## JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

### R18 B.TECH LIST OF OPEN ELECTIVES FOR III YEAR

**Applicable From 2018-19 Admitted Batch**

<table>
<thead>
<tr>
<th>Branch</th>
<th>Open Elective Offered (OE – I)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Civil Engineering</td>
<td>Disaster Preparedness &amp; Planning Management</td>
</tr>
</tbody>
</table>
| Computer Science & Engineering / Information Technology | 1. Entrepreneurship  
2. Fundamentals of Management for Engineers  
3. Cyber Law & Ethics                             |
| Election and Instrumentation Engineering | Basics of Sensors Technology                                                             |
| Election and Communication Engineering | Fundamentals of Internet of Things                                                         |
| Electrical and Electronics Engineering | 1. Reliability Engineering  
2. Renewable Energy Sources                                                                 |
| Mechanical Engineering/ Aeronautical Engineering | Quantitative Analysis for Business Decisions                                                   |
| Mechatronics                    | 1. Industrial Management  
2. Non-Conventional Energy Sources                                                             |
| Petroleum Engineering           | General Geology                                                                               |
| Metallurgical and Materials Engineering | 1. Testing of Materials  
2. Alloy Steels                                                                                     |
| Mining Engineering             | 1. Introduction to Mining Technology  
2. Coal Gasification, CBM & Shale Gas                                                            |

*Note: Students should take Open Electives from the List of Open Electives Offered by Other Departments/Branches Only.*
Course Objectives: The objectives of the course are

- To understand basic concepts in Disaster Management
- To understand definitions and terminologies used in Disaster Management
- To understand types and categories of disasters
- To understand the challenges posed by disasters
- To understand impacts of disasters

Course Outcomes: The student will develop competencies in

- The application of Disaster Concepts to Management
- Analyzing relationship between Development and Disasters.
- Ability to understand categories of disasters and
- Realization of responsibilities to society

UNIT - I:
Introduction - Concepts and definitions: disaster, hazard, vulnerability, resilience, risks severity, frequency and details, capacity, impact, prevention, mitigation.

UNIT - II
Disasters - Disasters classification; natural disasters (floods, draught, cyclones, volcanoes, earthquakes, tsunami, landslides, coastal erosion, soil erosion, forest fires etc.); manmade disasters (industrial pollution, artificial flooding in urban areas, nuclear radiation, chemical spills, transportation accidents, terrorist strikes, etc.); hazard and vulnerability profile of India, mountain and coastal areas, ecological fragility.

UNIT - III
Disaster Impacts - Disaster impacts (environmental, physical, social, ecological, economic, political, etc.); health, psycho-social issues; demographic aspects (gender, age, special needs); hazard locations; global and national disaster trends; climate change and urban disasters.

UNIT - IV
Disaster Risk Reduction (DRR) - Disaster management cycle – its phases; prevention, mitigation, preparedness, relief and recovery; structural and non-structural measures; risk analysis, vulnerability and capacity assessment; early warning systems, Post disaster environmental response (water, sanitation, food safety, waste management, disease control, security, communications); Roles and responsibilities of government, community, local institutions, NGOs and other stakeholders; Policies and legislation for disaster risk reduction, DRR programmes in India and the activities of National Disaster Management Authority.

UNIT - V
Disasters, Environment and Development - Factors affecting vulnerability such as impact of developmental projects and environmental modifications (including of dams, landuse changes, urbanization etc.), sustainable and environmental friendly recovery; reconstruction and development methods.

TEXT BOOKS:

REFERENCE BOOKS:
1. http://ndma.gov.in/ (Home page of National Disaster Management Authority)
Course Objective: The aim of this course is to have a comprehensive perspective of inclusive learning, ability to learn and implement the Fundamentals of Entrepreneurship.

Course Outcome: It enables students to learn the basics of Entrepreneurship and entrepreneurial development which will help them to provide vision for their own Start-up.

