(BM 101) INTERNAL COMBUSTION ENGINES & TURBINES

Structure:

Teaching Scheme		Evaluation Scheme			
L	**P**	**TW**	**PR**	**Th. Ex**	**Total**
4	2	-	50	100	150

Objective:

Students are expected to understand & analyze the fundamentals and working of Internal Combustion Engines and Turbines to meet the modern requirements.

A: Theory:

Unit	Contents.	Duration
1	**INTRODUCTION:** Engine components and basic engine nomenclature, I.C. Engine classification, Four Stroke, Two stroke, S.I., C.I. Engines and their comparisons, I.C. Engines Losses and applications.	**02 Hours**
2	**FUEL-AIR CYCLES:** Introduction, The cycles, Effects of variable Specific heats, Dissociation Actual cycles, Various Losses in actual cycles.	**03 Hours**
3	**CARBURETION & FUEL INJECTION:** Review, Properties of Air-fuel mixture, Air fuel mixture requirements for steady state and transient conditions. Simple carburettor, complete carburettor. Theory of simple carburettor (approximate & exact analysis), Design of Carburettor. Analytical treatment based on above syllabus. Ideal requirements of carburettor. Air craft carburettor. Introduction to petrol injection system. Requirements of injection system, types of injection system. Bosch fuel pump, Fuel injectors, types of nozzle, Electronic fuel injection system.	**05 Hours**
4	**COMBUSTION IN S.I. & C.I. ENGINES:** Introduction**,** Combustion in S.I. Engines, Ignition limits, stages of combustion, effect of engine variables on ignition lag & flame propagation, normal & abnormal combustion, effect of detonation & its control combustion chamber design. Principle Octane rating, HUCR, Combustion in C.I. Engines: Stages of combustion, delay period, diesel knock & its control, cetene rating, Air-fuel ratio, Design of combustion chamber.	**05 Hours**
5	**TWO STROKE ENGINES:** Introduction, Two stroke engines & port timing diagram, Comparison between two stroke & four stroke engines, Scavenging process & Scavenging systems, Scavenging pumps, Supercharging of two stroke engines. Numericals.	**03 Hours**
6	**EXHAUST EMISSIONS:** Exhaust emissions coming out of I.C. engine exhaust, effect on human health. causes of formation. Pollutants measurements & abetment, Emission Standards.	**03 Hours**

7	**PERFORMANCE TESTS & SUPERCHARGING:** Introduction, Performance parameter and their measurement- Morse Test, BP, FP., Heat balance sheet, performance characteristics of S.I. & C.I. Engines, Performance maps. **Supercharging:** Introduction, Objectives & principles of supercharging, Methods of Supercharging, Supercharging Limits, Modifications for supercharging, Advantages & limitations, Turbo charging.	**06 Hours**
8	**GAS TURBINES:** Simple cycle, Brayton cycle. Performance evaluations parameters like force, work done, efficiency, air-fuel ratio. Regeneration, reheating, intercools. Numericals and applications	**05Hours**
9	**STEAM TURBINES:** Introduction classification advantages of turbines, Impulse & reaction turbines, compounding of steam turbines, velocity diagrams, work done on turbine blades, turbine efficiency, and losses in steam turbines Governing of steam turbines- throttle governing, bypass governing & nozzle control governing.	**06 Hours**
10	**ALTERNATIVE POTENTIAL ENGINES:** Stratified Engine, Wankel Engine, Variable Compression Engine, Stirling Engine.	**02 Hours**

Section A: Unit Nos. 1, 2,3,4,5.
Section B: Unit Nos. 6, 7, 8,9,10.

B: Practical:

Term work shall Consist of record book on laboratory experiments (any 8) studies on the following.	
Sr. No.	**Practical**
1	Trial on Diesel Engine with variable load & constant speed.
2	Trial on Diesel Engine with variable speed & constant load.
3	Trial on Petrol Engine with variable load & constant speed.
4	Trial on Petrol Engine with variable speed & constant load.
5	To draw the actual Valve Timing diagram for a given engine.
6	Dissembling & Assembling of the given Carburettor.
7	Morse Test.
8	Study of different types of lubrication systems.
9	Study of different types of fuel injection systems.
10	Study of different types of carburetors.
11	Assignment on study of cooling systems.
12	Assignment on study of ignition systems.
13	Assignment on study of any one automobile engine with engine with reference to characteristics.

The assessment of term work shall be on the following criteria:

- Continuous Assessment.
- Performing the experiments in the laboratory.

C: Suggested Text Books and References:

Sr. No.	Title	Author	Publication.
1	**Internal Combustion Engines & Air pollution.**	Edward Obert.	Harper & Row Publications.
2	**Principals of combustion.**	Kenneth K. Kou.	
3	**Internal Combustion Engines.**	Mathur & Sharma	Dhanpat Rai & Co.
4	**Internal Combustion Engines.**	Dr. V. Ganeshan.	TMH.
5	**Steam & Gas Turbines.**	R.Yadav.	Central Publishing House.
6	**Internal Combustion Engines.**	Dr. V.M. Domkundwar.	Dhanpat Rai & Co.
7	**Thermal Engineering.**	R.K. Rajput.	Laxmi Publications.
8	**Fundamentals of I.C. Engines.**	H.N. Gupta.	Printice & Hall, India

(BM 102) OPERATIONS RESEARCH

Structure:

Teaching Scheme		Evaluation Scheme			
L	**P**	**TW**	**PR**	**Th. Ex**	**Total**
4	2	50	--	100	150

Objective:

Students are expected to understand & analyze the fundamentals of Operations Research and to understand the various techniques of optimization.

A: Theory:

Unit	Contents.	Duration
1	**INTRODUCTION:** Operations Research: Development, history, definitions, objectives, characteristics, limitations, phases and applications. Optimization models and their classifications.	**02 Hours**
2	**LINEAR PROGRAMMING:** Introduction, Formulation of LP problem. Graphical method , Simplex Method, Big M Method, Two Phase Method, Special Cases of Linear Programming, Formulation Of Dual Problem, Application Of Duality.	**06Hours**
3	**INTEGER PROGRAMMING :** Introduction, Need for Integer Programming, Forms of IPP, Solution of IPP by Gomoryôs Cutting Plane Algorithm, Branch and Bound Algorithm, Additive Alogorithm for Zero- One IPP.	**06 Hours**
4	**TRANSPORTATION PROBLEM:** Introduction, Methods for finding initial solution, Test of optimality, Maximization Transportation problem, Transshipment problem, Degeneracy.	**04 Hours**
5	**ASSIGNMENT PROBLEM:** Introduction. Solution methods, Variations of the assignment problem, Traveling salesman problem.	**02 Hours**
6	**SEQUENCING MODELS:** Scheduling and sequencing. Assumptions in sequencing models, Processing 'n' jobs on 'm' machines. Processing of two jobs on machines with each having different processing order.	**03 Hours**
7	**INVENTORY CONTROL SYSTEM (QUANTITATIVE APPROACH):** Introduction, Meaning of Inventory Control, functional classifications of Inventories. Advantages of Inventory Control, Costs associated with Inventories, Advantages of Inventory Control, Deterministic Inventory Models; economic lot size with instantaneous replenishment with and without shortage costs, economic lot size with finite replenishment with and without shortage, economic lot size models with quantity discount.	**03 Hours**
8	**QUEUING THEORY:** Queuing Systems: Introduction, cost associated with characteristics, operating characteristics and probability distribution, Classification of queuing models. Kendall's notations. Models: (M/M/I). Minimum cost service rate.	**03Hours**

9	**THEORY OF GAMES:** Introduction, two-person zero-sum game, Minimum and Maximum principle, Saddle point, Methods for solving game problems with mixed strategies, Introduction to graphical and iterative models for solving prob1ems.	**03Hours**
10	**NETWORK MODELS:** Introduction to PERT/CPM & its importance in project management. Concept & construction of network diagrams. Critical path & project duration, floats, network crashing, optimum project duration & cost, PERT activity, time estimate, probability of completion of a project on or before specified time. Updating of project, Resource allocation & load smoothening.	**06 Hours**
11	**SIMULATION:** Simulation: Monte-Carlo Method.	**02 Hours**

Section A: Unit Nos. 1, 2,3,4,5.
Section B: Unit Nos. 6, 7, 8, 9, 10, 11

B: Term work:

Term Work shall consist of atleast Six Assignments on the Topic No. 2,3,4,7,8,10.

