JHARKHAND Rai University
UGC RECOGNISED UNIVERSITY
ACCREDITED BY NAAC

JHARKHAND RAI UNIVERSITY

MECHANICAL ENGINEERING

B.Tech

SYLLABUS 2018-2022

SEMESTER VIII

Kamre | Ratu Road | Ranchi | Jharkhand

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BATCH 2018-2022												
B.Tech in MECHANICAL ENGINEERING												
Choice Based Credit System												
SEMESTER VIII												
S.No.	**CATEGORY**	**CODE**	**COURSE TITLE**	**Periods**			**Evaluation Scheme**				**Subject Total**	**Credit**
				L	**T**	**P**	**Assignment**	**TA**	**Total**	**ESE**		
1	Professional Elective Courses		Professional Elective	3	0	0	20	10	30	70	100	3
2	Professional Elective Courses		Professional Elective	3	0	0	20	10	30	70	100	3
3	Open Elective Courses		Open Elective II	3	0	0	20	10	30	70	100	3
4	Open Elective Courses		Open Elective III	3	0	0	20	10	30	70	100	3
5	Humanities and Social Sciences including Management Courses	HSMC402	**Human Values & Ethics	2	0	0	20	10	30	70	100	0
PRACTICAL /SESSIONAL												
1	Project	7PROJME404	Project IV	0	0	12			150	50	200	6
									TOTAL		**700**	**18**

** NOTE: Qualifying Non Credit Course

Professional Elective (Select any two)						
Sl.No.	Code	Course Title	L	T	P	C
1	7PECMEL431	Principles of Management	3	0	0	3
2	7PECMEL432	Automobile Engineering	3	0	0	3
3	7PECMEL433	Design of Transmission Systems	3	0	0	3
4	7PECMEL434	Total Quality Management	3	0	0	3
5	7PECMEL435	Energy Conservation and Management	3	0	0	3

Subject Code	Subject	L	T	P	C
7PECMEL431	Principles of Management	3	0	0	3

Course Objectives:

- To understand the principles of management and their application to the functioning of an organization.
- To enable the students to study the evolution of Management.
- To study the functions and principles of management.
- To learn the application of the principles in an organization.
- To enable the effective and barriers communication in the organization.
- To study the system and process of effective controlling in the organization.

Detail Contents:

Module I

Definition of management, science or art, manager vs. entrepreneur; Types of managers-managerial roles and skills; Evolution of management- scientific, human relations, system and contingency approaches; Types of Business Organizations, sole proprietorship, partnership, company, public and private enterprises; Organization culture and environment; Current trends and issues in management.

Module II

Nature and purpose of Planning, types of Planning, objectives, setting objectives, policies, Strategic Management, Planning Tools and Techniques, Decision making steps & processes.

Module III

Nature and purpose of Organizing, formal and informal organization, organization structure, types, line and staff authority, departmentalization, delegation of authority, centralization and decentralization, job design, human resource management, HR planning, Recruitment selection, Training & Development, Performance Management, Career planning and Management.

Directing, individual and group behavior, motivation, motivation theories, motivational techniques, job satisfaction, job enrichment, leadership, types & theories of leadership, effective communication.

Module IV

Controlling, system and process of controlling, budgetary and non-budgetary control techniques, use of computers and IT in management control, productivity problems and management, control and performance, direct and preventive control, reporting.

Course Outcomes:

Upon completion of this course,

- The students will get a clear understanding of management functions in an organization.
- The students will get a clear understanding of management functions in an organization.
- Students will be able to have clear understanding of managerial functions like planning, and have same basic knowledge on international aspect of management.
- To understand the planning process in the organization.
- To understand the concept of organization.
- Demonstrate the ability to directing, leadership and communicate effectively.
- To analysis isolate issues and formulate best control methods.

Text Books:

1. Robins S.P. and Couiter M., Management, Prentice Hall India, 10th ed., 2009.
2. Stoner JAF, Freeman RE and Gilbert DR, Management, 6th ed., Pearson Education, 2004.
3. Tripathy PC & Reddy PN, Principles of Management, Tata McGraw Hill, 1999.

Subject Code	Subject	L	T	P	C
7PECMEL432	Automobile Engineering	3	0	0	3

Course Objectives:

- To understand the construction and working principle of various parts of an automobile.
- To make the student conversant with fundamentals of automobile systems.
- To develop competencies in performance analysis of vehicles.
- To make the student conversant with automobile safety, electrical system and vehicle maintenance.
- To understand the emerging trends of electric vehicles, hybrid electric vehicles and solar vehicles.

Detail Contents:

Module I

Types of automobiles, vehicle construction and layouts, chassis, frame and body, vehicle aerodynamics, IC engines-components, function and materials, variable valve timing (VVT). Engine auxiliary systems, electronic injection for SI and CI engines, Module injector system, rotary distributor type and common rail direct injection system, transistor based coil ignition & capacitive discharge ignition systems, turbo chargers (WGT, VGT), engine emission control by 3-way catalytic converter system, Emission norms (Euro & BS).