UNIT – I
Entrepreneurial Perspectives

UNIT - II
New Venture Creation
Introduction, Mobility of Entrepreneurs, Models for Opportunity Evaluation; Business plans – Purpose, Contents, Presenting Business Plan, Procedure for setting up Enterprises, Central level - Startup and State level - T Hub, Other Institutions initiatives.

UNIT – III
Management of MSMEs and Sick Enterprises
Challenges of MSMEs, Preventing Sickness in Enterprises – Specific Management Problems; Industrial Sickness; Industrial Sickness in India – Symptoms, process and Rehabilitation of Sick Units.

UNIT – IV
Managing Marketing and Growth of Enterprises

UNIT – V
Strategic perspectives in Entrepreneurship

TEXT BOOKS:
3. Entrepreneurship, Arya Kumar, 4 e, Pearson 2015.
CS601OE: FUNDAMENTALS OF MANAGEMENT FOR ENGINEERS

III Year B.Tech. CSE/IT II-Sem  

L  T  P  C
3  0  0  3

Course Objective: To understand the Management Concepts, applications of Concepts in Practical aspects of business and development of Managerial Skills for Engineers.

Course Outcome: The students understand the significance of Management in their Profession. The various Management Functions like Planning, Organizing, Staffing, Leading, Motivation and Control aspects are learnt in this course. The students can explore the Management Practices in their domain area.

UNIT - I
Introduction to Management: Evolution of Management, Nature & Scope-Functions of Management-Role of Manager-levels of Management-Managerial Skills - Challenges-Planning-Planning Process-Types of Plans-MBO

UNIT - II

UNIT - III

UNIT - IV

UNIT - V

TEXT BOOKS:
Course Objectives
1. To make the students understand the types of roles they are expected to play in the society as practitioners of the civil engineering profession
2. To develop some ideas of the legal and practical aspects of their profession.

Course Outcomes
1. The students will understand the importance of professional practice, Law and Ethics in their personal lives and professional careers.
2. The students will learn the rights and responsibilities as an employee, team member and a global citizen

UNIT-I

UNIT-II

UNIT-III
Information security policies and procedures: Corporate policies- Tier 1, Tier 2 and Tier3 policies - process management-planning and preparation-developing policies-asset classification policy-developing standards.

UNIT-IV
Information security: fundamentals-Employee responsibilities- information classification-Information handling- Tools of information security- Information processing-secure program administration.

UNIT-V

REFERENCES:
EC600OE: FUNDAMENTALS OF INTERNET OF THINGS

B.Tech. ECE III Year II Semester

Course Objectives: The objectives of the course are to:
1. understand the concepts of Internet of Things and able to build IoT applications
2. Learn the programming and use of Arduino and Raspberry Pi boards.
3. Known about data handling and analytics in SDN.

Course Outcomes: Upon completing this course, the student will be able to
1. Known basic protocols in sensor networks.
2. Program and configure Arduino boards for various designs.
3. Python programming and interfacing for Raspberry Pi.
4. Design IoT applications in different domains.

UNIT – I

UNIT - II
Machine-to-Machine Communications, Difference between IoT and M2M, Interoperability in IoT, Introduction to Arduino Programming, Integration of Sensors and Actuators with Arduino,

UNIT – III
Introduction to Python programming, Introduction to Raspberry Pi, Interfacing Raspberry Pi with basic peripherals, Implementation of IoT with Raspberry Pi

UNIT - IV
Implementation of IoT with Raspberry Pi, Introduction to Software defined Network (SDN), SDN for IoT, Data Handling and Analytics,

UNIT - V
Cloud Computing, Sensor-Cloud, Smart Cities and Smart Homes, Connected Vehicles, Smart Grid, Industrial IoT, Case Study: Agriculture, Healthcare, Activity Monitoring

TEXT BOOKS:

REFERENCE BOOKS:
EI600OE: BASICS OF SENSORS TECHNOLOGY

B.Tech. EIE III Year II Semester

Pre-requisites: Physics, Mathematics

Course Objectives:
1. To provide basic knowledge in transduction principles, sensors and transducer technology and measurement systems.
2. To provide better familiarity with the Theoretical and Practical concepts of Transducers.
3. To provide familiarity with different sensors and their application in real life.
4. To provide the knowledge of various measurement methods of physical and electrical parameters.