The assessment of term work shall be on the following criteria:

- Continuous Assessment.
- Performing the experiments in the laboratory.

C: Suggested Text Books and References:

S. N.	Title	Author	Publication.
1	Operational Research	Gupta P.K. & Hira D.S.	S. Chand & Co. Ltd
2	Introduction to Optimization	Gupta P .K. & Hira D.S.	Jain Brothers.
3	Operations Research	Askhedkar R.D. & Kulkami R.V	Dhanpat Rai & Co.
4	Operations Research	Patel R.C., Dave N.R.& Manglani A.K.	C. Jamnadas & Co.
5	Mathematical Models in Operations Research	Sharma J.K	Tata McGraw ï Hill Publishing Co. Ltd.
6	Operations Research	Sharma S.D., Kedar Nath.	Ram Nath & Co.

7	Operations Research: An Introduction	Tata H.A.	Prentice Hall of India Pvt. Ltd.
8	Principles of Operations Research with applications to Managerial Decisions.	Wagner H.N.	Prentice Hall of India Pvt. Ltd,
9	Managerial Guide to PERT/CPM	Wiest J.D. & Levy F.K.	Prentice Hall of India Pvt. Ltd

(BM 103) ROBOTICS AND INDUSTRIAL APPLICATIONS

Structure:

Teaching Scheme		Evaluation Scheme			
L	P	TW	PR	Th. Ex	Total
4	2	25	--	100	125

Objective:

Students are expected to understand the fundamentals of Robotics & to understand the various industrial applications.

A: Theory:

Unit	Contents.	Duration
1	**INTRODUCTION:** Definition & History of robots, Automation and Robotics, Robot-Anatomy, Robot classification ï Drive technologies, Work ï Envelope Geometries, Motion control methods, Robot specifications ï Payload, Reach, Precision, Accuracy and Repeatability.	**06Hours**
2	**ROBOT KINEMATICS:** Matrix representations of coordinate transformation, Transformation about reference frame and moving frame, Forward & Inverse Kinematics. Examples of 2R, 3R & 3P manipulators, RPY and Eulerôs angle. Homogeneous coordinate transformation and examples, D-H representation of kinematics linkages. Forward and Inverse kinematics of various manipulators using D-H representations.	**10Hours**
3	**TRAJECTORY PLANNING:** Introduction, general considerations in path description and generation, joint space schemes, Cartesian space schemes, path generation in runtime, planning path using dynamic model, Joint space verses Cartesian Space, point to point and continuous trajectory , 4-3-4 & trapezoidal velocity strategy for robots.	**08 Hours**
4	**ROBOT END EFFECTORS, SENSORS AND VISION SYSTEMS: End Effectors:** ï Types of end effectors, mechanical, vacuum, magnetic, adhesive grippers, tools as end effectors, Gripper force analysis and design. **Introduction to Sensors: -** Need of sensors in a robotic system, Robotic sensors ï Types of sensors based on working principle, desirable features of sensors, various sensing devices used in robot work cells, sensor characteristics, selection of sensors, photo-sensors, limit switches. Range sensors, proximity sensors, touch / sensors, Remote Center Compliance (RCC) device. **Vision Systems**: - Need of vision in a robotic system, Image acquisition, Illumination Techniques, Image conversion, Cameras, sensors, Camera and system interface, Frame buffers and Grabbers.	**06Hours**
5	**ROBOT PROGRAMMING LANGUAGES:** Introduction, robot programming methods, robot programming languages, Artificial intelligence in robotics	**04 Hours**
6	**INDUSTRIAL APPLICATIONS:** General considerations in Robot applications, Material transfer, Machine loading, Welding, Spray painting, Assembly, Inspection.	**06 Hours**

Section A: Unit Nos. 1, 2, 3
Section B: Unit Nos. 4,5,6
B: Term work:

Term work shall Consist of record book on the following.	
Sr. No.	**Practical**
1	One Assignment on ñIntroduction to Robot Configurationò
2	A demonstration of Robot with 2 DoF, 3 DoF, 4 DoF, etc.
3	Two Assignments on Programming the Robot for Applications
4	Two Assignments on Programming the Robot for Applications in Val II
5	Two Programming exercises for robots.
6	Two case studies of applications in industry involving working out the scheme with type of robots, other accessories with sequence and logic.
7	Exercise on robotic simulation software.

The assessment of term work shall be on the following criteria:

- Continuous Assessment.
- Performing the experiments in the laboratory.

C: Suggested Text Books and References:

S. N.	**Title**	**Author**	**Publication.**
1	Robotics Technology and Flexible Automation	S.R.Deb	Tata McGraw Hill
2	Industrial Robotics	M.P.Groover, M. Weiss R.N.	McGraw, Hill 1996
3	Robotics: Control , sensors , vision and intelligence	K.S.Fu, R.C.Gonzalez and C.S.G.Lee	MCGraw-Hill.1987
4	Introduction to Robotics	J.J.Craig	Pearson Publications
5	Robotics Engineering	Klafter , Richard D., et al	Prentice Hall of India Pvt. Ltd.
6	Fundamentals of Robotics Analysis and control	Robert J. Schilling	Eastern Economy Edition
7	Robotics and Control	R K Mittal and I J Nagrath	Tata McGraw Hill
8	Introduction to Robotics, Analysis, Systems, Applications	Saeed B Niku	Prentice Hall of India Pvt. Ltd,

(BM104) QUALITY ENGINEERING AND INDUSTRIAL MANAGEMENT

Structure:

Teaching Scheme		Evaluation Scheme			
L	P	TW	PR	Th. Ex	Total
4	2	25	--	100	125

Objective:

Students are expected to understand the fundamentals of quality & to apply different statistical process control tools for managerial decisions.

A: Theory:

Unit	Contents.	Duration
1	**INTRODUCTION:** Historical perspective, contribution of Taylor, Henry Fayol, Gilbert, Charles Babbage, Henry Gantt to the evolution of management science in the Indian context. Ownership of Industries Proprietorship, partnership, joint stock companies, public and private undertakings, co-operative organizations.	**06Hours**
2	**QUALITY PHILOSOPHY:** The Meaning of Quality and Quality Improvement; Brief History of Quality Methodology; Statistical Methods for Quality Control and Improvement; Total Quality Management (quality philosophy, links between quality and productivity, quality costs legal aspects of quality implementing quality improvement). Definitions and aims of standardizations, techniques for standardization (Statistical Principles, Codification system, variety control and value Engineering).	**08Hours**
3	**STATISTICAL PROCESS CONTROL:** Chance and assignable causes, Statistical Basis of the Control Charts -basic principles, choices of control limits, significance of control limits, control limits, analysis of pattern on Variable attribute control charts (no numericals)	**06Hours**
4	**MOTIVATION AND BEHAVIOR:** Hawthorns studies and its findings Maslows theory X and Y theory, Immaturity theory motivation hygiene theory, Pretence of needs and satisfaction of needs, goal oriented behavior, integration of organizational goals and needs of employee.	**06Hours**
5	**MANAGEMENT AND BEHAVIORAL APPROACH:** Contribution of Elton Mayo and Skinner to behavior sciences. Skills of a manager at various levels in an organization and inter-related systems, understanding past behavior, predicting future behavior, directing, changing and controlling behavior.	**06 Hours**
6	**PROCESS MANAGEMENT:** Definition of process management. Major process decisions-process choice, vertical integration, resource flexibility, customer involvement, capital intensity, relationships between decisions, service operation. Designing processes, rearranging and process improvement	**06 Hours**
7	**JOB EVALUATION AND MERIT RATING:** Definition, concepts, objectives, Procedure and Methods of job evaluation and Merit Rating.	**02Hours**

Section A: Unit Nos. 1, 2, 3
Section B: Unit Nos. 4,5, 6, 7

B: Term work:

Term work shall consist of at least eight assignments based on above syllabus.

