Carnot, Otto and Diesel- Air standard efficiency.

Basic laws of heat transfer (Fourier’s law of heat conduction, Newton’s law of cooling Steffen Boltzmann’s law)

Module 2 (12 hours)

I.C. Engines: Classification of I.C Engines, Different parts of I.C engines, Working of two stroke and four stroke engines-petrol and diesel engines-air intake system, exhaust system, fuel supply system, ignition system, lubrication system, cooling system and engine starting system-Performance of I.C. engines, advantage of MPFI and CRDI over conventional system.

Refrigeration: Unit of refrigeration, COP, Block diagram and general descriptions of air refrigeration system, vapour compression and vapour absorption systems- Required properties of a refrigerant, important refrigerants– Domestic refrigerator- Ice plant.

Air conditioning system: Concept of Air conditioning, psychometry, psychometric properties, psychometric chart, psychometric processes, human comfort– winter and summer air conditioning systems (general description), air conditioning application.

Module 3 (12 hours)

Power transmission elements: Belt Drive - velocity ratio of belt drive, length of belt, slip in belt- simple problems– Power transmitted– Ratio of tensions– Centrifugal tension Initial tension– Rope drive, chain drive and gear drive-TYPES of gear trains (simple descriptions only)

Module 4 (12 hours)

Power plants: General layout of hydraulic, diesel, thermal and nuclear power plants- nonconventional energy sources (general description only).

Hydraulic turbines and pumps : Classifications of hydraulic turbines –types of hydraulic turbines –runaway speed, specific speed, draft tube, cavitations, selection of hydraulic turbines .Classification of pumps– positive displacement and rotodynamic pumps (description only)- applications

Steam turbines: Classification of steam turbines, description of common types of steam turbines: Impulse and reaction, compounding methods.

Module 5 (12 hours)

Simple description of general purpose machines like lathe, shaping machines, drilling machines, grinding machines and milling machines, Basic concepts of CNC, DNC, CIM and CAD/CAM

Manufacturing Processes: Moulding and casting, forging, rolling, welding- arc welding-gas welding (fundamentals and simple descriptions only)
Internal continues assessment (Maximum Marks –50)

60% Test (minimum 2)
20% Assignments (minimum 2) such as home work, quiz, seminar.
20% regulatory in class

Text book

1 P.L. Bellany, Thermal Engineering, Khnna Publishes
2 Benjamin J., Basic Mechanical Engineering, Pentx

Reference Books

1 R.C. Patal, Elements of heat engines, Acharya Publishers
2 G.R Nagapal, Power plant engineering, Khnna publishes
3 P.K. Nag, Engineering Thermodynamics, McGraw Hill
4 Dr.P.R Modi & Dr.M.S. Seth, Hydraulics & Fluid Mechanics including Hydraulic Machines, Standard Book House
EN010 108: Basic Electrical Engineering
(Common to all branches)

Teaching Scheme
I hour lecture and 1 hour tutorial per week

Objectives
• To provide students of all branches of engineering with an overview of all the fields of electrical engineering
• To prepare students for learning advanced topics in electrical engineering

Module I (10 hours)
Magnetic circuits – mmf, field strength, flux density, reluctance, permeability – comparison of electric and magnetic circuits – force on current carrying conductor in magnetic filed.

Module II (12 hours)
Alternating current fundamentals – generation of AC – frequency, period, average and r m s value, form factor, peak factor, phasor representation – j operator – power and power factor – solution of RLC series and parallel circuits.

Module III (13 hours)
DC machine – principle of operation of DC generator – constructional details – e m f equation – types of generators.
Transformer – principle of operation – e m f equation Constructional details of single phase and three phase transformer – losses and efficiency – application of power transformer, distribution transformer, current transformer and potential transformer.