Course Outcomes:
1. After completion of the course the student is able to:
2. Identify suitable sensors and transducers for real time applications.
3. Translate theoretical concepts into working models.
4. Design the experimental applications to engineering modules and practices.
5. Design engineering solution to the Industry/Society needs and develop products.

UNIT - I
Introduction to measurement systems
General concepts and terminology, measurement systems, sensor classifications: Analog Input and Output, Digital Input and Output, general input-output configuration, methods of correction.

Passive Sensors
Resistive Sensors: Potentiometers, Strain Gages, Resistive Temperature Detectors (RTDs), Thermistors, Light-dependent Resistors (LDRs), Resistive Hygrometers.
Capacitive Sensors: Variable capacitor and Differential capacitor.

UNIT II
Self-generating Sensors or active sensors
Thermoelectric Sensors: Thermocouples, Thermo electric effects, Common thermocouples, Practical thermocouple laws, Cold junction compensation in thermocouples circuits.
Piezoelectric Sensors: Piezoelectric effect, piezoelectric materials, applications.

UNIT III
VELOCITY AND ACCELERATION MEASUREMENT

UNIT IV
DENSITY, VISCOSITY AND OTHER MEASUREMENTS
Units of Viscosity, specific gravity scales used in Petroleum Industries, Different Methods of measuring consistency and Viscosity – Two float viscorator – Industrial consistency meter. Sound-Level Meters, Microphones, Humidity Measurement.
UNIT V
CALIBRATION AND INTERFACING

TEXT BOOKS:

REFERENCES:
2. Wiley & Sons Ltd. (2006).
4. Instrument Transducers – An Introduction to their Performance and design – by Herman K.P. Neubrat, Oxford University Press.
EE600OE: RELIABILITY ENGINEERING

III Year B.Tech. EEE II-Sem

Prerequisite: Mathematics-III (Laplace Transforms, Numerical Methods and Complex variables)

Course Objectives:
- To introduce the basic concepts of reliability, various models of reliability
- To analyze reliability of various systems
- To introduce techniques of frequency and duration for reliability evaluation of repairable systems

Course Outcomes: After completion of this course, the student will be able to
- model various systems applying reliability networks
- evaluate the reliability of simple and complex systems
- estimate the limiting state probabilities of repairable systems
- apply various mathematical models for evaluating reliability of irreparable systems

UNIT - I
Basic Probability Theory: Elements of probability, probability distributions, Random variables, Density and Distribution functions- Mathematical expected – variance and standard deviation
Binomial Distribution: Concepts, properties, engineering applications.

UNIT- II
Network Modeling and Evaluation of Complex Systems
Conditional probability method- tie set, Cut-set approach- Event tree and reduced event tree methods- Relationships between tie and cut-sets- Examples.

UNIT - III

UNIT - IV
Continuous Markov Processes: Modeling concepts- State space diagrams- Unreliability evaluation of single and two component repairable systems

UNIT - V
Frequency and Duration Techniques: Frequency and duration concepts, application to multi state problems, Frequency balance approach.
TEXT BOOKS:

REFERENCES:
Pre-requisites: None

Course Objectives:
- To recognize the awareness of energy conservation in students
- To identify the use of renewable energy sources for electrical power generation
- To collect different energy storage methods
- To detect about environmental effects of energy conversion

Course Outcomes: At the end of the course the student will be able to:
- Understand the principles of wind power and solar photovoltaic power generation, fuel cells.
- Assess the cost of generation for conventional and renewable energy plants
- Design suitable power controller for wind and solar applications
- Analyze the issues involved in the integration of renewable energy sources to the grid

UNIT - I
Introduction

Wind Power Plants
Appropriate Location -Evaluation of Wind Intensity -Topography -Purpose of the Energy Generated -General Classification of Wind Turbines-Rotor Turbines-Multiple-Blade Turbines Drag Turbines -Lifting Turbines-Generators and Speed Control used in Wind Power Energy Analysis of Small Generating Systems.