The assessment of term work shall be on the following criteria:

- Continuous Assessment.
- Performing the experiments in the laboratory.

C: Suggested Text Books and References:

S. N.	Title	Author	Publication.
1	Principles of Management	Koontz O Donnel	McGraw Hill
2	Statistical Quality Control	E.L. Grant and R.S. Leavenworth, 7thedition	McGraw Hill
3	Essentials of management	Koontz Weirich 7th Edition	TATA McGraw Hill
4	Management of Organizational Behaviour	Hersey Paul and Kenneth H,	Prentice Hall of India Pvt. Ltd.
5	Operations management-strategy and analysis	Lee J.Krajewski and Larry P. Ritzman Fifth Edition	Addison-Wiley.
6	Organizational Behavior	Stephen P Robbins, 9th Edition	Pearson Education Publications

ELECTIVE - I
(BM105) ENERGY CONSERVATION AND MANAGEMENT

Structure:

Teaching Scheme		Evaluation Scheme			
L	P	TW	PR	Th. Ex	Total
4	--	--	--	100	100

Objective:

Students are expected to understand & analyze the Energy Conservation and Management of the same.

A: Theory:

Unit	Contents.	Duration
1	**INTRODUCTION:** Global and Indian energy scenario in various sector and Indian economy. Role of Non-Conventional Energy Sources in Energy Conservation. Need and importance of Energy Conservation and Management. Qyoto Protocol, Carbon Credits and Clean Development Mechanism (CDMC).	**06Hours**
2	**COSTING OF UTILITIES :**like steam, compressed air, electricity and water. Steam and Condensate Systems. Boilers (including package boiler), efficiency, testing, excess air and flue gas monitoring. Steam distribution, Steam Traps, Condensate and Flash-steam utilization, Thermal Insulation.	**08Hours**
3	**MECHANICAL SYSTEMS:** Energy Conservation Opportunities in compressed air systems, refrigeration and air- conditioning system and water systems. Elementary coverage of energy conservation in pumps and fans. Cogeneration -concept, options (steam/gas turbine/DCT-based), Selection criteria.	**06Hours**
4	**ELECTRIC SYSTEM:** Demand control, Demand Side Management (DSM), Power Factor Improvement, benefits and ways of improvement, Load scheduling, Electric motors, losses, efficiency, energy-efficient motors, motor speed control, variable speed drive.Lighting: Illumination levels, fixtures, timers, energy-efficient illumination.	**08Hours**
5	**ENERGY AUDITING:** Elements and concepts, Types of energy audits, methodology, Instruments used in energy auditing. Portable and On-line instruments	**06Hours**
6	**ECONOMIC ANALYSIS:** Cash flows, Time value of money, Formulae relating present and future cash flows - single amount, uniform series. Payback period. Return on Investment (ROI). Life Cycle cost. Sankey Diagrams. Specific Energy consumption. Load Management.	**08Hours**

Section A: Unit Nos. 1, 2,3
Section B: Unit Nos. 4,5,6
B: Suggested Text Books and References:

S. N.	Title	Author	Publication.
1	Energy conservation-related booklets Published by National productivity Council (NPC) & Petroleum Conservation Research Assn.(PCRA)		
2	Energy Technologyô	S Rao and B B Parulekar	Khanna Publishers, 1999
3	Efficient Use of Electricity in Industries	B.G. Desai, M.D.Parmar, R.Paraman and B.S. Vaidya	ECQ serries Devki R & D. Engineers, Vadodara
4	India -The energy Sector,	P.H. Henderson:	Oxford University Press
5	Industrial Energy conservation.	D.A. Ray:	Pergamon Press
6	Energy conservation Guide book,	Patrick Steven R., Patric Dale R. , and Fordo Stephen :	The Fairmont Press Inc.7.

ELECTIVE - I
(BM 105) ENTERPRENEURHIP DEVELOPMENT AND INDUSTRIAL ECONOMICS

Structure:

Teaching Scheme		Evaluation Scheme			
L	P	TW	PR	Th. Ex	Total
4	--	--	--	100	100

Objective:

Students are expected to understand & analyze the fundamentals of Entrepreneurship Development and Industrial Economics

A: Theory:

Unit	Contents.	Duration
1	**INTRODUCTION**: Meaning of entrepreneurship, Definition of Entrepreneur, Reasons for becoming an Entrepreneur, Qualities of entrepreneur, Leadership Strategies & Implementation, Effective Communication & Presentation Skills, Characterization of an Entrepreneur etc.	**03 Hours**
2	**IDENTIFYING BUSINESS OPPORTUNITIES:** Scanning business environment, Business Strategy ï Concepts, Market survey, Product identification, Strategies for design of new product**.**	**04 Hours**
3	**MANAGEMENT OF SMALL SCALE INDUSTRY**: Organizing, and planning personnel management, marketing Management, Roles and Responsibilities of a Manager in changing environment, Managerial Relations ï Tools and Techniques, Market Research.	**04 Hours**
4	**ESTIMATION OF RESOURCES**: Estimation of resource required for establishment of an enterprise (Starting a manufacturing industry, marketing enterprise or service business) like space, human resources, Equipments and financial resources.	**07 Hours**
5	**REPORT:** Preparation of a project feasibility report, Appraisal of a project	**03 Hours**
6	**GOVERNMENT POLICIES:** Government policy in promoting small scale industries, Incentives and benefits to small scale industries.	**04Hours**
7	**FINANCIAL RESOURCES:** Sourcing for finance SIDBI. State financial cooperation, commercial Banks. Shares & Debentures.	**04 Hours**
8	**CAPITAL INVESTMENTS:** Fixed capital & working capital, Estimation and analysis of working capital management.	**03Hours**
9	**BOOK OF ACCOUNTS:** Preparation of trading and profit & loss Account, Balance sheet, Ratio analysis, Cash How statement, Time value of money, Present value and future value.	**04Hours**
10	**PROBLEMS:** Problems faced by entrepreneurs & S.S.I.	**04 Hours**

Section A: Unit Nos. 1, 2,3,4,5.
Section B: Unit Nos. 6, 7, 8,9,10.
C: Suggested Text Books and References:

Sr. No.	Title	Author	Publication.
1	Entrepreneur Development	Vasant Desai	Himalaya Publication.
2	You too can become an Entrepreneur	Nalinaksha Mutsudd	WheelerPublication, New Delhi.

ELECTIVE - I
(BM 105) POWER PLANT ENGINEERING

Structure:

Teaching Scheme		Evaluation Scheme			
L	P	TW	PR	Th. Ex	Total
4	--	--	--	100	100

Objective:

Students are expected to understand & analyze the fundamentals of Power Plant Engineering and its applications.

