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॥ अंतरी पेटवू ज्ञानज्योत ॥



North Maharashtra University,
Jalgaon

Syllabus for Forth Year Engineering
Degree Course (B.E.)

PRODUCTION

w.e.f. July, 2001

North Maharashtra University, Jalgaon

B.E. (Production Engineering) (1998 Course)

Term I

Sr. No	Subject Code	Subject	Teaching Scheme Hours/Week		Examination Scheme				
			Lectures	Practical	Paper Duration Hours	Maximum Marks			
						Paper	TW	PR	OR
1		Tool Design	4	2	3	100	25	-	25
2		Production, Planning & Control	4	2	3	100	25	-	25
3		Financial Management & Cost Control	4	2	3	100	25	-	25
4		Elective-I	4	2	3	100	25	-	-
5		** Project	-	*4	-	-	50	-	-
6		** Seminar	-	2	-	-	-	-	50
Total			16	14	-	400	150	-	125
Grand Total			30		-	675			

Note:- *During first 4 to 5 week theory related to project should be taught in practical hours only.

** Common to Mechanical, Production & Engg.

Term II

Sr. No	Subject Code	Subject	Teaching Scheme Hours/Week		Examination Scheme				
			Lectures	Practical	Paper Duration Hours	Maximum Marks			
						Paper	TW	PR	OR
1		**Tribology	4	2	3	100	25	-	25
2		**Cad/ Cam	4	4	4	100	25	-	25
3		Materials Management	4	2	3	100	25	-	25
4		Elective-II	4	2	3	100	25	-	-
5		**Project	-	4	-	-	50	-	50
6		**Technical Visits	-	-	-	-	50	-	-
Total			16	14	-	400	200	-	125
Grand Total			30		-	725			

Note:- ** Common to Mechanical, Production & Automobile Engg.
Total of Maximum of Term I & II = 1400

ELECTIVES

ELECTIVE -I

1. ENERGY MANAGEMENT
2. TOTAL QUALITY MANAGEMENT
3. AUTOMOBILE ENGG.-I
4. NON-CONVENTIONAL ENERGY
5. MANAGEMENT INFORMATION SYSTEM

ELECTIVE -II

1. MECHANICAL ESTIMATION & COSTING
2. INDUSTRIAL RELATIONS
3. AUTOMOBILE ENGG.-II
4. POWER PLANT ENGG.
5. FOUNDRY ENGINEERING

Term - 1st
TOOL DESIGN
(B.E. Prod)

Teaching Schedule:

Lectures: 4 hrs/week
Practicals: 2 hrs/week

Examination Schedule:

Theory Paper: 100 marks
Termwork: 25 marks
Oral: 25 marks
Paper Duration: 3 Hrs

UNIT - I. 9 hrs
Mechanics of Metal Cutting including Merchant's Theory, Cutting forces/power and their empirical estimations for various metal cutting processes and their estimation by dynamometer. Machinability, tool wear and tool life. Heat generation in metal cutting and cutting fluid/coolant. Estimation of cutting tool, cutting tool materials. Weightage = 20 marks

UNIT - II. 9 hrs
Design of following cutting tools: Single point tools, form tools, drills, reamers, broaches, milling cutters, thread cutting tools, taps. Weightage = 20 marks

UNIT - III. 9 hrs
Classification of Jigs & Fixtures, its significance, principles of Jig and fixture design - operation, analysis, locations, clamping, chip control, positioning, tool guide, fool-proofing, indexing, standard-parts, safety, constructional methods of jigs and fixtures. Weightage = 20 marks

UNIT - IV. 9 hrs
Basic types of press working operations and equipments, general classification and components of press tools, Design features/principles of press tools for various press working operations like blanking, piercing, bending, forming, deep drawing, etc. Design of combination and progressive dies. Mounting and adjustment, tool making and maintenance of press tools. Weightage = 20 marks

UNIT - V. 9 hrs
Introduction to Pressure die casting dies, plastic injection and blow moulding dies, forging dies. Design calculation of cavity, shapes, shrinkage and other allowance. Use of computers in die design. (Computer programming should not be asked in exam.) Weightage = 20 marks

Term-work:-

1. Live demonstration of HSS, Carbide tools, tool holders and IS codes related to above syllabus.
Assignment on selection of tool for cutting data.
2. Three experiments on tool force measurement using tool dynamometers. e.g. lathe, drill, milling, shaper, slotter, etc. Design and drawing of three cutting tools required for different machine tools.
3. Design and working drawing of (with tracings and blue print) of
 - a) One Jig
 - b) One fixture for any machine operations
 - c) Progressive press tool
 - d) Deep drawing tool or Bending press tool.

Note:- (i) Use of computers should be done for the above designing and drawing. i.e. use of softwares like ideas, pro-engineer, etc.

(ii) For every batch, one working drawing should be on tracing paper and with the help of autocad.

4. An industrial tour (local also) should be arranged where all the above syllabus will be covered.

5. Solid Modelling of any one cutting tools by using CAD/CAM software. (compulsory)

Oral:

Oral will be based on the termwork which is in the form of prescribed journal.

Recommended Books:

- | | |
|------------------------|--------------|
| 1. Tool Design | by Donaldson |
| 2. Die Design Handbook | by SME |
| 3. Jigs & Fixtures | by P H Joshi |
| 4. Press Tools | by P H Joshi |

Term - 1st
PRODUCTION PLANNING & CONTROL
B.E. (Prod.)