UNIT - II
Photovoltaic Power Plants


UNIT - III
Induction Generators

UNIT - IV
Storage Systems
UNIT - V
Integration of Alternative Sources of Energy

Interconnection of Alternative Energy Sources with the Grid:
Interconnection Technologies - Standards and Codes for Interconnection - Interconnection Considerations - Interconnection Examples for Alternative Energy Sources.

TEXT BOOKS:

REFERENCES:
ME600OE: QUANTITATIVE ANALYSIS FOR BUSINESS DECISIONS

Course Objectives:
- Understand the problem, identifying decision variables, objective and constraints
- Formulation of Optimization Problem by constructing Objective Function and Constraints functions
- Learn to select appropriate Optimization Technique for the formulated Optimization Problem
- Understood the procedure involved in the selected Optimization Technique
- Solve the Optimization Model with the selected Optimization Technique

Course Outcomes: At the end of the course, student will be:
- Familiar with issues that would crop up in business
- Able to formulate Mathematical Model to resolve the issue
- Able to select technique for solving the formulated Mathematical Model
- Able to analyze the results obtained through the selected technique for implementation.

UNIT – I:

UNIT – II:
Transportation and Assignment Models: Definition and Application of the Transportation Model, Solution of the Transportation Problem, the Assignment Model, & Variants of assignment problems. Traveling Salesman Problem.

UNIT – III:
Replacement Model: Replacement of Capital Cost items when money’s worth is not considered, Replacement of Capital Cost items when money’s worth is considered, Group replacement of low-cost items.

UNIT – IV:

UNIT – V:
Queuing Theory and Simulation: Basic Elements of the Queuing Model, Poisson Arrivals and Exponential Service times; Different Queuing models with FCFS Queue discipline: Single service station and infinite population, Single service station and finite population, Multi service station models with infinite population. Simulation: Nature and Scope, Applications, Types of simulation, Role of Random Numbers, Inventory Example, Queuing Examples, Simulation Languages.
TEXTBOOKS:

REFERENCE BOOKS:
1. Introduction To Operations Research; Hillier/Lieberman / TMH, 2008.
UNIT- I

UNIT - II
Designing Organizational Structures: Departmentalization and Decentralization, Types of Organization structures – Line organization, Line and staff organization, functional organization, Committee organization, matrix organization, Virtual Organization, Cellular Organization, team structure, boundary less organization, inverted pyramid structure, lean and flat organization structure and their merits, demerits and suitability.

UNIT - III
Operations Management: Objectives- product design process- Process selection-Types of production system(Job, batch and Mass Production),Plant location-factors- Urban-Rural sites comparison- Types of Plant Layouts- Design of product layout- Line balancing(RPW method) Value analysis-Definition-types of values- Objectives- Phases of value analysis- Fast diagram

UNIT - IV:
Statistical Quality Control: variables-attributes, Shewart control charts for variables- chart, R chart, – Attributes- Defective-Defect- Charts for attributes-p-chart -c chart (simple Problems), Acceptance Sampling- Single sampling- Double sampling plans-OC curves.

UNIT - V

TEXT BOOKS

REFERENCE BOOKS
1. Motion and Time Study by Ralph M Barnes! John Willey & Sons Work Study by ILO.
2. Human factors in Engineering & Design/Ernest J McCormick /TMH.
3. Production & Operation Management/Paneer Selvam/PHI.
5. Industrial Engineering Hand Book/Maynard.
UNIT – I
Principles Of Solar Radiation: Role and potential of new and renewable source, the solar energy option, Environmental impact of solar power, physics of the sun, the solar constant, extraterrestrial and terrestrial solar radiation, solar radiation on tilted surface, instruments for measuring solar radiation and sun shine, solar radiation data.