A: Theory

Unit	Contents	Duration
1	**INTRODUCTION:** Generation of Electricity and sources of energy, future trends in power industry, coordination of power from different source.	**01 Hrs**
2.	**THERMAL POWER PLANT** : General layout of modern Thermal power plant ,Working of Thermal power plant, Site Selection for Thermal power plant, thermodynamic cycles, Coal handling, storage, Preparation & Feeding, combustion and combustion equipments, Ash handling and dust collection, draught system	**06 Hrs**
3.	**HYDROELECTRIC POWER PLANT:** Hydrograph, flow duration & mass curves. General arrangement of an hydroelectric project and its operation , site selection, Storage and pond age, classification of hydro stations, selection of prime movers Governing of turbines, operation of different components of hydro station reservoirs .Dam, spill ways, canals, penstock, water hammering effects, surge tank draft tube Specific speed of turbine, advantages of hydro station, brief description of some important hydel installations in India	**08 Hrs**
4.	**DIESEL ENGINE POWER PLANT :** Layout of Diesel engine Power Plant, Type of Engines used for Diesel power plants, cooling & lubrication system for the diesel engines, filters, supercharging of Diesel engines , performance of diesel plant, advantages and limitations of diesel plant over thermal plant , Present Trends in Diesel research	**06 Hrs**
5.	**GAS TURBINE POWER PLANT :** Plant layout, method of improving the output and performance, fuel and fuel systems, method of testing open and closed cycle plants, operating characteristics, applications, advantage of combined working of different parts.	**04 Hrs**
6.	**NUCLEAR POWER PLANT**:-Principle of release of nuclear energy fusion & fission reaction, nuclear fuels used in reactors ,multiplication and thermal utilization factors, elements of nuclear reactor ,moderators ,control rod ,fuel rods ,coolants ,brief description of reactor PWR , BWR ,sodium graphite reactor, fast breeder reactor ,Homogenous reactor and gas cooled reactors, radiation hazard , shielding, radio active waste disposal.	**08 Hrs**
7.	**CHOICE OF SITE FOR POWER STATION**:-Load estimation, load duration curve, load factor, capacity factor, use factor, diversity factor, and demand factor, effect of variable load on power plant, selection of the number and size of units	**05 Hrs**
8.	**ECONOMIC ANALYSIS OF POWER PLANTS**:-Cost of energy production, selection of plant and generating equipment, performance and operating characteristics of power plants, Tariffs for electrical energy.	**02 Hrs**

SECTION :A Chap 1,2,3, 4.
SECTION :B Chap 5, 6, 7, 8.

B: Suggested text Books and References

SR.No.	Title	Author	Publication
1.	A Course in Power Plant engineering	Arora and Domkundwar.	Dhanpat Rai
2.	Power station Engineering Economics	Skrotizke and Vopat	
3.	Power Plant engineering.	by P K Nag	
4.	Power Plant engineering	G.R.Nagpal	
5.	Power Plant engineering	H S Keshwani	

Suggested References:

SR.No.	Title	Author	Publication
1.	Modern Power Plant Engineering,	Joel Weisman & Ray Eckart	Prentice hall, International Inc
2.	Power Station Engineering and Economy	Barnhardt G. Askratzki & William A Vopal	Tata Mcgrow Hill Publications co Ltd.
3.	Power Plant Engineering	Fredrick T Mores	Affiliated East West press private Ltd.

ELECTIVE - I
(BM 105) ADVANCED MATERIALS AND MANUFACTURING TECHNIQUES

Structure:

Teaching Scheme		Evaluation Scheme			
L	P	TW	PR	Th. Ex	Total
4	--	--	--	100	100

Objective:

Students are expected to understand & analyze the fundamentals of Power Plant Engineering and its applications.

A: Theory

Unit	Contents
1	Composites: Classifications, properties, application of composites, polymer matrix materials, metal matrix materials, ceramic matrix materials, carbon materials, glass materials, fiber reinforcements, types of fibers, whiskers, laminar composite, filled composites, particulate reinforced composites, design of composites materials, hybrid composites, angle plied composites, mechanism of composites, calculation of properties, unidirectional fiber composites, critical volume fraction, discontinuous fiber composites, rule of mixtures equation, critical angle
2.	Organic Materials: Introduction, Thermoplastics ,Thermosets,Types of Polymers, Mechanical characteristic, Forming Techniques, applications of polymers, plastics and elastomers
3.	Ceramics: Introduction, Classifications, properties, structures, Processing of Ceramics, Refractories materials, electronic ceramics, cement and concrete.
4.	Miscellaneous Materials: Classification, applications and properties of cutting tool materials, semi conducting materials, dielectric materials, magnetic materials, ferroelectrics materials. Smart materials, Super alloys
5.	Advances In Casting Processes: Sheet molding casting V -Process, flask less molding, evaporative casting, plaster mould casting design for plaster mould casting, quality-accuracy-uniformity & other considerations in casting and molding.
6.	Non-traditional Machining Process: Introduction, Chemical machining, Electro Chemical machining, Electro discharge machining, Wire EDM, Magneto abrasive finishing, Abrasive flow machining, Water jet machining, Micro drilling by different processes like laser beam, ion beam, electro jet, etc, electro stream drilling. Non-traditional Debarring process
7.	Metallic Coating: Importance, principle, applications of; Chemical vapor deposition, physical vapor deposition, Thermal spray coating, Electro plating, Electro less coating
8.	Rapid Prototyping (RP): Principle and elements of RP. Advantages & applications of RP, Introduction to regenerative manufacturing process like SLS, LOM, FDM.

	SECTION :A Chap 1,2,3, 4.
	SECTION :B Chap 5, 6, 7, 8.

B: Suggested text Books and References

S.No.	Title	Author	Publication
1.	The Nature and Properties of Engineering Materials	Z.D. Jastrezebski.	
2.	Introduction to Physical Metallurgy	S.H. Avner	
3.	Composites Materials	S.C. Sharma.	
4.	Materials Science and Engineering	R.K. Rajput.	
5.	Materials and Processes in Mfg.	E.P. DeGarmo, J.T. Black,R.A. Kosher.	
6.	Modern Manufacturing process Engineering	Benjamin W. Niebel, Allen B. Draper, Richard A. Wysk	McGraw Hill
7.	Non Traditional Manufacturing processes	Garry F. Benedict Marcel	Dekker Inc., New York.
8.	Production Technology Hand Book	H.M.T. Tata McGraw Hill	
9.	Non Traditional Machining Processes	E.J. Weller	Society of Manufacturing Engineers,Dearban Michigan
10.	Manufacturing Processes	B.H. Amstead, Philip F. Ostwald arid Myron L. Begeman,	John Wiley Sc Sons, eighth edition.
11.	ASM "Metals Hand Book		ASM Publications
12.	Non-conventional Machining Processes	P.K. Mishra	Narosa pubication.

(BM 201) SEMINAR

(Term Work 50 marks)

Every individual student shall work on a recent topic selected or assigned from any engineering/allied/applied fields for the seminar of academic or industrial interest. It is expected that the student has to collect information on a topic which is not covered in curriculum of the under graduate course. Student has to refer hand book, research journals, reference books, proceeding of conference through library or internet and record of references considered for seminar is to preserved in hard copy or soft copy, which shall be produced at the time of seminar.

The report of seminar should be submitted in printed volume duly certified by guide, HOD and Principal in prescribed format given below. The student should deliver a seminar talk at least for 20 minutes based on the work done by him/her. The performance will be judged by his guide and another expert appointed by HOD.

INSTRUCTIONS TO PREPARE REPORT AND PPT

1. Seminar report shall be typed on A-4 size white bond paper.
2. Typing shall be with line spacing of 1.5using black inkjet print on one side of the paper.
3. Margins a) Left 37.5mm b) Right, Top and Bottom 25mm.
4. Page number ï At the bottom center aligned 12 point font size.
5. Header and Footer (12 point font size ï Times New Roman)
    a) Header ï Right side at top stating title of the seminar.
    b) Footer ï Right side at bottom stating institute name.
6. Font
    a) Main title font ï 14 point ï bold ï Times New Roman ï Upper case
    b) Sub title font ï 12 point ï bold - Times New Roman ï Title case
    c) Text font - 12 point ï normal - Times New Roman ï Running
    d) Graph / Figure / Table titles ï 12 point ï normal - Times New Roman ï Title case

7. Graph / Figure / Table: - shall be located at the center along with its title and Graph No. / Figure No. / Table No.

   If Graph / Figure / Table or any information is copied from any of the references, reference no. is to be shown at the end of its title / statement in square bracket superscripted form

8. Seminar report shall consists of at least following contents
   a. First page.
   b. Certificate.
   c. Acknowledgement.
   d. Index page (Chapter wise)
   e. Graph index (Graph no., Title, Page no.)
   f. Figure index (Figure no., Title, Page no.)
   g. Table index (Table no., Title, Page no.)
   h. Introduction /Abstract of seminar.
   i. Literature review.
   j. Core content of seminar.
   k. Merits and demerits of subject.
   l. Future scope.
   m. Conclusion.
   n. References.
   o. Appendix
   p. Compact Disc.
9. Format of seminar report

   a. First page (Title page) and cover of seminar report.