Teaching Scheme :
Lectures : 4hrs/week
Practicals: 2 hrs/week

Examination scheme:
Paper : 100 marks
Termwork : 25 marks
Oral : 25 marks
Paper Duration: 3 hrs

Unit I: 9 hrs
i) Meaning, scope, objectives & function of Production Planning & control. Types of PPC organisations. Role of PPC in the organisation. Relation of PPC with other departments
ii) Forecasting - Use of forecast, type of forecasts, accuracy, statistical forecasting, various types of forecasting methods. Comparative study, verifying and controlling the forecasting
Weightage = 20 marks
9 hrs

Unit II: 9 hrs
PRODUCTION PLANNING
Planning functions, forecasting, routing, scheduling, loading, types of production & their characteristics - continuous & intermittent Production. Determination of capacity, Division of capacity, Sequential load statements, Scheduling, Machine capacity, make or buy decision. Production Plan.
Weightage = 20 marks
9 hrs

Unit III: 9 hrs
Definition, despatching, follow-up and coordination with various departments
a) Despatching - Job orders & Issue systems
b) Follow-up - Progressing, types of feedback systems, Preventing production delays, causes of delays
c) Evaluation - Definition, need, importance & advantages of evaluation
Weightage = 20 marks
9 hrs

Unit IV : LINE BALANCING 9 hrs
Basic terminology and concepts, methods of solutions for problems involving minimisation of the number of work stations for a given cycle time and minimisation of cycle time for a given no. of work station. Methods of line balancing, capacity. Planning, man power planning.
Weightage = 20 marks

Unit V : PERT/CPM

9 hrs

Network construction, Fulkerson's cycle, Activity time estimation and Time analysis, Types of float, Probability aspects. Project, Planning, Cost analysis and crashing of activities, project scheduling & monitoring. Resource Smoothing & levelling. Learning curve (Computer)

Weightage = 20 marks

TERM WORK will consist of eight assignments with assignments from each unit.

Oral:

Oral will be based on the termwork which is in the form of prescribed journal.

RECOMMENDED BOOKS:

1. Production Planning & Control - Samuel Elion
2. Production Planning & Control - L.C.Jhamb
3. Forecasting Production planning & control - M.C.Niece
4. Production/Operation Management - P.C.Moore
5. Production, Planning, Control & Integration - by Sipper - McGraw Hill

Term - 1st

FINANCIAL MANAGEMENT & COST CONTROL

B.E.(Prod)

Teaching Scheme :

Lectures : 4hrs/week
Practical: 2 hrs/week

Examination scheme:

Paper : 100 marks
Termwork : 25 marks
Oral : 25 marks
Paper Duration: 3 hrs

UNIT - 1

(8 hrs)

Tools of financial Analysis - funds flow analysis, sources and use of funds, balance sheet and profit and loss statement, measurement of cash flows, revenue costs, profits relationship, break even analysis, ratio analysis, Analysis of operating and financial leverage, long term and short term cost, output relationship statement of changes in financial position.

Weightage = 20 marks

UNIT - 2

(8 hrs)

Financial Planning & Budgeting :- Financial forecasting, forecasting techniques, criteria for investment decisions, capital budgeting, capital rationing, sources of raising capital. Procedure for negotiation with financial institution for raising fixed and working capital. Management of working capital. Internal financing, dividend policy, cost of capital. Problems of financial planning and budgeting in public sector undertaking.

Weightage = 20 marks

UNIT - 3

(8 hrs)

Theory costing, need of costing, classification, system and methods of costing, manufacturing account. Elements of cost - material, labour, expenses, Overheads. Direct and indirect cost, fixed and variable cost, other classifications.

Weightage = 20 marks

UNIT - 4

(8 hrs)

Cost allocation - cost accumulation and allocation. Allocation of cost of service departments, allocating cost from one department to other.

Depreciation - various methods for calculating depreciation. Standard costing concept. Development and use of standard costing. Variance analysis. Budget and budgetary control.

Weightage = 20 marks

UNIT - 5 (8 hrs)
Marginal costing, use of marginal costing in decision making.
Cost volume profit analysis, assumptions, determination of break
even point, CVP under multiple products.
Process costing - concept, transfer cost, concept of by-products,
scrap, waste, losses. Weightage = 20 marks

TermWork:

Minimum eight assignment on the above topics; each assignment
should have case studies or problems of the related topic.
Minimum one assignment should be from each unit.

Oral:

Oral will be based on the termwork which is in the form of
prescribed journal.

Recommended Books:

1. Financial Management by Khan, Jain ; TMH publications
2. Financial Management by Pandey; Vikas Publishing House, New Delhi
3. Cost accounting by Bhar; Academic Publishers, Calcutta.
4. Accounting for management text and cases
by Bhattacharya S K, Vikas publishing.

Elective - 1
ENERGY MANAGEMENT
B.E. (Prod)

Teaching Scheme :

Lectures : 4hrs/week
Practical: 2hrs/week

Examination scheme:

Paper : 100 marks
TermWork: 25 marks
Paper Duration: 3 hrs

UNIT - 1 (8 hrs)

Energy conversion:

Energy resources, consumption, conservation. Historical patterns,
potential for energy savings.

Energy Audits:

Introduction, elements of energy audit, measurement in energy
audits, presentation of energy audit results.

Economic investment analysis, utility rate structures.

Weightage = 20 marks

UNIT - 2 (8 hrs)

Energy conservation in combustion systems:

Introduction, boiler and heater performance, principles of
combustion analysis, fuels and their properties, combustion
system efficiency calculations (no problems in exam), testing
combustion equipment, efficiency improvement of combustion
system.

Estimation of steam usage, steam traps, condensate line.

Weightage = 20 marks

UNIT - 3 (8 hrs)

Heat recovery:

Waste heat classification, recuperators, regenerators, heat
wheel, heat pipe, heat pumps, waste heat boiler, air preheater,
economisers.

Industrial Insulation:

Properties and characteristics, selection, economical thickness.
Industrial co-generation: Topping and bottoming cycle, steam and
electrical tracking, pumped hydro and compressed air systems.

Weightage = 20 marks

UNIT - 4 (8 hrs)
 Artificial lighting and day lighting: concepts, types, requirements, design strategies.
 Energy conservation in buildings: HVAC systems, passive building concepts.
 Electrical systems: Sources of losses, variable speed drives, demand control.
 Industrial energy use profiles: Primary metals, cement industry, paper industry, food industry, chemical industry.
 (No problems on this unit) Weightage = 20 marks

UNIT - 5 (8 hrs)
 Energy Auditing Techniques: Concepts, Instruments, Techniques of buildings, electrical systems, mechanical systems, lighting, chemical processes, utilities; data collection and analysis, identification and ranking of energy conservation measures, implementation.
 (No problems on this unit.) Weightage = 20 marks

TermWork

Minimum eight assignment on the above topics; each assignment should have case studies of the related topic.
 Minimum one assignment should be from each unit.