UNIT-II
Solar Energy Collection: Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors.
Direct Energy Conversion: Need for DEC, Carnot cycle, limitations, principles of DEC. Thermoelectric generators, seebeck, peltier and jouli Thomson effects, Figure of merit, materials, applications, MHD generators, principles, dissociation and ionization, hall effect, magnetic flux, MHD accelerator, MHD Engine, power generation systems, electron gas dynamic conversion, economic aspects. Fuel cells, principles, faraday’s law’s, thermodynamic aspects, selection of fuels and operating conditions.

UNIT-III

UNIT-IV
Wind Energy: Sources and potentials, horizontal and vertical axis windmills, performance characteristics, Betz criteria.

UNIT-V
Geothermal Energy: Resources, types of wells, methods of harnessing the energy, potential in India.

TEXTBOOKS:
1. Non-Conventional Energy Sources /G.D. Rai
2. Renewable Energy Technologies /Ramesh & Kumar/Narosa

REFERENCE BOOKS:
1. Renewable energy resources/ Tiwari and Ghosal/Narosa.
4. Solar Energy/Sukhame
Prerequisites: None

Course Objective: To expose the students to different geological environments, which relate to petroleum industry

Course Outcome: The student would understand the basics of geology, viz: formation of earth, layers of earth, different types of rocks, formation of sedimentary basins and the micro fossils and their relationship to oil and gas.

UNIT - I
Dimensions of earth, structure, composition and origin of earth-envelops of the Earth- crust, mantle, core. Internal dynamic process- Plate tectonics- continental drift, Earthquake and volcanoes. External dynamic process- weathering, erosion and deposition.

UNIT - II
Fundamental concepts in Geomorphology-geomorphic processes distribution of landforms-drainage patterns –development, Landforms in relation to rocks types, paleochannels, buried channels.

UNIT - III
Geological work of rivers, wind, Ocean and glaciers and the landforms created by them.

UNIT - IV
Origin of igneous, sedimentary and metamorphic rocks. Sedimentary structures-petrographic character of conglomerate, sandstone, shale, limestones. Introduction to sedimentary basins and deltaic systems. Topographic maps, thematic maps, Topographic and thematic profiles.

UNIT - V

TEXT BOOK:

REFERENCE BOOKS:
MM600OE: TESTING OF MATERIALS

III B.Tech.(MME) II Semester

Course Objectives:
1. To gain and understanding of the response of various metals under the application of stress and/or temperature.
2. To build necessary theoretical background of the role of lattice defects in governing both elastic and plastic properties of metals will be discussed.
3. Obtain a working knowledge of various hardness testing machines BHN, VHN, RHN
4. Obtain a working knowledge of creep and fatigue and analysis of data.

Course Outcomes: At the end of the course the student will be able to:
1. Classify mechanical testing of ferrous and non-ferrous metals and alloys.
2. Recognize the importance of crystal defects including dislocations in plastic deformation.
3. Identify the testing methods for obtaining strength and hardness.
4. Examine the mechanisms of materials failure through fatigue and creep

UNIT I

UNIT II

UNIT III

UNIT IV
Creep and Stress Rupture: Introduction, The creep curve, Stress-rupture test, Structural changes during creep, Mechanism of creep deformation, theories of creep. Fracture at elevated temperature.

UNIT V
NDT: Principle, Operation, Advantages and Limitations of Liquid Penetrant, Magnetic Particle, Radiography and Ultrasonic tests.

TEXT BOOKS:
2. Mechanical behavior - Ed. Wulf.