Module II

Transmission systems, clutch types & construction, gear boxes- manual and automatic gear shift mechanisms, over drive, transfer box, flywheel, torque converter, propeller shaft, slip joints, universal joints, differential and rear axle, Hotchkiss drive and Torque tube drive.

Module III

Steering geometry and types of steering gear box, power steering, types of front axle, and types of suspension systems, pneumatic and hydraulic braking systems, antilock braking system (ABS), electronic brake force distribution (EBD) and traction control.

Module IV

Alternative energy sources, natural gas, LPG, biodiesel, bio-ethanol, gasohol and hydrogen fuels in automobiles, modifications needed, performance, combustion & emission characteristics of alternative fuels in SI and CI engines, Electric and Hybrid vehicles, application of Fuel Cells

Course Outcomes:

Upon completion of this course, students will understand

- The function of each automobile component and also have a clear idea about the overall vehicle performance.
- Clear idea about the overall vehicle performance.
- Identify the different parts of the automobile.
- Explain the working of various parts like engine, transmission, clutch, brake.
- Describe how the steering and the suspension systems operate.
- Understand the environmental implications of automobile emissions.
- Develop a strong base for understanding future developments in the automobile industry

Text books:

1) Kirpal Singh, Automobile Engineering, 7th ed., Standard Publishers, New Delhi, 1997.
2) Jain K.K. and Asthana R.B., Automobile Engineering, Tata McGraw Hill, New Delhi, 2002.
3) Heitner J., Automotive Mechanics, 2nd ed., East-West Press, 1999.
4) Heisler H., Advanced Engine Technology, SAE International Publ., USA, 1998.

Subject Code	Subject	L	T	P	C
7PECMEL433	Design of Transmission Systems	3	0	0	3

Course Objectives:

- To learn about the design procedures for mechanical power transmission components.
- To gain knowledge on the principles and procedure for the design of Mechanical power Transmission components.
- To understand the standard procedure available for Design of Transmission of Mechanical elements.

Detail Contents:

Module I

Flexible transmission elements- design of flat belts & pulleys, selection of V-belts and pulleys, selection of hoisting wire ropes and pulleys, design of chains and sprockets

Gear transmission- speed ratios and number of teeth, force analysis, tooth stresses, dynamic effects, fatigue strength, factor safety, gear materials; Design of straight tooth spur gear and parallel axis helical gears based on strength and wear considerations, pressure angle in the normal and transverse plane; equivalent number of teeth and forces for helical gears.

Module II

Straight bevel gear- tooth terminology, tooth forces and stresses, equivalent number of teeth. Estimating the dimensions of a pair of straight bevel gears; Worm gear, merits & demerits, terminology, thermal capacity, materials, forces & stresses, efficiency, estimating the size of worm gear pair. Cross helical gears, terminology, helix angles, sizing of a pair of helical gears.

Module III

Gear box- geometric progression, standard step ratio; Ray diagram, kinematics layout; Design of sliding mesh gear box- Design of multi-seed gear box for machine tool applications; constant mesh gear box, speed reducer Module; Variable speed gear box; Fluid couplings, Torque converters for automotive applications.

Module IV

Cam design, types: pressure angle and undercutting base circle determination, forces and surface stresses; Design of plate clutches, axial clutches, cone clutches, internal expanding rim clutches; Electromagnetic clutches; Band and Block brakes, external shoe brakes, internal expanding shoe brake.

Course Outcomes:

Upon completing this course

- The students will be able to design transmission systems for engines and machines.
- Design belt drives (flat belt, V-belt), chain drives, rope drives, belt drive pulleys & chain sprockets.
- Design spurs and straight helical gears based on strength and wear consideration.
- Design various cams, clutches, internal and external shoe brakes using basic knowledge acquired from earlier studies.
- Design straight bevel gear, worm gear pair and cross helical gear.

Text Books:

1. Shigley J., Mischke C., Budynas R. and Nisbett K., Mechanical Engineering Design, 8th ed., Tata McGraw Hill, 2010.
2. Jindal U.C., Machine Design: Design of Transmission System, Dorling Kindersley, 2010.
3. Maitra G. and Prasad L., Handbook of Mechanical Design, 2nd ed., Tata McGraw Hill, 2001.

Subject Code	Subject	L	T	P	C
7PECMEL434	Total Quality Management	3	0	0	3

Course Objectives:

- To facilitate the understanding of total quality management principles and processes.
- To understand the concept of Quality.
- To understand the Implication of Quality on Business.
- To Implement Quality Implementation Programs.
- To have exposure to challenges in Quality Improvement Programs.

Detail Contents:

Module I

Introduction, need for quality, evolution of quality; Definitions of quality, product quality and service quality; Basic concepts of TQM, TQM framework, contributions of Deming, Juran and Crosby. Barriers to TQM; Quality statements, customer focus, customer orientation & satisfaction, customer complaints, customer retention; costs to quality.