Module IV (13 hours)
Three phase system – generation of three phase voltage – star and delta system – relation between line and phase voltages and currents – phasor representation of thre e phase system - balanced delta connected system – three wire and four wire system – simple problems. Three phase power measurement – Single wattmeter, two wattmeter and three wattmeter methods.
Synchronous generator (Alternator) – principles of operation and types.

Module V (12 hours)
Generation of electric power – types of generation – hydroelectric, thermal and nuclear (Block schematic and layout only) - Non conventional energy sources – solar, wind, tidal, wave and geothermal.
Requirements of good lighting system – working principle of incandescent lamp, Fluorescent lamp and mercury vapour lamp-energy efficient lamps (CFL, LED lights) – need for energy management and power quality – home energy management.

**Text Books**
3. Hughes – Electrical and Electronic Technology – Pearson Education

**Reference Books**
1. R.V. Srinivasa Murthy – Basic Electrical Engineering – Sunguine Technical
EN010 109: Basic Electronics Engineering and Information Technology  
(Common to all branches)

Teaching Scheme
2 hour lecture and 1 hour tutorial per week

Credits: 5

Objectives
- To provide students of all branches of engineering with an overview of all the fields of electronics engineering and information technology

MODULE 1 (18 hours): Basic Circuit Components: 
- Diode: Germanium, Silicon, Zener, LEDs (working principle only). Forward and reverse characteristics. [2hr.]
- Rectifiers: Half wave, fullwave, Bridge circuits, DC Power supply: Capacitor filter, Zener regulator. [3hrs.]
- Transistors: Different configurations - CE characteristics-β and α, concept of Amplifiers: Common emitter RC coupled amplifier, Frequency response, Bandwidth.(No analysis required)

Comparison of BJT,FET,MOSFET, IGBT. [2hr.]


MODULE 2 (18 hours): Basic communication Engineering: 
- Communication: Frequency bands: RF, VHF, UHF, x, ku, ka, c. Modulation – need for modulation, basic principles of amplitude, frequency and pulse modulation. [6hrs.]
- Block schematic of AM transmitter, Super-hetrodyne receiver, FM receiver.-function of each block. [3hrs.]

Wireless communication: Satellite Communication-Earth station, transponder and receiver.

Mobile Communication: GSM-BSC, Cell structure, frequency re-use, hands-of, establishing a call.

MODULE 3 (18 hours): Basic instrumentation and Consumer electronics: 
- Electronic instrumentation: Transducers: Basic principles of Strain guage, LVDT, Thermistor, Photodiode, Typical moving coil microphones and Loud speaker. Block diagram of Digital Multimeter. [8hrs].
- CONSUMER ELECTRONICS: Basic principles of TV –Interlaced Scanning-Block Diagram of PAL TV receiver(color). Basic principles of DTH, brief descriptions of MP3, multichannel audio 5.1,7.1.

MODULE 4 (18 hours): Introduction: 

MODULE 5 (18 hours): Computer software: 
Networks - Concepts of Networking - Network Topologies - WAN - LAN - MAN, Protocol - Internet - working concept, Internet Architecture, IP addresses, Routing, Domain Name System (Basic concepts only)

References

1. Basic Electronics – Devices, Circuits and IT fundamentals. Santiram Kal, PHI (Module 1 to 5)
2. Basic Electronics: Bernad Grob, Mc Graw Hill Publication (Module 1)
3. Electronic Devices: Floyd, Pearson Education (Module 1)
4. Electronic Devices and Circuits: J.B. Gupta, S.K. Kataria & Sons (Module 1, 2, 3)
7. Communication Systems: Sanjay Sharma, S.K. Kataria & Sons (Module 2)
8. Satellite Communication: Robert M. Gagliardi, CBS Publishers & Distributors (Module 2)
9. Basic Radio and TV; S.P. Sharma, Tata McGrawhill (Module 2 & 3)
10. Wireless Communication; T.S. Rappaport, Pearson (Module 3)
13. Computer Networks, Andrew S. Tanenbaum, Pearson Education (Module 5)
EN010 110: Mechanical Workshop  
(Common to all branches)  

Teaching scheme  Credits: 1  
3 hours practical per week

Objectives

- To provide students of all branches of engineering in house experience of basic mechanical instruments and activities.