REFERENCE BOOKS:
Course objectives:
1. Low carbon, Medium carbon and High carbon steels with respect to structure property
correlations and strengthening mechanisms with alloy additions
2. Ultra-high strength steels, Stainless steels and Tool steels with respect to heat treatment,
properties and applications.

Course Outcomes:
1. Ability to understand different types of alloys used in alloy steels.
2. Ability to solve different metallurgical problems in alloy steels.
3. It has a lot of scope in R&D and in automobile engineering.

UNIT I
Low-carbon Mild steels: Introduction; cold forming steels, High strength packing steels; HSLA steels;
Low-carbon Ferrite pearlite steels – structure property relationships, strengthening mechanisms,
Formability of HSLA steels.

UNIT II
Medium- High carbon ferrite-pearlite steels – structure property relationships, Bainitic steels; Low-
Carbon bainitic steels-requirements, development and choice of alloying elements, Mechanical
properties, microstructure and impact properties; High-Carbon bainitic steels.

UNIT III
Ultra-high strength steels: Introduction, steels tempered at low temperatures, secondary hardening,
thermo- mechanical treatments, rapid austenitizing treatments, structure-property relationships in
tempered martensite, cold-drawn pearlite steels, maraging steels.

UNIT IV
Stainless steels: Classification, Composition, Microstructures, Heat treatment an application.

UNIT V
Tool steels and Heat resistant steels: Classification, Composition, Micro structure an Heat treatment
and application.

TEXT BOOKS:

REFERENCE BOOKS:
2. Heat Treatment of steels – Rajan & Sharma
MN600OE: INTRODUCTION TO MINING TECHNOLOGY

III B.Tech. Mining. Engg. II-Semester

Pre-Requisites: NIL

Course Objectives:
The student is expected to learn the fundamentals of mining engineering so as to encourage multi-disciplinary research and application of other branches of engineering to mining technology.

Course Outcomes: Upon completion of the course, the student shall be able to understand various stages in the life of the mine, drilling, blasting and shaft sinking.

UNIT-I
Introduction: Distribution of mineral deposits in India and other countries, mining contributions to civilization, mining terminology.

UNIT-II
Stages in the life of the mine - prospecting, exploration, development, exploitation and reclamation. Access to mineral deposit- selection, location, size and shape (incline, shaft and adit), brief overview of underground and surface mining methods.

UNIT-III
Drilling: Types of drills, drilling methods, electric, pneumatic and hydraulic drills, drill steels and bits, drilling rigs, and jumbos.

UNIT-IV
Explosives: Classification, composition, properties and tests, fuses, detonators, blasting devices and accessories, substitutes for explosives, handling and storage, transportation of explosives.; Rock blasting: Mechanism of rock blasting, blasting procedure, and pattern of shot holes.

UNIT-V
Shaft sinking: Ordinary and special methods, problems, and precautions, shaft supports and lining.

TEXT BOOKS:

REFERENCE BOOKS:
MN601OE: COAL GASIFICATION, CBM & SHALE GAS

III B.Tech. Mining. Engg. II-Semester

Pre-Requisites: NIL

Course Objectives: To specialize the students with additional knowledge on geological and technological factors of coal gasification industry mining methods of underground coal gasification, linkage techniques etc.

Course Outcomes: Student can get specialized in the underground coal gasification concepts, application and future scope in various geomining conditions.

UNIT - I
Underground Coal Gasification (UCG) Concept; Chemistry, conditions suitable for UCG, Principles of UCG, Merits and Demerits.

UNIT - II
UCG Process Component factors: Technology of UCG, opening up of coal seam for UCG.

UNIT - III
Mining methods of UCG: Chamber method, Stream method, Borehole procedure method, Blind borehole method.

UNIT - IV
Non-Mining methods of UCG: Level seams, Inclined seams.

UNIT - V

TEXT BOOKS:
1. Underground Coal Mining Methods – J.G. SINGH

REFERENCE BOOK:
1. Principles and Practices of Modern Coal Mining – R.D. SINGH