Recommended Books:

1. Industrial Energy Management Principles by Carig Smith.
2. Energy Management & Conservation by D Patrick.A

Elective - 1 TOTAL QUALITY MANAGEMENT B.E.(Prod)

Teaching Scheme :
 Lectures : 4hrs/week
 Practical: 2hrs/week

Examination scheme:
 Paper : 100 marks
 TermWork: 25 marks
 Paper Duration: 3 hrs

UNIT - 1 (8 hrs)
 Evolution of total quality control and management. Historical perspective. Business Quality Management, Quality as an integral part of business Planning through quality assurance, profitability improvement, Cost reduction and return-on-investment performance from quality programs. Cost effective systems management. Systems approach to quality and economics. Weightage = 20 marks

UNIT - 2 (8 hrs)
 Elements of TQM, Management Strategies for quality through education and training, employee-participation programs like round tables and quality circles. Quality engineering customer quality requirements and quality policy. Analysis and planning of quality activities. Process control engineering w.r.t. vendor, material, production and customer services, Quality information equipment engineering w.r.t. inspection and testing. computer aided quality information processing and control. Statistical methodology in total quality control, frequency distribution control charts, sampling tables, special methods and product reliability. Weightage = 20 marks

UNIT - 3 (8 hrs)
 Application of quality control to company problems with emphasis on basic area via. new design control, improvement of design quality of existing product, closed integrated control activities with vendor and supplier where cost-effective burden of quality

proof rests, in-coming material control, product control w.r.t. pre-production, in-process, final assembly, shipment and field product service, and special process studies having programs both for systematic quality improvement and permanent corrective action to eliminate quality deficiencies. Weightage = 20 marks

UNIT - 4 (8 hrs)
ISO 9000, deming wheel, deming 14 points-pros & cons in Industrial Engineering context, Philip crosby philosophy, juran philosophy, tshikawa diagram, just-in-time philosophy. Just-in-time management, problems of queues tendts of JIT. Load smoothing, push vs pull method of production, set-up time reduction.
Introduction to quality assurance, difference between inspection, quality control and quality assurance. Weightage = 20 marks

UNIT - 5 (8 hrs)
Total productive maintenance, Kaizen and continual improvement, cost benefit analysis, life-cycle costing. Application of TQM to service type organization. Service guarantee, case studies on application of TQM. Vendor inspection, process capability study, field complaint analysis, quality audit system. Weightage = 20 marks

TermWork

Minimum eight assignment on the above topics; each assignment should have case studies of the related topic.
Minimum one assignment should be from each unit.

Recommended Books:

1. Quality planning and analysis by Juran
2. Total quality control by Armond
3. Quality systems by Dalela, standard publishers, Delhi.
4. TQM & IS 14000 by K C Arora, S K Kataria & sons, Delhi.

Elective - 1
AUTOMOBILE ENGINEERING - I
B.E. (Prod)

Teaching Scheme :
Lectures : 4hrs/week
Practical: 2hrs/week

Examination scheme:
Paper : 100 marks
TermWork: 25 marks
Paper Duration: 3 hrs

UNIT - 1 (8 hrs)
GENERAL: Vehicle specifications, vehicle layout, types of vehicles and their applications, two and four wheelers, cars, light commercial vehicles, trucks, buses, earth moving machinery, of highway vehicles, agricultural tractors, construction of automobile and various systems of automobile.
CHASIS & FRAME: Frame, subframe, integral construction frame alignment, body, dumpers, doors, hood, articulated vehicles, trailers and safety considerations. Weightage = 20 marks

UNIT - 2 (8 hrs)
SPRINGS & SUSPENSIONS:
Types of springs and suspensions, coil and helical springs, leaf spring, transverse leaf spring suspension, Torsion bar, independent suspension, self levelling, suspension, pneumatic suspension, rubber suspension, antiroll bars, gas hydraulic suspension, shock absorbers, construction, working and types, front and rear suspension, basic suspension, movements, bouncing, pitching, rolling, knee action spring. Effect of suspension on

tyre wear and on handling and stability of vehicles.
Determination of roll axis. Ride evaluation suspension for two wheelers. Weightage = 20 marks

UNIT - 3 (8 hrs)
TRANSMISSION: Requirements of transmission system, types of transmission system, mechanical system, overdrives, construction of gear boxes, sliding mesh and constant mesh types, control mechanism - synchromesh devices, epicyclic and preselector gear boxes. Hydraulic transmission and its advantages, planetary gears, fluid couplings and torque - converter transmissions, automatic transmissions in different vehicles.
Weightage = 20 marks

UNIT - 4 (8 hrs)
PROPELLER SHAFT, DRIVE AXLE & DIFFERENTIAL: Drive shaft universal joints, principles of operation and constructional features. Drive axle, front and rear wheel drive axles, function of live axle. Single, double and triple axles. Torque shaft mountings, construction and principle of operation of differential friction in differential, conventional, double reduction and non-slip differentials, half-shafts, differential locks and their use.
Weightage = 20 marks

UNIT - 5 (8 hrs)
STEERING SYSTEM: Function and geometry-caster, camber, toe-in, toe-out, steering linkages and gears, differential steering systems, steering characteristics, alignment of front wheels, power steering. Road feedback, driving and braking of steered wheels. Analysis of steering forces, skip angles, tyre parameters like pneumatic trailing pin angles, scrub radius, centre point steering.
Weightage = 20 marks

TermWork:

Minimum eight assignment on the above topics; Minimum one assignment should be from each unit.

Recommended books:

- | | | | |
|----|-------------------------|----|--------------|
| 1. | Automotive mechanics | by | Crouse |
| 2. | Automotive Engineering | by | Narang |
| 3. | Automobile Engg. I & II | by | Kirpal Singh |
| 4. | Automobile Chassis | by | Heldt |
| 5. | Automotive mechanics | by | Heitner |

ELECTIVE - 1
NON-CONVENTIONAL ENERGY SOURCES
B.E. (Mech/Prod)

Teaching Scheme:
Lectures : 4 Hrs/week
Practical: 2 Hrs/week

Examination Scheme:
Paper: 100 marks
Term work: 25 marks
Paper Duration : 3 hrs

UNIT I:- 9 hrs
1. Solar Energy: Availability, Limitations, energy by efficiency by 1st & 2nd law of thermodynamics. Use of solar energy.
2. Solar radiation: Physics of the sun. Energy radiated by the sun. Geometry of solar radiation. Measurement of solar radiation, Computation of solar radiation on inclined surface.
Weightage= 20 marks

UNIT II:-

9 hrs

3. Flat plate collectors: Energy balance for a flat plate collector. Simple equation and performance curves. Selection of flat plate collector, Collector efficiency factor, Collector heat removal factor, material for collectors.