(Institute logo)

Seminar Report

on

ñTitle of Seminarò

By

Name of student

Submitted in partial fulfillment of the requirement for the degree of

Batchelor of Engineering (Mechanical)

Department of Mechanical Engineering

Name of Institute

Year 2009-10

b. Certificate

(Institute logo)

CERTIFICATE

This is to certify that the seminar report entitled

ñTitle of Seminarò

Submitted by

Name of student

has completed as per the requirement of Dr. Babasaheb Ambedkar Marathwada University in partial fulfillment of degree

B.E.(Mechanical)

Guide	Head of Department
	Principal
(Name)	(Name)
	(Name)

Department of Mechanical Engineering

Name of Institute

Year 2009-10

c. Acknowledgement:- Acknowledgement shall consists of students opinion related to the seminar topic and his gratitude towards his guide, other staff, social members and his friends those who have really helped him to complete seminar report.

d. Chapter Index: - Shall have title as ñINDEXò in bold - 14 point aligned at top center and page consisting of table with three columns as Chapter No., Chapter particulars, and Page No.

Chapter No. and Page No shall be aligned at center of cell and chapter particulars left aligned in the cell.

e. Graph Index / Figure Index / Table Index: - Shall have title as ñGRAPH INDEX / FIGURE INDEX / TABLE INDEXò in bold ï 14 point center aligned at top of page. Page consisting of three column table as Graph No. / Figure No. / Table No. in first column, Title of Graph / Figure / Table in second column and Page No. in third column. (Similar to chapter index.)

10. Sketches:-Shall be drawn on separate sheet, center aligned with Figure No. and Title of sketch at its bottom.
11. Table shall preferably be typed in text format only with table no. and its title at the top, centrally aligned.
12. Standard mathematical symbols and notations shall be used.
13. The last item on Index should be references.
14. Compact Disc (C.D.) consisting of soft copy of seminar report, PPT, and supporting literature shall be affixed at back cover of report.
15. Presentation shall be made with help of Power point.
    a. Preferably each slide shall have plain white or faint yellow or navy blue or maroon colored back ground with contrast matching font.
    b. Each slide shall be numbered and header - footer shall be added similar to report.
    c. Figure / Graph / Table shall be labeled with Figure No. / Graph No. / Table No. and with reference nos. shown in seminar report
    d. Only brief points are to be highlighted on slides
    e. Information copied from references shall be numbered with reference number.
    f. Points are not to be read directly from slide at the time of presentation.
    g. Presentation shall be based on Figure, Graph, Table, Charts and points etc.
    h. First slide shall be identical to cover page of report.

i. Second slide should contain introduction / abstract of seminar and content of presentation with bullets.

j. Third slide shall focus on literature review.

k. Fourth slide on wards core content of presentation shall be discussed.

l. Slides at the end shall consist of merits, demerits, future scope, conclusion and references.

The Term work marks for seminar will be allotted based on the following

1. Seminar Report	10 Marks	
2. Literature Review	08 Marks	
3. Technical Content	10 Marks	
4. Presentation Skill(Aids used)	14 Marks	
5. Question Answer	08 Marks	**Total 50 Marks**

(BM 202) PROJECT – I
(Practical Examination 50 Marks.)

1. Every student or group of maximum three students should undertake a project work under the guidance of teacher allotted.
2. The project work could be theoretical work on trouble shooting, design development, fabrication of prototype / model, implementing a research paper or application of advanced software.
3. Preferably project shall be useful to the general community such as rural, former community and small scale industry etc.
4. If the project is based on software, it shall impart sufficient knowledge of software and its application to the students. The software used should not be among the softwares recommended in undergraduate curriculum. It should be entirely new to the students.
5. If the project is based on fabrication, it shall be supported by design and development.
6. It is essential that the student/s should concentrate on need, feasibility, economy, usefulness, effects on environment and global warming.
7. The student/s should get their project topic approved by the project committee under the leadership of project in charge / HOD appointed by Principal.
8. Student has to collect information from hand book, research journals, reference books, proceeding of conference through library or internet.
9. Student/s should prepare a spiral bound report with detail schedule of activities planned for completion of project and its presentation similar to the seminar report and shall be presented by all the partners dividing presentation among them at the time of examination in presence of guide and external examiner.
10. It is compulsory to continue with same project in next semester and copy of report shall be produced at the time of final dissertation. Theme of project defined in 7 th semester and its achievement must be compared.
11. Students shall prepare paper / project to participate in State level / National / International competition. The projects participated shall get additional benefit in final semester based on certificate of participation.

The practical examination shall be based on presentation and marks shall be allotted on following points.

1. Report	5 Marks.
2. Literature Review	5 Marks.
3. Technical Content	5 Marks.
4. Regency of topic	5 Marks.
5. Usefulness	5 Marks.
6. Feasibility	5 Marks.
7. Presentation	5 Marks.
8. Economy	5 Marks.
9. Merits	5 Marks.
10 Question / Answer	5 Marks.
	Total 50 Marks

(BM 106) REFRIGERATION AND AIRCONDITIONING

Structure:

Teaching Scheme		Evaluation Scheme			
L	P	TW	PR	Th. Ex	Total
4	2	-	50	100	150

Objective:

Students are expected to understand & analyze the fundamentals of refrigeration and air-conditioning.

A: Theory:

Unit	Contents.	Duration
1	**INTRODUCTION:** Fundamentals of thermodynamics, Refrigerator, heat pump, coefficient of performance, unit of refrigeration, Exegetic efficiency, Carnot cycle for refrigeration and its performance.	02 Hours
2	**SIMPLE VAPOUR COMPRESSION CYCLE:** Modification of Carnot cycle, vapor compression cycle and its components, representation on T -s and P-h planes. Effect of operating condition on performance of VCC, sub cooling & superheating of refrigerant, methods to improve cop of VCC, regeneration and its importance in VCC, actual VCC.	06 Hours
3	**MULTISTAGE VAPOUR COMPRESSION CYCLE:** Limitations of simple VCC for achieving low temperatures, intercooling, popular arrangements of intercooling with multicompression; multieveaparator , System; individual compressors, compound. compression; cascade systems.	06 Hours
4	**GAS CYCLE REFRIGERATION :** Comparison of air refrigeration with VCC, components, Bell Coleman cycle, regenerative BCC, Necessity of aircraft refrigeration; Advantages of air cycle for aircraft refrigeration, classification of aircraft refrigeration system and their analysis; Dry air rated temperature (DART).	06 Hours
5	**VAPOUR ABSORPTION SYSTEM:** Principal of absorption system; common refrigerant absorbent pairs; comparison between absorption and compression system; simple absorption system; modification to simple vapour absorption system; Use of temperature concentration diagram (T -C) and enthalpy concentration diagram (h-c) Lithium-Bromide water vapour absorption system.	06 Hours
6	**REFRIGERANTS:** Properties of refrigerants; classification of refrigerants, Designation of refrigerants; Selection of refrigerants; ODP and GWP of CFC's refrigerants; substitutes for CFC refrigerants, Azeotropic mixtures, Secondary refrigerants.	03 Hours

7	**INTRODUCTION TO PSYCHROMAETRY:** Psychrometry and Air-composition, psychometric properties, psychometric relations, Adiabatic saturation and thermodynamic wet bulb temperature; psychomotor	**04 Hours**
8	**APPLIED PSYCHROMETRY:** Psychometric processes: its representation psychometric chart; Adiabatic mixing of air streams; coil bypass factor, Air conditioning process;ADP,ventilation and infiltration. Use of Air-conditioning calculation format	**05Hours**
9	**APPLICATION OF REFRIGERATION AND AIR CONDITIONING**	**02 Hours**

Section A: Unit Nos. 1, 2, 3, 4.
Section B: Unit Nos. 5, 6, 7, 8, 9.

conditioning process;ADP, ventilation and infiltration.