Module II

TQM principles; leadership, strategic quality planning; Quality councils- employee involvement, motivation; Empowerment; Team and Teamwork; Quality circles, recognition and reward, performance appraisal; Continuous process improvement; PDCE cycle, 5S, Kaizen; Supplier partnership, Partnering, Supplier rating & selection.

Module III

The seven traditional tools of quality; New management tools; Six sigma- concepts, methodology, applications to manufacturing, service sector including IT, Bench marking process; FMEA- stages, types.

Module IV

TQM tools and techniques, control charts, process capability, concepts of six sigma, Quality Function Development (QFD), Taguchi quality loss function; TPM- concepts, improvement needs, performance measures.

Quality systems, need for ISO 9000, ISO 9001-9008; Quality system- elements, documentation, Quality auditing, QS 9000, ISO 14000- concepts, requirements and benefits; TQM implementation in manufacturing and service sectors.

Course Outcomes:

Upon completion of this course,

- The students will be able to use the tools and techniques of TQM in manufacturing and service sectors.
- Given a product or a service type, the student manager will be able to enumerate and justify the dimensions of product quality or service quality for the same.
- For a given type of organization, the student manager will be able to enlist and justify the four levels of benchmarking and/ or enlist and brief seven step benchmarking model.
- Given the phase of manufacturing (design/ manufacturing/ assembly/ finished product/ service), the student manager will be able to identify potential failure modes and justify the calculation of RPN through 15 steps of FMEA procedure.
- The student manager will be able to explain the concept of Six Sigma its DMAIC process.
- Assess the implementation of ISO 9000/9001-2008/14000 for given manufacturing,

service sector.

Text Books:

1. Besterfield D.H. et al., Total quality Management, 3rd ed., Pearson Education Asia, 2006.
2. Evans J.R. and Lindsay W.M., The management and Control of Quality, 8th ed., first Indian edition, Cengage Learning, 2012.
3. Janakiraman B. and Gopal R.K., Total Quality Management, Prentice Hall India, 2006.
4. Suganthi L. and Samuel A., Total Quality Management, Prentice Hall India, 2006.

Subject Code	Subject	L	T	P	C
7PECMEL435	Energy Conservation and Management	3	0	0	3

Course Objectives:

- To understand the energy data from industries and carry out energy audit for energy savings.
- To facilitate the students to achieve a clear conceptual understanding of technical and commercial aspects of energy conservation and energy auditing.
- To enable the students to develop managerial skills to assess feasibility of alternative approaches and drive strategies regarding energy conservation and energy auditing.

Detail Contents:

Module I

Introduction to energy & power scenario of world, National Energy consumption data, and environmental aspects associated with energy utilization; Energy Auditing- need, types, methodology and barriers, role of energy managers, instruments of energy auditing.

Module II

Components of EB billing, HT and LT supply, transformers, cable sizing; Concept of capacitors, power factor improvement, harmonics; Electric motors- motor efficiency computation, energy efficient motors; Illumination- Lux, Lumens, types of lighting, efficacy, LED lighting and scope of energy conservation in lighting.

Module III

Thermal systems, Boilers, Furnaces and Thermic Fluid heaters- efficiency computation and energy conservation measures; Steam distribution and usage, steam traps, condensate recovery, flash steam utilization; Insulation & Refractories.

Module IV

Energy conservation in major utilities; pumps, fans, blowers, compressed air systems, Refrigeration& Air Conditioning systems, Cooling Towers, DG sets.

Energy Economics- discount period, payback period, internal rate of return, net present value; Life Cycle costing- ESCO concept.

Course Outcomes:

Upon completion of this course,

- The students will be able to perform of energy auditing for the energy consumption of industries.
- Conceptual knowledge of the technology, economics and regulation related issues associated with energy conservation and energy auditing.
- Ability to analyse the viability of energy conservation projects.
- Capability to integrate various options and assess the business and policy environment regarding energy conservation and energy auditing.
- Advocacy of strategic and policy recommendations on energy conservation and energy auditing.

Text Books:

1. Witte L.C., Schmidt P.S. and Brown D.R., Industrial Energy Management and Utilization, Hemisphere Publ., Washington, 1988.
2. Callaghn P.W., Design and Management for Energy Conservation, Pergamon Press, Oxford, 1981.
3. Murphy W.R. and McKay G., Energy Management, Butterworths, London, 1987.
4. Energy Manager Training Manual, Bureau of Energy Efficiency (BEE) under Ministry of Power, GOI, 2004 (available at www.energymanager training.com).

Subject Code	Subject	L	T	P	C
HSMC402	**Human Values & Ethics	2	0	0	0

The objectives of the course are:

To provide a critical perspective on the socialization of human beings.

- To introduce students about some key aspects of Indian culture and ethics.
- To help students reflect critically on gender violence.
- To expose the students to more egalitarian interactions between men and women.
- To develop students sensibility with regard to issues of gender in contemporary India.
- To understand the moral values that ought to guide the Management profession.
- To justify the moral judgment concerning the profession.
- Intended to develop a set of beliefs, attitudes, and habits that engineers should display concerning morality.
- To create an awareness on Management Ethics and Human Values.
- To inspire Moral and Social Values and Loyalty.