4. Solar concentrator: Limitations of flat plate collectors. Various concentration their advantages, simple thermal energy balance equations. Parabolic, parabolic through, heliostats. Selection of various materials for concentration.

Weightage= 20 marks

UNIT III:-

9 hrs

5. Solar heating systems: Solar water and heating systems. Types of solar water heater, Passive solar heating systems. Solar heating economics.

6. Solar distillation systems: Various solar stills. Design and selection.

7. Solar electric power and process heat: Solar photo voltaic system. Materials used and their performance.

Solar thermal power plant: Fluid need, temperature required, various systems used and their performance.

Weightage= 20 marks

UNIT IV:-

9 hrs

8. Wind energy: Availability of wind, Various types of winds & their performance.

9. Geothermal energy: Various types of geothermal power plants.

10. Ocean thermal energy: Comparison of various plants. Principle working of OTEC.

Weightage= 20 marks

UNIT V:-

9 hrs

11. Tidal energy: Tidal energy available in India. Suitable locations. study of various tidal energy power plants. Characteristics of turbine required.

12. Bio gas: Chemistry of biogas generation variables affecting simple gas plants. Use of bio-gas for diesel engine.

Weightage= 20 marks

TERMWORK:-

Eight assignment based on above syllabus.
Minimum one assignment from each unit.

RECOMMENDED BOOKS:-

1. Krieten and Krieder: Principles of Solar engineering. McGraw Hill Books Co.
2. S.P. Sukhatme: Solar energy
3. G.D. Rai: Solar thermal Engineering.
4. Wakil: Power plant engineering.
5. H.P. Garg and J. Prakash: Solar energy, Tata McGraw Hill Books

Elective - 1
MANAGEMENT INFORMATION SYSTEM
B.E. (Prod)

Teaching Scheme :
Lectures : 4hrs/week
Practical: 2hrs/week

Examination scheme:
Paper : 100 marks
TermWork: 25 marks
Paper Duration: 3 hrs

UNIT - 1

(8 hrs)

MIS: Introduction to Management information system (MIS), MIS pyramid, components of total MIS, developing a long range information system, management reporting system, information retrieval, systematic analysis of information.

Weightage = 20 marks

UNIT - 2 (8 hrs)
MIS & Organisation Chart: MIS approach to organisation, transaction processing system, marketing, inventory, manufacturing, financial planning, decision concept, control/feedback system. Weightage = 20 marks

UNIT - 3 (8 hrs)
System Analysis: Structure of system analysis, identification of need, feasibility study, economic analysis, technical analysis, role of system analyst, skills of system analyst. Weightage = 20 marks

UNIT - 4 (8 hrs)
Database System: Introduction to database, purpose of database system, database administrator, ER model, recoverability from failure, concurrency, serialiability. Weightage = 20 marks

UNIT - 5 (8 hrs)
Software development:- Different approaches to software development, classic methods, prototyping, spiral model, \$GL, software myths, software testing, software maintenance, DFD, CASE. Weightage = 20 marks

TermWork:

Minimum eight assignment on the above topics; each assignment should have case studies of the related topic.
Minimum one assignment should be from each unit.

Recommended Books:

1. Management Information System by Davis, McGraw Hill, New York
2. Information System for Modern Management by Mudrick, Ross; PHI
3. MIS by Jawadekar, Venus Prakashan, pune.

Term - 1st
PROJECT
B.E. (Mech/Prod/Auto)
(Continued in 2nd semester)

Teaching Scheme :
Lectures : 4hrs/week

Examination scheme:
Termwork : 50 marks

OBJECTIVE: To provide an opportunity to students to work independently on a topic/problem/experiment selected by them and encourage them to think independently of their own to bringout the conclusion under the given circumstances of the curriculum period in the budget provided with the guidance of the teachers. To encourage creative thinking process. This helps them to get confidence by planning and carrying out the work plan of the project and to successfully complete the same, through observations, discussions and decision making process.

Number of students in a batch:

Not more than four students should work in a group for a topic. Project may be taken up by an individual or in a group. A batch of not more than 10 students (per branch) shall work under the guidance of a teaching staff member. A project group shall submit atleast 4 titles to their suggested guides out of which one shall be approved by the respective guide.

TOPICS:-

Project work shall be based on any of the following topics:
1. Fabrication of model/products, testing set up or setting up of an experimentation unit/apparatus/small equipment individually

or in a group.

2. Extensive numerical analysis of some problem may be carried out using computer.
3. A report on the complete design, process charts, costing of a product/machine/prototype.
4. Experimental verification of principles used in Mech/Prod/Auto Engg. applications.
5. Design of equipment/project/gadget device and its fabrication.
6. Extensive survey of industrial problems/systems/SSI units/Entrepreneurs based on actual field visits and consultation with experts.
7. Projects/problems related to the area of creative design to solve the problems referred to by the industries around.

FORMAT OF PROJECT REPORT

The project report should be typed with double space on A-4 size bond paper should be not more than 70 pages and not less than 25 pages and figures, graphs, annexures, etc. The project report should be written in the following format:

1. Title sheet
2. Certificates
3. Acknowledgement
4. Contents
5. Abstract
6. List of figures/photographs/graphs/tables (xeroxing of illustrative matter such as the photographs, figures, tables and other data from handbook etc. must be acknowledged on the appropriate pages of the report).
7. Introduction
8. Literature survey/Theory
9. Design/Experiment/Fabrication/Production/Actual work carried out of the same.
10. Observations/Results.
11. Discussions of results and conclusion.
12. References.
These references should be given in the standard format as that of international technical journals.
13. Annexures, Appendices, etc. if any.

Two copies of hard bound report should be submitted to the Institute/Department (One for university and one for college) and one should remain with every student in a group.

Project work (termwork) assessment shall be based on the project report submitted and presentation of the project may be made with the help of charts, photographs, blackboard, slide, overhead projector, etc. by the student of his work. The presentation should be around 15-20 minutes, followed by question/answer session in the presence of fellow students and guide and teachers in the department.

HOD + three senior most staff member should work as co-ordinator for a class for uniform assessment of presentation of all students to avoid variation in project termwork marks.

Distribution of termwork marks (project work) :

70% marks shall be given by the guide, 10 % marks for first presentation (progress) and 20 % marks for final presentation shall be given by the co-ordinating staff committee including based on the presentation of the project in class by the student as mentioned above.