B: Practical:

Term work shall consist of Any four experiments from the followings	
Sr. No.	**Practical**
1	Tools used in Refrigeration Air Conditioning practice
2	Domestic Refrigerator
3	Different types of Air-Conditioning systems.
4	Controls used in Refrigeration & Air conditioning such as expansion devices. Thermostat, HP, LP cut out, OHP, Relays, Solenoid valves. Humidity measurement.
5	Leak detection & procedure for charging of Refrigerant.
6	Trials on following test rigs (any two) a) Refrigeration test rig. b) Air-conditioning test rig. c) Heat pump. d) Cascade refrigeration system. e) Ice plant test rig. f) Water Cooler Test rig .
7	Technical reports on visits to refrigeration and air-conditioning establishments. (Any two)
8	The practical examination shall consist of performing an experiment based on the practical work done during the course and viva-voce based on the syllabus.

C: Suggested Text Books and References:

Sr. No.	Title	Author	Publication.
1	Refrigeration and Air conditioning.	Arora C.P	Tata Mc Graw Hill Pub.1985 .
2	Refrigeration &Air conditioning	P. L. Ballaney.	Hanna pub.
3	Refrigeration and Air conditioning	Mnohar Prasad	Wiley Eastern pub. .
4	Refrigeration and Air conditioning,.	Domkundwar.	Dhanpat Rai Pub. 1998
5	Principles of Refrigeration	Dossat R.J	Prentice Hall pub.1997
6	Refrigeration and Air conditioning.	Anantnarayan.	Tata MC Graw Hill Pub.1987
7	Refrigeration and Air-conditioning.	Jain V. K.	
8	ASHARE: Handbook.		
9	Air-conditioning System Design-Handbook, Carrier corp, USA		

(BM 107) AUTOMOBILE ENGINEERING

Structure:

Teaching Scheme		Evaluation Scheme			
L	P	TW	PR	Th. Ex	Total
4	2	25	25	100	150

Objective:

Students are expected to understand & analyze the fundamentals of Automobile Engineering.

A: Theory:

Unit	Contents.	Duration
1	**BASIC CONCEPTS AND CLUTCHES:** Vehicle specifications, classification, layout, applications, purpose of clutch, classification, single plate clutch, multiple plate clutch, centrifugal clutch, cone clutch, diaphragm spring clutch, vacuum operated clutch, clutch plates types, clutch trouble shootings.	**06 Hours**
2	**GEARBOX:** Function, various resistances, tractive effort, performance curves, Gear selector mechanisms . sliding mesh, gear box, constant mesh gear box and synchromesh gearbox, epycyclic gear box, torque convertor, automatic transmission, overdrive.	**08 Hours**
3	**SUSPENSION SYSTEM:** Objectives, various types of springs, shock absorbers, conventional suspension system, independent suspension systems, air suspension, hydra-pneumatic suspension, rubber suspension, anti roll bar suspension	**08 Hours**
4	**FRONT AXLE, STEERING SYSTEM AND TYRES** Front axle, types, stub axle, steering geometry, wheel alignment and wheel balancing ,centre point steering, cornering force slip angle, scrub radius, under steer ,over steer, steering linkages, steering gearboxes, power steering. Tyres ï function, construction, types of tyres, tubeless tyres.	**06 Hours**
5	**PRPELLER SHAFT, UNIVERSAL JOINTS, DIFFERENTIAL AND REAR AXLE:** Propeller shaft, universal joints, final drive, differential and their types, rear axle arrangements, Different types of floating rear axles and Hotchkiss and torque tube drive	**06 Hours**
6	**BRAKING SYSTEMS AND AUTOMOTIVE ELECTRICALS :** Purpose, classification, mechanical, hydraulic, air brakes, servo-braking systems, antiskid braking systems. Battery, ignition system, starting systems, charging system, dashboard instruments.	**06 Hours**

Section A: Unit Nos. 1, 2,3.
Section B: Unit Nos. 4,5,6
B: Practical:

Term work shall consist of record book on laboratory experiments studies on the following.	
Sr. No.	**TERMWORK**
1	Study of layout of an automobile.
2	Study of construction and working of types of engines used in the automobile
3	Study of construction and working types of clutches used in the automobile
4	Study of construction and working types of gear boxes used in the automobile
5	Study of construction and working suspension system used in the automobile
6	Study of construction and working types of steering systems used in the automobile
7	Study of construction and working differential used in the automobile
8	Study of construction and working braking systems used in the automobile
9	Study of construction and working ignition systems used in the automobile

The assessment of term work shall be on the following criteria:

- Continuous Assessment of the assignment based on the syllabus
- Performing the experiments in the laboratory ie demonstration and working of the different components as mentioned above, also assembling and dissembling the parts for knowing the details.

PRACTICAL EXAMINATION

The practical examination shall be consisting of Viva- Voce based on the practical work done during the course and on the syllabus.

C: Suggested Text Books and References:

S. N.	**Title**	**Author**	**Publication.**
1	Automotive Mechanics	Crouse & Anglin	Tata McGraw Hill .
2	Automotive Mechanics	Joseph Heitner	C.B.S.Publisher and Distributors
3	Automobile Engineering	R.K.Rajput	Luxmi Publications..
4	Automobile Engineering, Vol.I & II	Kirpal Singh	Standard Publishing House

(BM 108) AUTOMATIC CONTROL SYSTEM

Structure:

Teaching Scheme		Evaluation Scheme			
L	P	TW	PR	Th. Ex	Total
4	2	-	50	100	150

Objective:

Students are expected to understand the concepts of various control systems

A: Theory:

Unit	Contents.	Duration
1	**INTRODUCTION: -** Need of Control System, Manual Vs Automatic Control System, Advantages of Automatic Control System, Open Loop and Closed Loop Control System and their comparison, Concept of Feedback, Requirements of Ideal Control System, Generalized Control System, Definition of Transfer Function.	**04Hours**
2	**REPRESENTATION OF CONTROL SYSTEM COMPONENTS:-** Study of various types of control system components and their mathematical representation used in systems like Mechanical System, Electrical System, Thermal System, Fluid System, A.C and D.C. motors in control system, Grounded chair representation, Force-Voltage, Force-Current Analogy	**06Hours**
3	**BLOCK DIAGRAM AND SIGNAL FLOW GRAPH: -** Transfer Function Definition, Block Representation of System Elements, Block Diagram Reduction, Conversion of Block Diagram to Signal Flow Graph and vice versa, Masons Gain Formula, Comparison of Block Diagram and Signal Flow Graph, Finding Transfer Function of Control System by both methods.	**06Hours**
4	**ELECTRICAL SYSTEMS: -** Detail study of A.C. and D.C. Servo Motor, Stepper Motor Servomechanism, Position Control System.	**02Hours**
5	**CONTROL ACTION AND CONTROLLERS:-** Basic types of control action like ON/OFF, Proportional, Integral, Derivative Type and their combination, Pneumatic and Hydraulic (P, I, PI, PD and PID) controllers, Comparison of Pneumatic and Hydraulic Control System.	**06 Hours**
6	**TRANSIENT AND STEADY STATE RESPONSE ANALYSIS: -** Introduction, Various Types Standard Input Signals, First Order and Second Order System Response to Step, Ramp and Impulse Input, concept of time constant and its importance in speed response, Effect of Damping Ratio on Response of Second Order System, System Specification, System Stability and Routhôs Stability Criteria.	**04 Hours**
7	**FREQUENCY RESPONSE ANALYSIS:-**Polar Plots, Nyquist Stability Criterion, Stability Analysis, Relative Stability Concepts, Phase and Gain Margin, M & N circles	**04Hours**

8	**FREQUENCY RESPONSE ANALYSIS USING BODE PLOT: -** Bode plot attenuation diagram, Stability Analysis using Bode Plots, Simplified Bode Plot.	**04Hours**
9	**ROOT LOCUS PLOTS:-** Definition of Root Loci, General Rules for constructing Root Locus, Analysis using Root Locus Plots, Use of MATLAB Software.	**04Hours**

Section A: Unit Nos. 1, 2, 3, 4
Section B: Unit Nos. 5, 6, 7, 8, 9

B: Term work:

Term work shall Consists of record book on the following.	
Sr. No.	**Practical**
1	Study of control system components.
2	An experiment on speed control of stepper motor.
3	An experiment on a level control system.
4	An experiment on ON-OFF temperature controller.
5	An experiment on various modes of control I, P, P+I, P+D, and P+I+D.
6	Assignment based on Chapter No. 2,3,5,6,7,8,&9 at least one on each chapter.