1. **VALUE CRISIS IN CONTEMPORARY INDIAN SOCIETY**
   - 1.1 Value Crisis at the Individual Level
   - 1.2 Societal Level
   - 1.3 Intellectual Level
   - 1.4 Cultural Level
   - 1.5 Value – What are they?
   - 1.6 The Indian Concept of Values.
   - 1.7 Modern Approach to the Study of Values.
   - 1.8 Aesthetic Sensibilities

2. **MORAL AND ETHICAL HUMAN VALUES**
   - 2.1 Bases for Moral Judgment
   - 2.2 Some Canons of Ethics.
   - 2.3 Virtue Ethics.
   - 2.4 Ethics of Duty.
   - 2.5 Ethics of Responsibility
   - 2.6 Factors to be considered in Making Ethical Judgments.
   - 2.7 Different Meanings of Human Values
   - 2.8 A New Approach to Human Value ,Freedom, Creativity Love &Wisdom

3. **MORAL VALUES IN PROFESSION**
   - 3.1 What is a Profession?
   - 3.2 Professional Ethos
   - 3.3 Code of Professional Ethics
   - 3.4 Practicing the Code

3.5 Corporate Social Responsibility
3.6 The Larger Domain of Human Values
3.7 Institutionalizing Ethics and Human Values

4. GENDER SENSITIZATION

4.1 Socialization of women
4.2 Just Relationships, being together as equals
4.3 Declining sex ratio, demographic consequences
4.4 Women's work, its politics and economics, fact and fiction, unrecognized and unaccounted work
4.5 Domestic violence, eve teasing and harassment. Is home a safe place?

Course Outcome:

At the end of the course learners will be able to:

- To attain a finer grasp of how gender discrimination works in our society and how to counter it.
- Understand the ideas of values, ethics, and morality in a multicultural context.
- Understand how universal values can be uncovered by different means, including scientific investigation, historical research, or public debate and deliberation (what some philosophers call a dialectic method)
- Understand and discuss the idea of moral relativism and the challenges it poses to universal values
- Critically assess the relationship between theory and practice in the formulation of values.
- Understand that values arise from lived experiences, but need to be justified to others.
- Understand the role of deliberation and debate in framing such values.
- Understand how to create an actionable document through such a process.
- Understand the importance of human solidarity and dignity.

Suggested Texts:

- Dr. Rajan Mishra, Human Values: Laxmi Publications Pvt. Ltd.
- S. Dinesh Babu, Professional Ethics and Human Values; Laxmi Publications Pvt. Ltd.
- P.S. Rathore. Business Ethics And Communication; S.Chand Publishing
- Dr. K.Alex. Managerial Skills; S. Chand Publishing.
- Dr. M. Adithan, Study Skills For Professional Students For Higher Education , S.Chand Publishing
- Govindarajan M "Professional Ethics and Human Values."
- R.R. Gaur and R. Sangal " A Foundation Course in Human Values and Professional Ethics"

Websites:

- www.tatamcgrawhill.com/digital Solutions/ monopoly
- www.schandedutech.com
- www.laxmipublications.com

Subject Code	Subject	L	T	P	C
7PROJME404	Project IV	0	0	12	6

Objectives:

It is intended to start the project work early in the seventh semester and carry out both design and fabrication of a mechanical device whose working can be demonstrated. The design is expected to be completed in the seventh semester and the fabrication and demonstration will be carried out in the eighth semester.

OPEN ELECTIVE II						
Select Anyone						
Subject Code	**Subject Name**	**L**	**P**	**T**	**Credit**	**Semester**
5A.454	Advance Disaster Management	3	0	0	3	VIII
9.474	Entrepreneurship	3	0	0	3	VIII
11.652	Environmental Management	3	0	0	3	VIII
OPEN ELECTIVE III						
Select Anyone						
Subject Code	**Subject Name**	**L**	**P**	**T**	**Credit**	**Semester**
11.556	Research Methodology	3	0	0	3	VIII
11.553	Marketing Management	3	0	0	3	VIII
11.651	Entrepreneurship & Small Business Management	3	0	0	3	VIII
11.671.2	Project Planning Analysis & Management	3	0	0	3	VIII
13A.357	Renewable Energy & Green Technology	3	0	0	3	VIII
13A.131	Soil & Water Conservation Technology	3	0	0	3	VIII
7.401	Operation Research & Techniques	3	0	0	3	VIII

Subject Code	Subject	L	T	P	C
5A.454	**Advance Disaster Management**	3	0	0	3

Program: B.Tech
Semester: VIII
Course: Advance Disaster Management
Course Code: 5A.454

Course Objective:

- Affirm the usefulness of integrating management principles in disaster mitigation work.
- Distinguish between the different approaches needed to manage pre- during and post- disaster periods.
- Understand the process of risk management.
- Relate to risk transfer.

Module I

Introduction: Types of disasters, Natural hazards and disasters Disaster Risk Reduction and Phases of Disaster Management Mitigation, preparedness, response, recovery, rehabilitation, common Moduley capacity building, Disaster risk reduction by education, information and public awareness, role of government in Disaster management.