College should submit detailed progressive assessment report of the students getting more than 90% marks in termwork alongwith the marksheets.

Viva-voice or oral examination (as university examination) shall be conducted by the guide and one external examiner appointed by

university in the college campus.

Note: College should send the project list to the university for acceptance in second week after the starting of 7th semester.

Term - 1st

The project work will be selected in the 1st semester. Initial layout, design and theoretical determination of all the main parameters will be finalised in 1st semester. Student should submit the termwork in the first semester shall consist of

1. Synopsis
2. Detail planning of project work
3. Literature of work done in project in first term.

Term - 1st

SEMINAR

B.E. (Mech/Prod/Auto)

Teaching Scheme :
Practical: 2 hrs/week

Examination scheme:
Oral : 50 marks

Student individually will independently study a topic assigned to them and submit a report and deliver a short seminar/lecture on that topic.

Seminar should be based on deep study of any topic related to mechanical/production/automobile engineering.

- e.g.
- a) Advanced Manufacturing Processes.
 - b) Latest materials and their manufacturing properties.
 - c) Socio-economic impact of manufacturing activities.
 - d) Environmental problems involved in manufacturing.

TermWork:

Two copies of spiral bound report should be submitted to the Institute/Department (One for university and one for college) and one should remain with every student in a group.

The report will contain the summary of information collected by the students. The reports will be of A-4 size, spiral bound and should contain all the necessary charts, drawings, references, etc.

Oral:

The presentation should be around 10-15 minutes, followed by 10 minutes question/answer session in the presence of external examiner, fellow students and guide and teachers in the department.

Term - 2nd

TRIBOLOGY

(B.E. Mech & Prod)

Teaching scheme
Lectures : 4 hrs/week
Practical: 2 hrs/week

Examination scheme
Theory : 100 marks
Term work: 25 marks
Oral : 25 marks
Paper Duration: 3 hrs

UNIT I:-

1. Tribology: Introduction, Tribology in design, Tribology in industry, Economic considerations. 9 hrs

2. Mechanics of Rolling motion: Introduction, Free rolling, Micro slip in rolling, tyre Road contacts.
3. Friction: Introduction, Laws of friction, kinds of friction, cause of friction, friction measurement, theory of friction, variables in friction. Friction in Stability- Characteristics of friction variations, analysis of stick- slip oscillations and its elimination.
4. Wear: Types of wear, Various factors affecting wear, measurement of wear, wear between solids, between metals and flowing liquids. Weightage= 20 marks

UNIT II:-

9 hrs

Lubricants & Lubrications: Lubricants- Properties- physical and chemical.

Lubrication - Introduction, basic modes of lubrication- Thick film, Thin film, boundary lubrication. Hydrostatic & Hydrodynamic lubrication, squeeze film lubrication, elasto hydrodynamic lubrication, pressure viscosity term in Reynolds equation, Hertz theory, Ertel - Grubin equation, Lubrication of spheres, gear teeth & rolling elements bearings. Flow of viscous fluid through various slots. Seals- Mechanical & Dynamic. Weightage= 20 marks

UNIT III:-

9 hrs

1. Hydrostatic bearings: Basic concepts, operations, advantages & limitations. Hydrostatic step bearing, conical & spherical bearings, load carrying capacity & flow of lubricants, controlling of flow through restricters, Influence of restrictors on performance, Bearing power & film thickness, bearing temperature & power. Hydrostatic lifts- Lubkin Solution.

2. Hydrodynamic bearings: Theory of Hydrodynamic lubrications, mechanism of pressure development in oil film. Infinite tapered shoe slider bearing. Sommerfield & honrism solution for an infinite journal bearings. Short bearing theory applied to journal bearing. Practical design considerations. Weightage= 20 marks

UNIT IV:-

9 hrs

1. Friction & power losses in Journal Bearing: Evaluation of friction loss in concentric & eccentric journal bearing & quality of oil flow with circumferential groove & hole source for heat balance.

2. Hydrodynamic thrust bearing: Introduction, flat plate, thrust learning, step thrust bearing, tapered land thrust bearing, tilting pad thrust bearing, spring mounted thrust bearing, hydrodynamic, pocket thrust bearing. Weightage= 20 marks

UNIT V:-

9 hrs

1. Hydrostatic squeeze film, circular & rectangular plates, Impact conditions between lubricated solids, application to journal bearing.

2. Air lubricated bearings: Tilting pad bearings, Magnetic recording disks with flying head hydrostatic, hydrodynamic thrust bearing with air lubrication.

3. Lubrication practice, Quality control & Management: Characteristics of lubricating method, lubricating devices and systems, organising a plant lubrication program. Typical Industrial systems. Service application chart. Weightage= 20 marks

TERM WORK:-

Assignments based on

1. Design of aurostatic bearing.
2. Squeeze film lubrication of piston pin.
3. Heat balance in bearings.
4. Reynolds equation

Practical on-

1. Journal bearing Apparatus
2. Tilting pad thrust bearing apparatus
3. Friction in journal bearing
4. Four ball tester
5. Coefficient of friction using pin on disk type friction monitor.
6. Brake line friction test rig.

NOTE:- Oral will be based on the prescribed termwork presented in the form of certified journal.

RECOMMENDED BOOKS:-

1. Basic lubrication theory: A. Cameron
2. Theory and practice of lubrication for Engineers: D.D.Fuller, John Wiley & sons 1984.
3. Fundamentals of friction & wear of materials: American Society of metals.
4. The design of Aerostatic Bearings: J.W.Powell
5. Gas Bearings: Grassam & Powel
6. Principles of Tribology: Edited by j. Halling
7. Friction, Wear, Lubrication- Tribology Handbook: Edited by Prof. I.V.Kragelsky.
8. Friction & wear: PUGH B.
9. Tibology Handbook: Neal M.J.Butterworth.
10. Fundamentals of fluid film lubrication : Hamrock; MCGraw Hill.