The assessment of term work shall be on the following criteria:

- Continuous Assessment.
- Performing the experiments in the laboratory.

PRACTICAL EXAMINATION :

The practical examination shall be consisting of performing experiment based on the practical work done during the course and Vivo- Voce based on the syllabus.

C: Suggested Text Books and References:

S. N.	**Title**	**Author**	**Publication.**
1	Automatic Control Systems	Nagrath Gopal	
2	Control System Engineering	Ogatta	Prentice Hall of India Pvt. Ltd.
3	Automatic Control Systems	Francis Raven	Mc Graw Hill
4	Feedback Control System	S. Bhide, Jalgaonkar	Prentice Hall of India Pvt. Ltd.

ELECTIVE-II

(BM 109) MACHINE TOOL DESIGN

Structure:

Teaching Scheme		Evaluation Scheme			
L	P	TW	PR	Th. Ex	Total
4	2	50	-	100	150

Objective:

Students are expected to understand & the fundamentals of Machine Tool Design

A: Theory:

Unit	Contents	Duration
1	**INTRODUCTION:**General requirements to machine tools, Machine tool design recommendations, Classification of motions to shape surface, Machine tool drives for rectilinear motion, Periodic motion, reversing motion etc.	**02Hours**
2	**KINEMATICS OF MACHINE TOOLS:** Kinematics or gearing diagram of Lathe, drilling Machine, Milling Machine etc. Main drive and feed drive, principles specification of Machine tool	**04Hours**
3	**DESIGN OF KINEMATICS SCHEME:** Methods to determine transmission ratios for drives. Development of Kinematics scheme, minimum of transmission groups, Determination of number of teeth on gears.	**06Hours**
4	**SPEED AND FEED BOXES:** General requirement Design of gear trains, speed boxes types, speed changing devices Feed boxes characteristics of feed mechanism, types of Rapid traverse mechanisms, variable devices.	**08Hours**
5	**SPINDLE DESIGN AND SPINDLE BEARINGS:** Main requirement, Materials and details of spindle design, Spindle bearings, bearings, types of bearings and their selections, Bearing Materials BED,	**08Hours**
6	**COLUMNS, TABLES AND WAYS:** Materials, typical constructions and design.	**04Hours**
7	**MACHINE TOOLS CONTROL SYSTEMS:** Requirement of control system selection and construction of control systems Mechanical control system, predilection control, remote control safety devices.	**04Hours**
8	**MACHINE TOOL DYNAMICS:** Dynamic performance, dynamic and elastic system of Machine, tools. Dynamics of cutting forces, tool chatter.	**04Hours**

B: TERMWORK:

Term work shall consist of record book on laboratory experiments studies on the following.	
Sr. No.	**Practical**
1	Design & Working drawing of speed gear and feed gear box
2	Design & Working drawing of four machine tool mechanisms
3	Design of bed or column
4	Design of sideways or power screws
5	Preparation of standard test chart for General Purpose Machine (Anyone)

The assessment of term work shall be on the following criteria:

- Continuous Assessment.
- Performing the experiments in the laboratory.

C: Suggested Text Books and References

Sr. No.	**Title**	**Author**	**Publication**
1	Machine Tool Design	Sen and Bhattacharya	CBS Publishers
2	Machine Tool Design	N.K. Mehta	Tata Mc Graw Hill.
3	Machine Tool Design	N. Acherkan	Mir Publishers
4	Design of machine tools	S.K. Basu and D.K. Pal	Oxford and IBH
5	Principles of Machine Tool	Bhattacharya and S. G. Sen	New central book agency Calcutta
6	Design Principles of Metal Cutting Machine Tools	F. Koenigsberger	The Macmillan Company New York

ELECTIVE-II

(BM109) SIMULATION AND MATHEMATICAL MODELLING

Structure:

Teaching Scheme		Evaluation Scheme			
L	**P**	**TW**	**PR**	**Th. Ex**	**Total**
4	2	50	-	100	150

Objective:

Students are expected to understand simulation and mathematical modeling.

A: Theory:

Unit	Contents.	Duration
1	**INTRODUCTION TO SIMULATION**: System & System environment, Components of system, Types of system, Types of models, Steps in simulation. Study, Advantages and Disadvantages of simulation. Simulation Examples: Simulation of Queuing systems	**06Hours**
2	**GENERAL PRINCIPLES:** Concepts of discrete event simulation, Time-Advance Mechanism, Component of Organization of a Discrete-Event Simulation Model.	**04Hours**
3	**STATICALLY MODELS IN SIMULATION:** Useful statistical model, Discrete distribution, Continuous distribution, Poisson process, Empirical distribution	**04Hours**
4	**QUEUING MODELS:** Characteristics of Queuing systems, Queuing notations, Long run measures of performance of Queuing systems, Steady state behavior of infinite population Monrovian models, Steady state behavior finite population model.	**04Hours**
5	**RANDOM NUMBER GENERATION:** Properties of random numbers, Generation of pseudo random numbers, Techniques for generating random numbers, Tests for random numbers	**02 Hours**
6	**RANDOM VARIATE GENERATION:** Inverse transform technique, Convolution method, Acceptance rejection techniques.	**02Hours**
7	**INPUT MODELLING:** Data Collection, Identifying the Distribution of data, Parameter estimation, Goodness-of-fit tests, Selection input model without data, Multivariate and Time series input model.	**04Hours**
8	**VERIFICATION AND VALIDATION OF SIMULATION MODEL:** Length of simulation runs, Validations.	**03Hours**
9	**OUTPUT ANALYSIS FOR A SINGLE MODEL:** Types of simulations with respect to output analysis stochastic nature of output data, Measure of performance and their estimation, Output analysis of terminating simulation, Output analysis for steady state simulation.	**06Hours**
10	**CASE STUDIES:** Simulation of manufacturing systems, Simulation of inventory control systems, Simulation of pert network.	**04Hours**
11	**SIMULATION SOFTWARE:** GPSS	**01Hours**

Section A: Unit Nos. 1, 2, 3, 4, 5
Section B: Unit Nos. 6, 7, 8, 9, 10,11

B: Term work:
Term work shall consist of at least eight assignments on the above syllabus

The assessment of term work shall be on the following criteria:
Continuous Assessment.

C: Suggested Text Books and References:

S. N.	Title	Author	Publication.
1	Simulation Modeling and Analysis	Averill Law, W. David Kelton	Tata Mc GRAW-HILL ï 2003.
2	System Simulation ï 2nd Edition	Geoffery Gordon	Prentice Hall of India Pvt. Ltd. New Delhi-1990
3	System Simulation with Digital Computer	Narsingh Deo	Prentice Hall of India Pvt. Ltd. New Delhi-1990

ELECTIVE-II

(BM109)COMPUTATIONAL FLUID DYNAMICS

Structure:

Teaching Scheme		Evaluation Scheme			
L	P	TW	PR	Th. Ex	Total
4	2	50	-	100	150

Objective:

Students are expected to understand the fundamentals of fluid dynamics.