Module II

Earthquake: Structure of earth, plate tectonics, causes of earthquake, epicenter, hypocenter, magnitude and intensity, iso-seismals, different types of earthquake waves, seismic zoning of India, structural form and earthquake resistance, plan and shape of buildings, soft stories, slenderness limitations, strong column-weak beam theory, base isolation – different techniques, soil response to earthquake, site selection, liquefaction – its causes and remedial Measures, retrofitting of structures, use of IS codes.

Module III

Tsunami and Cyclone, Tsunami, The process of triggering waves, dynamics of tsunami waves, management of tsunami disaster, Cyclone major location of occurrence, intensity of classification, cyclone resistant design, management and mitigation.

Flood and Drought

Flood, types of flood, effects of flood, flood defenses and management.

Drought, concept of drought, consequences of drought, drought profile, management and risk reduction, lessons on mitigation.

Module IV

Landslide: Causes of landslide, signs and early warning systems of landslides, means of mitigation Fire Terminologies, fire resistance, fire endurance, fire detection and alarms, properties of different Material at elevated temperatures, mitigation measures.

Course Outcomes:

On completion of this course, the students will be able to exhibit

- Understanding foundations of hazards, disasters and associated natural/social phenomena.
- Familiarity with disaster management theory (cycle, phases).
- Knowledge about existing global frameworks and existing agreements (e.g. Sendai).
- Methods of community involvement as an essential part of successful DRR.

- Humanitarian Assistance before and after disaster.
- Technological innovations in Disaster Risk Reduction: Advantages and problems.
- Experience on conducting independent DM study including data search, analysis and presentation of disaster case study.
- Respond to disaster risk reduction initiatives and disasters in an effective, humane and sustainable manner.
- Upon completion of this course, the students will be able to understand application and use of GIS.

Suggested Reading:

1. *Disaster Management- J. P. Singhal, Laxmi Publications.*
2. *Disaster Management - Dr. Mrinalini Pandey, Wiley India Pvt. Ltd.*
3. *Disaster Science and Management- Tushar Bhattacharya, McGraw Hill Education (India) Pvt. Ltd.*
4. *Disaster Management: Future Challenges and Opportunities - Jagbir Singh, K W Publishers Pvt. Ltd.*

Subject Code	Subject	L	T	P	C
11.652	Environmental Management	3	0	0	3

Program: B.Tech
Semester: Eight
Course: Environmental Management
Course Code: 11.652

Course objective:

- Provide definitions of environment, management, systems and organizations in relation to environmental management.
- Describe organizations as systems and their role in environmental management.
- Understand the usefulness of systems thinking in relation to environmental management in organizations.
- Explain how environmental management can be used as environmental protection and how organizations can define and manage risk.

Module-I: -

Introduction to Environmental Studies: Self, Society, and Environment, Preservation vs. Conservation, Fundamental Causes of Environmental Problems, Opposing Values and Viewpoints on the Environment, Literature and the Environment

Module II:

Social Issues in Environment:- From unstable to sustainable Development urban Problem related to energy, Resettlement & Rehabilitation of people, Environment ethics , Consumerism, Environment Protection Act, Climate change, global warming, acid rain, ozone-layer depletion & nuclear accidents, Air Act, Waters Act, wild life protection Act, Issues involved in enforcement of environmental legislation for public Awareness.

Module III:

Environmental Ethics: Basic Facts and Environmental Ethics, Values, Science, and Environmental Ethics, Understanding Normative and Non-Normative Ethics,

Module IV:

Environmental Management: Introduction to Public Policy, Environmental Policy/Politics, International Environmental Law, and International Environmental Politics. Environmental Policy of the Government of India and the working of the Ministry of Environment and Forests, Central Pollution Control Board, State Pollution Control Boards. Annual Report of the Ministry of Environment and Forests.

Suggested Readings:-

1. William Dudley: The Environment: Opposing Viewpoints. Opposing Viewpoints Series. Greenhaven Press, 2001.
2. George S. Howard: How Should I Live My Life? Psychology, Environmental Science, and Moral Traditions. Rowman & Littlefield, 2002.
3. David Schmidtz and Elizabeth Willott: Environmental Ethics: What Really Matters, What Really Works. New York: Oxford University Press, 2002.
4. Susan Armstrong and Richard Botzler: Environmental Ethics: Divergence and Convergence (Second Edition).

Subject Code	Subject	L	T	P	C
11.556	Research Methodology	3	0	0	3

Program: B.Tech.
Semester: VIII
Course: Research Methodology
Subject Code: 11.556

Course Objective:

- To identify the overall process of designing a research study from its inception to its report. Students should be familiar with ethical issues in educational research, including those issues that arise in using quantitative and qualitative research.
- To assess critically the following methods: literature study, case study, structured surveys, interviews, focus groups, participatory approaches.
- To understand some basic concepts of research and its methodologies.
- To identify appropriate research topics.
- To select and define appropriate research problem and parameters.
- To prepare a project proposal (to undertake a project).
- To organize and conduct research (advanced project) in a more appropriate manner.
- To write a research report and thesis.
- To write a research proposal (grants)

Module I

Research Methodology: definition, objectives, role, scope in management research, process of Research, limitations & types

Research Design: Formulating the Research Problem, Choice of Research Design, Types of Research Design, and Sources of Experimental Errors.