Carpentry  

Fitting  
Practice in chipping – filing – cutting – male and female joints.

Smithy  
Forging of square and hexagonal prism. Study of forging principles, materials and operations.

Foundry  
Preparation of simple sand moulds – moulding sand characteristics, materials, gate, runner, riser, core, chaplets and casting defects.

Demonstration and study of machine tools – lathe, drilling, boring, slotting, shaping, milling and grinding machines, CNC machines and machining centers.

Demonstration and study of arc and gas welding techniques.

Note:

1. The minimum mark for a pass for EN010 110 Mechanical workshop is 25 out of 50 in internal assessments.

2. If the student fails in securing minimum mark for pass mentioned above will be considered as failed in the respective workshop.

The candidate not satisfying the above mentioned condition may be given ‘U’ grade in the grade card. For the purpose of fixing grade, the marks are hypothetically escalated to 150. Other grades may be given as specified for other subjects.

The failed candidate has to attend the respective workshop classes in the subsequent semesters. The internal assessment will be made by repeating all workshop activities. The student has to register for EN010 110 Mechanical Workshop in the college by paying the fees prescribed by the college.

HOD in charge of workshop will allot a staff member to monitor the activities and awarding the internal marks. The internal marks should be submitted to the university.
EN010 111: Electrical and Civil Workshops  
(Common to all branches)

Teaching scheme
3 hours practical per 2 weeks for each

Objectives

- To provide students of all branches of engineering in house experience of basic electrical and civil instruments and activities

**Electrical Workshop**

1. Wiring and estimation of one lamp and one plug, Control of two lamps in series and in parallel.

2. Staircase wiring.


4. Insulation megger - earth megger, measurement of insulation resistance and earth resistance. Study of volt meter, ammeter, watt meter and energy meter.

5. Working principle and wiring of Fluorescent, CFL and Mercury vapour lamp.

6. Study and wiring of distribution board including power plug using isolator, MCB and ELCB – Estimation of a typical 1BHK house wiring system.

7. Familiarization, soldering, testing and observing the wave forms on a CRO of a HW and FW Uncontrolled Rectifier (using diodes) with capacitor filter.

8. Observing the wave forms on a CRO of Experiment 7 without capacitor filter and find the average and RMS value of the voltage waveform.

9. Visit your college substation and familiarize the supply system, Transformer, HT Panel and Distribution etc.

**Civil Workshop**

**Masonry:** English bond – Flemish bond – wall junction – one brick – one and a half brick – two brick and two and a half brick – Arch setting.

**Plumbing:** Study of water supply and sanitary fittings – water supply pipe fitting – tap connections – sanitary fittings – urinal, wash basin – closet (European and Indian), Manholes.

**Surveying:** Study of surveying instruments – chain – compass – plane table – levelling – minor instruments. Demonstration of Theodolite and Total Station.

**Familiarization of latest building materials:** Flooring materials – Roofing materials – Paneling boards.
M G University

Note:

1. The minimum mark for a pass for EN010 111 Electrical and Civil workshop is 50 out of 100 in internal assessments.
2. If the student fails in securing minimum mark for pass mentioned above will be considered as failed in the respective workshop.

The candidate not satisfying the above mentioned condition may be given ‘U’ grade in the grade card. For the purpose of fixing grade, the marks are hypothetically escalated to 150. Other grades may be given as specified for other subjects.

The failed candidate has to attend the respective workshop classes in the subsequent semesters. The internal assessment will be made by repeating all workshop activities. The student has to register for EN010 111 Electrical and Civil Workshop in the college by paying the fees prescribed by the college.

HOD in charge of workshop will allot a staff member to monitor the activities and awarding the internal marks. The internal marks should be submitted to the university.