A: Theory:

Unit	Contents.	Duration
1	**REVIEW OF GOVERNING EQUATIONS CONNECTIVE FLUID FLOW :**Conservation of mass, Newtonôs second law of motion, expanded forms of Nevier-Stokes equations, conservation of energy principle, special forms of Nervier-Stoke equations, Classification of second order partial differential equations, initial and boundary conditions, governing equations in generalized coordinates.	**08Hours**
2	**FINITE DIFFERENCE, DECARTELIZATION, CONSISTENCY, STABILITY FUNDAMENTAL OF FLUID FLOW MODELING :** Elementary finite difference quotients, basic concept of finite difference equations, errors and stability analysis, some nontrivial problems with discredited equations. application to heat conduction etc.	**08 Hours**
3	**SOLUTION OF VISCOUS INCOMPRESSIBLE FLOWS BY STREAM FUNCTION: Two** dimensional incompressible viscous flow, incorporation of upwind scheme, estimation of discretization error, application to curvilinear geometries, derivation of pressure and drag.	**08 Hours**
4	**SOLUTION OF NEVIER-STOKES EQUATIONS FOR INCOMPRESSIBLE FLOW USING MAC AND SIMPLE ALGORITHMS :**Staggered grid, solution of unsteady Nervier- Stokes equations, solution of energy equation, formulation of the flow problems, simple algorithm.	**08 Hours**
5	**INTRODUCTION TO FINITE VOLUME METHOD:** Integral approach, discretisation and higher order schemes, application to complex geometry.	**08 Hours**

B: TERMWORK:

Term work shall consist of eight assignments based on the above syllabus..

C: Suggested Text Books and References

Sr. No.	Title	Author	Publication.
1	Computational Fluid Mechanics and Heat transfer.	Anderson D.A. Tannehill J.C. and Pletcher R.H.	
2	Numerical Heat Transfer and Flow	Patankar S.V	McGraw Hill, New York, 2002.
3	Computational Methods in Fluid Dynamics	Ferziger J. H. and Peric M.	Springer, New York,2003

ELECTIVE-II

(BM 109) INDUSTRIAL ENGINEERING

Structure:

Teaching Scheme		Evaluation Scheme			
L	P	TW	PR	Th. Ex	Total
4	2	50	-	100	150

Objective:

Students are expected to understand various concepts in Industrial Engineering.

A: Theory:

Unit	Contents.	Duration
1	**INTRODUCTION:** Productivity, definitions of work study, scope, applications, relationship, between productivity & standard of living, basic work content, excess work content, Management, techniques to reduce excess work content due to product process and ineffective time in control of workers and Management.	03Hours
2	**WORK STUDY:** Definition, concept, relation with Productivity, human factors, good relations, work study versus Management, supervisor, work study man, qualities of work study man, working conditions, prevention accidents and hazards	03Hours
3	**METHOD STUDY:** Definition, objectives procedure factors affecting selection of work, recording techniques such as outline process short, flow process chart, factory layout, flow diagrams, developing new layout materials handling its principles and equipment, movement of workers and materials in working area, string diagram and its significance, travel chart, multiple activity chart and their significance Micro motion study, two handed process chart, principles, therbligs, simo chart, cycle graph, and use of limits in method study, MOST	07Hours
4	**WORK MEASUREMENT:** Techniques, Pm-pose, use & basic procedure time study equipment selection of jobs for time study, approach to workers, steps in time study, data collection about jobs, operator & surroundings breaking down jobs into elements, types of elements, selection and measurement of each element.	04Hours
5	**JOB EVALUATION AND MERIT RATING**: Introduction, Different techniques of job evaluation; Merits, Demerits, Techniques of Merit rating, Significance of Job evaluation / merit rating with work measurement	03Hours
6.	**TIME STUDY RATING AND ALLOWANCES**: Definition of rating, system of rating, wasting house system of rating skill & effort, synthetic rating & objective rating, use of rating factor, rating the job, normalizing observations, types of allowances, applying the allowances.	03Hours

7.	**WORKS MEASUREMENT TECHNIQUES**: Work sampling - need, establishing confidence levels, determination of sample size, ra:1dom observation, conduct of study, use of work sampling. General study of standard data & PMTS. Methods of Improving Materials Productivity, factors affecting materials productivity. Introduction to Business Process Reengineering	**04Hurs**
8.	**KAIZEN:** Continuous method improvement, Kaizan concept, Kaizen umbrella for quality improvement. Kaizen and management, implications of QC for Kaizen, kaizen and TQC, Kaizen and suggestion systems, Kaizen and competition, process oriented Management versus result oriented Management, Kaizen and innovation, Kaizen and measurement, PDCA cycle, Kaizen Management.	**03Hours**
9.	**SINGLE MINUTE EXCHANGE OF DIES(SMED):**: Aspects of setup activities, internal and external setup. Fundamentals of SMED, setup improvement, conceptual stages. Techniques for, streamlining the aspect of set up, effects of SMED. one minute exchange of die (OTED)	**05 Hours**
10.	**JUST IN TIME:** Concept, scope, objectives, push & pull system, reduced inventories and improved set up times, source of profit in manufacturing process, TOYOTA production system, basic assumptions of TOYOTA production system, leveling, smoothing out the production system, JIT and automation, workplace control through - the Kaizen system. Customizationofmanufacturing.	**05 hours**

B: TERMWORK:

Term work shall consist of eight assignments based on the above syllabus..

C: Suggested Text Books and References:

Sr. No.	Title	Author
1	Introduction to work study	ILO
2	Motion & Time study Design & Measurement of Work	Ralph Barnes (Wiley Eastern)
3	Work Study	R.M. Currie & J. Faraday
4	Hand Book of Industrial Engineering	Irson & Grant
5	Just In Time	David Hukins

6	Kaizen	Shyam.Talwadekar
7	Kaizen	Masaki Imai
8	SMED	Shino Shingo

(BM203) PROJECT – II

(Term Work 50 Marks, Practical Examination 100 Marks.)

1. Student/s shall have to continue with the projects approved in last semester.
2. It is recommended to follow schedule of activities planned and accordingly have to work for completion of project under the guidance of allotted teacher.
3. Regular monitoring and guidance is expected to complete project in specified duration.
4. Student/s will have to prepare report of project similar to the seminar report with hard binding and golden embossing. Report shall consist of at least contents as that of seminar report.
5. Pre-demonstration session shall be arranged at the term end, in order to observe completion of project, corrections, proofreading of report shall be done by guide and committee. Suggestions are to be given for minor improvements in the project/project report. (If any)
6. Projects / Project report must be ready in all respect at the time of final dissertation.

Term work marks will be allotted based on pre-demonstration performance, presentation and

percentage of theme achieved.

Practical examination shall be based on final demonstration / presentation. Performance and

percentage of theme achieved.

Note: Additional weight age shall be given to the projects participated in State / National / International competition.

Instructions:

1. The project report shall be typed on A-4 size white bond paper.
2. Typing shall be with spacing of 1.5 or 2.0 using black ribbon or carbon on one side of the paper.
3. Margins:- (i) Left 37.5 mm.
(ii) Right, top and bottom 25 mm.
4. Binding:- Hard with golden embossing on the front cover of blue colour

or soft comb binding with transp8.rent front cover and non transparent plastic blue/black cover.

5. From: cover in case of hard bound report:
   It should be identical to first title page.
6. Format for title page (First Page)

Report of the project
on
(Title of Project)
by
(Name of student)

Submitted in partial fulfillment of the requirements for the degree of Bachelor of
Engineering (Mechanical)
Department of Mechanical Engineering
(Name of the college)

7. Format for Certification page (i.e. Second page)

CERTIFICATE

This is to certify that the project entitled
"Title of Project"
Submitted by
(Name of Student/s) .
is completed as per the requirements of the Dr. Babasaheb Ambedkar Marathwada
University in partial fulfillment of degree of
B.E.(Mechanical)
For the academic year--------

Guide Head of Department Principal

8. The third page would be for acknowledgements which would be followed by index page.
9. Sketches should be drawn on separate sheet (minimum A4 size) and be inserted at proper places. The sketches should be drawn in black ink and be numbered.
10. Tables should preferably typed in the text only.
11. The mathematical symbol should be typed or neatly written so as to match darkness of the text.
12. The last item on the index should be references