Term - 2nd
CAD/CAM
B.E.(Mech/Prod)

Teaching Scheme :	Examination scheme:
Lectures : 4hrs/week	Paper : 100 marks
Practicals: 4hrs/week	Termwork : 25 marks
2hrs for c++	Oral : 25 marks
& 2hrs for ideas, ansys, etc.	Paper duration : 4 hrs

UNIT 1: (9 hrs)

BASICS OF CAD/CAM:

Definition: Concept, product life cycle and CAD/CAM, Reasons for implementing CAD systems, Computer aided design process and various steps in it. Benefits of CAD. Integration of CAD/CAM, necessity, automation. Types of automation. Application of CAD/CAM. Wire frame modelling, surface modelling, solid modelling. Introduction to rapid prototyping or layered manufacturing technology. Concurrent engineering. (Weightage: 20 marks)

UNIT 2: (9 hrs)

INTERACTIVE COMPUTER GRAPHICS:

Definition, concept, two dimensional transformations, scaling, translation, rotation. Matrix representation and homogeneous co-ordinates. Composite transformations. Curves and surfaces. Parametric and non-parametric representation of curves and surfaces. Bezier curve, BSpline curve, Bezier surface, B-Spline surface. (Generation of all above curves and surfaces using c++ programming)

NOTE: C++ programming is limited for practical class only. It should not be asked in theory paper.) (Weightage: 20 marks)

UNIT 3: (9 hrs)

FEM ANALYSIS AND ITS APPLICATION:

Introduction, process of FEA, physical problems, mathematical models and the finite element solution. Finite element analysis as an integral part of CAD.

Heat transfer analysis: Governing heat transfer equations.
Incremental equations, torsion.
FEM analysis of rolling and extrusion processes, 2-D analysis.
(Weightage: 20 marks)

UNIT 4:

(9 hrs)

FMS, GT (CAM)

Components of computer integrated manufacturing systems. Building blocks of flexible manufacturing systems. FMS in job, batch and mass production. Machining systems of FMS. Tool management systems. Workpiece handling systems. Flexible manufacturing cell. Means to achieve various types of flexibilities such as machine process, material handling, product, production flexibility.

GROUP TECHNOLOGY:

Models and algorithms, visual methods, coding method, cluster analysis method, matrix formulation, mathematical programming formulation, graph formulation.

Concept of cellular manufacturing, types of cell manual and robotized, method of cell formation, advantages of cellular manufacturing.
(Weightage: 20 marks)

UNIT -V: ROBOTS:

Components, classification, selection, sensor technology. Robot arm trajectory, arm dynamics, trajectory planning, robot grippers.

Robot Kinematics: Object location, transformations (2d & 3d), direct & inverse kinematics, manipulator motion. Mathematical model of servo system.

REVERSE ENGG:

Basic steps in reverse engg., such as Data capture, Preprocessing, Segmentation and Surface fitting, 3D CAD model creation, Application of Reverse Engg.
(Weightage: 20 marks)

TERM WORK: (ANY FIVE):-

1. Design of any of the subsystem of compressor, condensor or evaporator in "C" language.
2. Design of any one of the following: Piston, cylinder, Connecting rod, Crankshaft, Valves, etc. with the help of "C" language.
3. Drafting of any one of the following components - Rotor and stator blades, casing, bearings, etc. with the help of Autocad.
4. Use of generative manufacturing processes for rapid prototyping.
5. Use of software packages like I-deas, Pro-E, Catia, Unigraphics, Surfcam, Mastercam, etc. for solid modelling of any engg. component.
6. Reverse engg. of any Geometric model.
7. Problems on FEM (Gears, etc).by using CAD/CAM packages like I-deas, Ansys, etc.
8. Program for transformations - translations, rotation, scaling.
9. Assignment on Robot programing. (compulsory) (practical purpose only)
10. Assignment on FMS, group technology. (compulsory)

NOTE: Any software package can be used for performing above termwork.

ORAL:-

Oral will be based on above termwork only. Scope of programming should be restricted to practicals only.

REFERENCE BOOKS:-

1. CAD/CAM by Ibrahim Zeid.
 2. CAD/CAM by Ramamuruti.
 3. CAD/CAM by Zimmer, Groover.
 4. Introduction to FEM by N S Ottoson
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Term - 2nd
MATERIALS MANAGEMENT
B.E. (Prod.)

Teaching Scheme :
Lectures : 4hrs/week
Practicals: 2 hrs/week

Examination scheme:
Paper : 100 marks
Termwork : 25 marks
Oral : 25 marks
Paper Duration: 3 hrs

UNIT I: 8 hrs
Definition, objectives, scope, function & importance of Materials Management. Need for integrated materials concept. Materials planning & Budgeting. Techniques of Materials requirement Planning. Role of Materials Management in increasing Profitability of an organisation. Vendor & Vendorselection, training & development of vendors, vendor rating. Organisation for Materials in a company. Weightage = 20 marks

UNIT II: Purchasing 9 hrs
Goals and objectives of purchasing. Purchase system, Purchase cycle, Purchasing methods, Purchase documents, Purchasing policies, Purchasing of seasonal commodities, Capital Equipment & Purchasing under uncertainties. Purchase budget. Role of Purchasing in Business, Purchasing role in new Product development. Pricing principals. Weightage = 20 marks

UNIT III: International Purchasing 9 hrs
Need of International Purchasing & nature of documents in International purchasing. Import substitution, Export-Import Policies. Export promotion incentives & subsidies. Problems associated with International Procurement. Import cycle. Identifying & qualifying, Potential International suppliers. Weightage = 20 marks

UNIT IV: Inventory Management: 9 hrs
Definition of Inventory, types of Inventories, Relevant costs in Inventory, Static Inventory models, Single order inventory model, Dynamic inventory control model under certainty. Probabilistic inventory control models. Selective inventory control. ABC analysis. Use of Computers in inventorycontrol. Value analysis. Weightage = 20 marks

UNIT V: Stores Management 9 hrs
Function, layout & organisation for stores. Waste, obsolete, surplus and scrap management. Stores systems & procedures. New development in storing material. Codification, classification, vendor codes, computer application in materials management such as Materials Planning, vendor rating, Selective control of inventories, Stock control, etc. Stores accounting and stock verification. Weightage = 20 marks

TERM WORK:

1. Minimum six assignments on the above topics.
2. Two assignments of computer application in materials management. (Use of Foxpro language for developing practical applications)

RECOMMENDED BOOKS :

1. Purchasing & Inventory control function - K.S.Menon
2. Integrated Material Management - Gopal Krishna & Sundersan
3. Inventory Control - L.C.Jhamb
4. Purchasing - Dobler

Elective - 2
MECHANICAL ESTIMATION & COSTING
B.E. (Prod)