Module II

Sampling: Advantages and Limitation of Sampling, Sampling process, Types of Sampling: Non probability, sampling techniques, Probability sampling techniques, Sampling and non-sampling errors.

Data collection: primary, secondary data collection, observation methods and survey method.

Module III

Measurement Concept, Levels of measurement—Nominal, Ordinal, Interval and Ratio Attitude Measurement: Comparative scaling techniques, Non-comparative scaling techniques, comparison, rank order, constant sum, semantic differential, itemized ratings, Likert Scale; Questionnaire-form & design. Questionnaire Designing: Types, Guidelines for developing a good questionnaire

Module IV

Data Preparation and Analysis: Editing, Coding, Cross Tabulation and Practices through Excel (Basic Concepts), Hypothesis testing, parametric test, Non parametric test. Central tendency, mean, median, mode, time series analysis, correlation analysis, regression analysis

Report Writing: Types of Research Reports, Guidelines for Writing a Report, Report Format, Guidelines for evaluating a report.

Course Outcomes:

On completion of this course, the students will be able to exhibit

- Students should understand a general definition of research design.
- Students should know why educational research is undertaken, and the audiences that profit from research studies.
- Students should be able to identify the overall process of designing a research study from its inception to its report.
- Students should be familiar with ethical issues in educational research, including those issues that arise in using quantitative and qualitative research.
- Students should know the primary characteristics of quantitative research and qualitative research.
- Students should be able to identify a research problem stated in a study.
- Students should be familiar with how to write a good introduction to an educational research study and the components that comprise such an introduction.

Suggested Reading:

1. Research Methodology C.R. Kothari
2. Research Methodology K.V. Rao
3. Research Methodology- PanneerSelvam, (Prentice Hall of India, Edition 2008)
4. Research Method for Behavioural Sciences – Gravetter. Fedrick,(Cengage Learning)
5. Marketing Research - Beri G.C ,(Tata McGraw Hill, 4th Edition)

Subject Code	Subject	L	T	P	C
11.553	Marketing Management	3	0	0	3

Program: B.Tech.
Semester: VIII
Course: Marketing Management
Subject Code: 11.553

Course Objective:

- To provide an understanding of the Conceptual framework, covering basic components of the marketing mix; Globalization of marketing for organizational growth;
- It will helpful in Manage the resources and processes in effective manner in the organization.
- Apply knowledge of 4ps concepts in an integrated manner.
- It will helpful in analyzing an organization's activities to develop/implement a marketing strategy.

Module I

Marketing: Nature and scope of marketing, Consumer need, want & demand, Concepts of traditional and modern marketing, Various Marketing Concepts: production, product, selling, marketing and societal marketing, marketing environment-marketing and its environment. Consumer Buying Behavior: Factors affecting buying behavior.

Module II

Market segmentation: Nature, basis & strategies. Marketing mix: Introduction & factors affecting. Product decisions: Product definition, new product development process, product life cycle, positioning, branding & packaging decisions.

Module III

Pricing decision: Importance, objectives & strategies. Product promotion: Promotion mix & factors affecting it. Distribution: Channel decisions, types & factors, physical distribution system & its components. Marketing of services: Introducing services, characteristics, services marketing mix, successful marketing of service, mastering service quality.

Module IV

Promotion: Promotion Mix, Push vs. Pull Strategy; Promotional Objectives, Advertising- Meaning and Importance, Types, Media Decisions, Promotion Mix, Personal Selling- Nature, Importance and Process, Sales Promotion – Purpose and Types; Publicity and Public Relations- Definition, Importance and Methods.

Suggested Reading:

1. Principles of Marketing- A South Asian Perspective, Kotler Philip, Armstrong Graw, Prafulla Y. Agnihotri and Haque, (2010), 13th edition, Pearson Education.
2. Marketing Management Global Perspective Ramaswamy and Namkumar, S. (2009), Indian Context, McMillan, Delhi.
3. Marketing Management, Saxena, Rajan. (2008), 3rd edition, McGraw Hill Education.
4. Marketing Management, Kumar, Arun and Meenakshi. N, (2009), Vikas Publishing House.

Subject Code	Subject	L	T	P	C
11.651	Entrepreneurship and Small Business Management	3	0	0	3

Program: B.Tech
Semester: VIII
Course: Entrepreneurship and Small Business Management
Course Code: 11.651

Course objective:

- Understand the actions taken to acquire and retain customers; produce goods and services; and measure/track financial performance.
- Understand the leadership skills and personal characteristics needed to succeed in starting and managing a small business.
- Research, develop and implement a business plan.
- Analyze financial statements to determine strengths or weaknesses of an existing business.
- Understand the basic principles of small business marketing

Module I

Entrepreneurship :Concept , Need, Definition& role of Entrepreneurship ,Definition, characteristics& scope of Entrepreneur, Innovation, Invention, Creativity, Opport Moduleies.
Concepts of Entrepreneur, Manager, Entrepreneur/Corporate Entrepreneur– comparative study, Roles& Responsibilities. Role of entrepreneur in Indian economy, Entrepreneurship as a career, Sustaining Competitiveness - Maintaining competitive advantage, Entrepreneurial culture. Reasons for the failure of entrepreneurial ventures, various case studies-successful, failed and turnaround ventures.

Module II

Information: assistance from different organizations in setting up a new venture, technology parks, industrial corporations, directorate of industries / cottage and small scale.

Module III

Laws: liabilities under the Factories Act, Shops & Establishment Act, Industrial Employment (Standing Orders) Act, Environment Protection Act, maintenance & submission of statutory records & returns, understanding labour – management relationship, Preparation of Project Report: product/ service selection, economic viability and market feasibility, projected financial state

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Module IV

International Entrepreneurship Support Moduleies: The nature of international entrepreneurship, Importance of international business to the firm, International versus domestics' entrepreneurship, Stages of economic development. Institutional support for new ventures: Supporting Organizations; Incentives and facilities; Financial Institutions and Small scale Industries, Govt. Policies for SSIs.
Case Studies: diagnostic case studies of successful / unsuccessful entrepreneurs.

Suggested Reading:

1. Creativity in Organizations- Nina Jacob, (Wheeler, 1998)

2. Entrepreneurship Development in India- C B Gupta & Srinivasan, Sultan Chand

Subject Code	Subject	L	T	P	C
11.671.2	**Project Planning analysis and Management**	3	0	0	3

Program: B.Tech.
Semester: VIII
Course: Project Planning analysis and Management
Course Code: 11.671.2

Course Objective:

- **To describe a project life cycle and can skillfully map each stage in the cycle.**
- **They will identify the resources needed for each stage, including involved stakeholders, tools and supplementary materials.**
- **The Students will describe the time needed to successfully complete a project, considering factors such as task dependencies and task lengths.**

Module I
Project: definition, characteristics, types, project life cycle, identification of projects. Project management: Meaning and scope. Project appraisal methods.

Module II
Technical appraisal: meaning, need factors considered in technical appraisal. Market appraisal: market survey for forecasting future demand and sales; concepts, terms and techniques involved in it. Financial appraisal: estimated funds required, sources of funds, profitability analysis.

Module III
Capital budgeting techniques, guidelines for preparation of project report. Social Cost Benefit Analysis- meaning, rationale, social appraisal of projects in developing counties with special reference to India. Project scheduling & control, network analysis. Gantt charts PERT & CPM

Module IV
Investment Feasibility Studies: managing Project Resources Flow, Project Feasibility studies, Project Cost – Capital & Operating, Forecasting Income, Estimation of Investment & ROI, Project Evaluation, Financial Sources, Appraisal Process, Issues in Project Management: Project Audit, Project Monitoring & MIS, Cost Control, Real Time Planning

Suggested Reading:

Planning Analysis: Selection Implementation & Review, P Chandra: Tata McGraw Hill.
Text Book of Project Management, P Gopalkrishnan& V E Ramamoorthy : McMillan
Project Management & Control, N. Singh, and Himalaya publishing house
Project Management, V Desai, Tata- McGraw Hill
Project Management M Patel, Vikas publication
Computer Aided Project Mgmt, Suhani, OUP pub.

Subject Code	Subject	L	T	P	C
13A.357	Renewable Energy & Green Technology	3	0	0	3

Program: B.Tech
Semester: VIII
Course: Renewable Energy & Green Technology
Course Code: 13A.357

Module I:

Energy sources, Introduction, Classification, Energy from Biomass, Types of biogas plants, constructional details, Biogas production and its utilization.

Module II:

Agricultural wastes, Principles of combustion, pyrolysis and gasification, Types of gasifiers, Producer gas and its utilization. Briquettes, Types of Briquetting machines, uses of Briquettes, Shredders.

Module III:

Solar energy, Solar flat plate and focusing plate collectors, Solar air heaters, Solar space heating and cooling, Solar energy applications / Solar energy gadgets, Solar cookers, Solar water heating systems, solar grain dryers, Solar Refrigeration system, Solar ponds, Solar photo voltaic systems, solar lantern, Solar street lights, solar fencing, Solar pumping systems.

Module IV:

Wind energy, Types of wind mills, Constructional details & application of wind mills. Liquid Bio fuels, Bio diesel and Ethanol from agricultural produce, its production & uses.