Teaching Scheme :
Lectures : 4hrs/week
Practical: 2hrs/week

Examination scheme:
Paper : 100 marks
TermWork: 25 marks
Paper Duration: 3 hrs

UNIT - 1 (8 hrs)
Process estimation- introduction, importance & objectives of estimation, constituents of estimate forms.
Process of costing- Difference between estimating and costing.
Advantages of costing, elements of costing, method of costing, method of calculating depreciation. Grouping of cost elements.
Numerical on above topics. Weightage = 20 marks

UNIT - 2 (8 hrs)
Mensuration in estimating-calculations of the volume & weight of the machine parts as per finished dimensions.
Estimation of rough casting, calculations of weight of casting, calculations of costing (material, labour, machining cost etc.) considering all types of allowances. All types of numerical for calculating cost of finished cast iron parts & calculation procedures. Weightage = 20 marks

UNIT - 3 (8 hrs)
Estimation of forged parts- Introduction, losses in forging, length of stroke, calculations for length of stroke required for finished forged product such as bolts, reets etc, considering all losses.
Estimation of welded jobs- Fabrication, welding procedures, welding costs. Power consumption & welding rates. Calculation procedure & numerical on cost estimation of welding jobs. Weightage = 20 marks

UNIT - 4 (8 hrs)
Mechanical time calculations- Introduction, set-up time, operation time, tear down time, personal allowance, fatigue allowance.
Travel of tool, feed, depth of cut, rpm, cutting speed.
Calculations for machining time for turning, boring, chamfering, drilling, reaming, threading, tapping, grinding of finished product.
Estimation of wood work- Furniture & patterns, Pattern material pattern allowances, estimation of wood for pattern & furniture.
Estimation of cost of pattern & furniture.
Numericals are included. Weightage = 20 marks

UNIT - 5 (8 hrs)
Estimation of sheet material works- Operations in sheet metal work, calculation of blank size, blank layout, sheet metal joint, types of presses capacity of a press, estimation of time Numerical.
Methods of wage payments- Time or day rate method, unit or piece rate method, combination method, incentive wage system, premium bonus plans. Weightage = 20 marks
TERM WORK:-
Minimum 8 assignments on the above topics. Each assignment should have problems of the related topic.

- RECOMMENDED BOOKS:-**
1. Mechanical estimating & costing by B.P.Sinha - Tech. Edu. series.
 2. Estimation & costing for mechanical students - T.P.Mukharji, P.G. Goswami.
 3. Mechanical estimating & costing by Banga Sharma
 4. Estimating & costing - D.M.Mukharjee.

Elective - 2
INDUSTRIAL RELATIONS
(B.E.Prod)

Teaching Scheme :
Lectures : 4hrs/week
Practical: 2hrs/week

Examination scheme:
Paper : 100 marks
TermWork: 25 marks
Paper Duration: 3 hrs

UNIT I:-(9 lectures) (20 marks)
Industrial relation- Definition and concept of Industrial relation, objectives of industrial relation, scope and aspect of industrial relations, requirement for good Industrial relation.

UNIT II:-(9 lectures) (20 marks)
Trade unionism & Workers participation in management: Meaning and concept of trade unionism, definition, Nature and scope of trade union, role & function of union, objective of trade union, concept & meaning, aim & objectives workers participation in management, Schemes of workers representative on board of management.

UNIT III:-(9 lectures) (20 marks)
Discipline and grivances: Cause of indiscipline, types of discipline arguments against negative discipline, punishment-alternatives to punishment, essentials of a good disciplinary system, Domestic enquiry and eguiry officer, roll of factory Inspector, meaning and causes of grivances procedure and its benefits, Desirable features of Grivances procedure.

UNIT IV:-(9 lectures) (20 marks)
Collective bargaining: Meaning and concept of collective bargaining, Function of collective bargaining, Structure and collective bargaining.
Collective bargaining in India.

UNIT V:-(9 lectures) (20 marks)
Legislation relation of Industrial relations: Objectives & selient features of-
The Trade Union Act 1936.
The industrial Employment (standing orders) Act 1957.
Industrial diepute Act 1947
The factories ACT 1948

TERM WORK:-
Students shall submit a report of industrial visit by making observation on any topic of the syllabus under guidance of teacher.

REFERENCES:
1. Dynamics of industrial relation in India. by C.B.Memoria.
2. Personnel Management and Industrial Relation. by Tripathi
3. Personnel Management and Industrial relations. by Dale Yodes.

Elective - 2
AUTOMOBILE ENGINEERING - II
B.E.(Prod)

Teaching Scheme :
Lectures : 4hrs/week
Practical: 2hrs/week

Examination scheme:
Paper : 100 marks
TermWork: 25 marks
Paper Duration: 3 hrs

UNIT - 1 (6 hrs)
AUTOMOTIVE ELECTRICALS: Batteries, their capacities, merits and demerits of 6,12 & 24 V batteries, Battery maintenance.

construction and use of storage batteries. Battery charging equipments, cutouts and regularators, electrical system for different vehicles. Ignition system, magnetos, spark plugs, induction coils, contact brakers, etc. Firing order, distributor, vacuum controlled distributor. Starter motors, generators and alternators.
Weightage = 20 marks

UNIT - 2

(8 hrs)

AIR-CONDITIONING SYSTEM:

Definition of basic terms of psychometry such as DBT, WBT, RH, etc. Human comfort conditions, temperature control system, insulation methods in auto air conditioner. Study of typical auto air conditioning systems, location of window air-conditioner. Study of typical auto air conditioning systems, various parts of system, compressor performance and its effect on overall engine performance.
Weightage = 20 marks

UNIT - 3

(8 hrs)

DASH BOARD INSTRUMENTS: Warning and indicating devices, Horn circuit, Head lamps types - switches, flashing indicators, electrical wipers, wiper motors and blades, wind screen washing system, fuel, temperature and pressure gauge, fuel indicator, speedometer, tachograph.

MAINTENANCE: maintenance of various systems and components in automobiles, speed limiting devices, wedge breaks, collapsible steering.
Weightage = 20 marks

UNIT - 4

(8 hrs)

BRAKING SYSTEMS: Types of brakes, retraders, regenerative braking system, brake liners, master and wheel cylinders, dual brake system, fail safe brakes, antilock brakes, electrical brakes, stopping distance and time braking efficiency. Brake effectiveness, factors controlling and stop of an automobile. Self energization and serve action of brake, characteristics and hydraulic brake fluid, bleeding of hydraulic brakes.
Weightage = 20 marks

UNIT - 5

(8 hrs)

WHEELS, TYRES & TUBES:

Construction & Types of wheels, wheel dimensions, types of tyres, tyres properties, tyre materials, specification of tyre size ply rating, class ply, radial ply, considerations in tread design, wheel and tyre trouble shooting. Retreading of tyres, process, precautions, controls, conventional and procured retreading processes.