Suggested Reading:

1. Non Conventional Energy Sources – G.D. Raj
2. Energy Technology (Nonconventional, Renewable and Conventional) – S.Rao, Dr. B.B. Parulekar
3. Non Conventonal Energy Resources – D.S. Chauhan, S.K.Srivastava
4. Fundamentals of Renewable Energy Sources – G.N. Tiwari and M.K. Chosal

Subject Code	Subject	L	T	P	C
13 A.131	**Soil, Water and Conservation Technology**	3	0	0	3

Program: B Tech
Semester: VIII
Course: Soil, Water and Conservation Technology
Course Code: 13 A.131

Module I:

Definition of soil, Components of soil and their role in agriculture. Soil forming rocks and minerals. Development of soil profile, soil formation, factors affecting soil formation, soil forming processes. Soil reaction and its measurement and significance.

Module II:

Chemistry of clay minerals with special reference to kaolinite. Montmorillonite and little. Physical properties of soil and their significance. Chemicals properties of soil. cation and anion exchange phenomenon and their importance in agriculture.

Module III:

Soil organic matter, humus formation and its importance in soil fertility .management and maintenance of organic matter in soil. Soil of Jharkhand .Classification .distribution and characteristics. Elementary idea of soil of India - occurrence. Characteristics. Physicochemical properties of chernozems, pozol and laterite soil .Basic idea of comprehensive system (7t approximation) of soil Classification Occurrence, distribution and function of soil Micro –organism.

Module IV:

Biological Nitrogen Fixation (symbiotic and Non-symbiotic). Nitrification. Microbial decomposition of or organic matter in soil, Role and use of Bio fertilizers in crop Production. Classification and use of Insecticide. Fungicides and herbicides e.g. BNC, DDI Malathion & 2.4.D

Suggested Reading:

1. Land and Water Management Engineering. 1982. Murthy V.V.N. Kalyani Pubhliers, New Delhi.
2. Irrigation: Theory and Practices.1989. Michael A.M. Vikas Publishing House Pvt. Ltd., New Delhi.
3. Principles of Agricultural. Engineering. Vol. II. 1993. Michael A.M. and T.P. Ojha. Jain Brothers, New Delhi.

L	T	P	C
3	0	0	3

Program: B.Tech
Semester: VIII
Course: Operation Research Technique
Course Code: 7.401

Course Objective:

- To motivate the students for creative writing
- To familiarize them with literary Forms and Figures of speech
- To expose them to the attractions and the challenges involved in creative writing

Module I
Introduction: Introduction to OR modeling approach and various real life situations. Linear programming problems: Some problems on Simplex Method, Duality theory, Revised Simplex.

Module II
Network Optimization Models: - The shortest path Problem, Minimum Spanning Tree Algorithm, Maximal Flow Algorithm, PERT/CPM. Integer Programming: - Branch and Bound Method, Gomory's Cutting plane method.

Module III
Dynamic programming: Modeling, Optimization, Replacement. Sequencing: - Sequencing decision problems for *n* jobs on two machines, n jobs on three Machines and *n* jobs on *n* machines.

Module IV
Game Theory: - Two person Zero Sum game, saddle point determination, Solution of (2´2) games without saddle point, Graphical method for solution of (2 ´ *n*) and (n ´ 2) games, Dominance Property.
Queuing Theory: - Basic structure, Exponential distribution, Birth-and-death Model, M/M/I Queue.

Suggested Reading:

Operation Research - *KantiSwaroop*
Operation Research - *PaneerSelvan, PHI*
Operation Research - *A.M.Natrajan*
Operation Research -*S.D.Sharma*
Operation Research - *R.K.Gupta*
Operation Resaerch - *Hillier andLieberman*

Subject Code	Subject	L	T	P	C
7OEC402	Entrepreneurship	3	0	0	3

Course Objective

- Build confidence to become a good manager.
- To understand the various types of MSME.
- To understand the intellectual property.
- To understand the various types of trademark.

Module I

Concept Of entrepreneurship:

Entrepreneurship and small scale industry need for promotion of entrepreneurship, entrepreneurship development programmers' (EDP), personality characteristics of entrepreneur. Identification of; Investment opportunities

Governmental regulatory framework, industrial policy, industrial development and regulation act, regulation of foreign collaboration and investment, foreign exchange regulation act, incentives for export oriented units, incentives for units in industrially backward areas, incentives for small scale industry, government assistance to SSI, how to start and SSI, list of items reserved for SSI, Scouting for project ideas, preliminary screening, project identification for an existing company.

Module II

Market and demand analysis:

Information required for market and demand analysis, market survey, demand for casting, uncertainties demand forecasting.

Module III

Cost of project and means of financing:

Cost of project, means of financing, planning the capital structure of a new company, term loan financial institutions, cost of production.

Module IV

Financial Management:

Concept and definition of financial management types of capital, of finance, reserve and surplus, concepts and liabilities, profit and loss statement balance sheet, depreciation, methods of calculating depreciation break even analysis.

Suggested Reading:

1. E.D.I. Ahmadabad, Publication regarding Entrepreneurship.
2. Project Preparation, Appraisal Budgeting and Implementation, Prasannachandra, TMH.
3. Entrepreneurship, TTTI. Entrepreneurial Development, C.S.Gupta & N.P.Srinivasan.
4. Entrepreneurship Development Practice & Planning, S.Chand.