Tubes, natural rubber and butyl flops. Rims, types and maintenance.
Weightage = 20 marks

TermWork:

Minimum eight assignment on the above topics; Minimum one assignment should be from each unit.

Recommended books:

1. Automotive mechanics by Crouse
 2. Automotive Engineering by Narang
 3. Automobile Engg. I & II by Kirpal Singh
 4. Automobile Chasis by Heldt
 5. Automotive menchanics by Heitner
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ELECTIVE - 2
POWER PLANT ENGINEERING
B.E. (Mech/Prod)

Teaching Scheme:
Lectures : 4 Hrs/week
Practical: 2 Hrs/week

Examination Scheme:
Paper: 100 marks
Term work: 25 marks
Paper Duration : 3 hrs

UNIT I:- 9 hrs
Thermal stations: Main parts of working of stations thermodynamics cycles, fuel handling, combustion & combustion equipment, problem of ash disposal, circulating water schemes & supply of make up water.
Choice of pressure of steam, generation & steam temperature, selection of appropriate vacuum economiser, air preheater, feed water heaters & dust collection characteristics of turbo alternator steam power plant heat balance & efficiency.
Weightage= 20 marks

UNIT II:- 8 hrs
Hydro electric power plant: hydrograph flow duration curves. Types of hydroelectric plants & their field of use. Capacity calculation for hydro power. Dam, head water control, penstock, water turbines, specific speeds, governors, hydro plant auxiliaries plant layout automatic & pumped storage project cost of hydroelectric project.
Weightage= 20 marks

UNIT III:- 9 hrs
Nuclear power plant:-
Elements of power plant, nuclear reactor, fuels, moderators, coolants, control classification of nuclear power layout stations cost of nuclear power.
Diesel power plant: Diesel engine performance & operation plant layout, logsheet, Application selection of engine size.
Weightage= 20 marks

UNIT IV:- 9 hrs
Gas turbine plants:-
Plant layout method of improving output & performance fuel & fuel systems method of testing open & closed cycle plants, operating characteristics, application, free piston engine plant limitation & application, advantages of combined working of different plants. Need of co-organisational of power plant in power system based load station & peak load station.
Weightage= 20 marks

UNIT V:- 9 hrs
Major electrical EQUIPMENT IN POWER STATION - GENERATOR AND EXCITORS, EARTHING OF POWER SYSTEM power & unit transformer circuit breakers, protective equipments, control board equipments elements of instrumentation plant layout, switch gear for power station auxiliaries.
Recent development in method of power generation, magneto hydrodynamic (MHD), Solar power, fuel cells geothermal & tidal power.
Weightage= 20 marks

TERMWORK:- Termwork consists of following study experiment:
1. To draw layout diagram of thermal, hydro & nuclear power plant.
2. Comparison of thermal, hydro and nuclear plant.
3. Study of major electrical equipment in power station.
4. Study of different types of boilers.
5. Study of diesel power plant & gas turbine plant.
6. Study of cooling system, lubrication system and IC engine.
7. Study of MHD, Solar power & tidal power.

RECOMMENDED BOOKS:-

1. Elements of electrical power station design
by M V Deshpande
2. Water power engineering
by Dandekar M M
3. Applied Thermodynamics
by B L Singhal
4. Power Plant Engg.
by P K Nag, TMH

(Elective-II)
FOUNDRY ENGINEERING
B.E.(Prod.)

Teaching Scheme :
Lectures : 4hrs/week
Practicals: 2 hrs/week

Examination scheme:
Paper : 100 marks
Termwork : 25 marks
Paper Duration: 3 hrs

UNIT I :(9 lectures) (20 marks)
Patterns - types, allowances and colour coding. Casting processes/molding processes; procedural steps to make molds by different techniques, advantages and limitations, green sand casting, dry sand casting, floor and pit molding, CO₂ process, croning process, investment casting, ceramic molding, Antioch process, graphite molds.

UNIT II :(9 lectures) (20 marks)
Permanent molds, pressure die-casting, centrifugal casting, molding machines, and mechanization in detail, molding sands, special additives, sand testing, sand properties

UNIT III :(9 lectures) (20 marks)
Core making, core blowers, types of cores, core baking, coresetting, chills and chaplets, core uses, core sand and sand ingredients, core coatings, cores and casting defects. Solidification of metals - solidification mechanism in pure metals and alloys, nucleation and growth, metal shrinkage, dendritic growth mechanism, freezing of ignot, segregation and inverse segregation

UNIT IV :(9 lectures) (20 marks)
Gating and risering (only theoretical treatment), design considerations, gating ratio, gating types, riser types, casting defects.

Steel casting practice in foundry:-
molding processes, molding sands, other ingredients for molding aggregate, cores, hot-tear formation, metal penetration, burn-on, core and mold washes, factors affecting solidification, gating & risering, steel melting practice, deoxidation, cleaning and inspection, equipments for steel melting, mainly induction and electric furnaces, cupola furnace etc.

UNIT 5:-(9 lectures) (20 marks)
Casting of grey, ductile and malleable cast iron (inbrief description).

Non-ferrous foundry: Al-alloy casting practice, melting practice and equipments for melting, molding practice, gating and risering, design principles. Cu-alloy foundry practice, moulds, sands, melting and pouring, gating and risering.

TERMWORK:-

Six assignment based on above syllabus.

RECOMMENDED BOOKS:-

1. Principles of metal casting- Carl, Loper, Heighne, Rosenthal
Tata McGraw Hill.
 2. Principle of foundry technology- P.L.Jain.
Tata McGraw Hill.
 3. Principles of metal casting- P.R. Belley.
 4. Principles of foundry technology - jain - TMH
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Term - 2nd
PROJECT
B.E. (Mech/Prod/Auto.)

Teaching Scheme :
Lectures : 4hrs/week

Examination scheme:
Termwork : 50 marks
Oral : 50 marks

Fabrication & Completion of the project work will be done in 2nd semester.

Final Project report as per syllabus given in first term should be submitted.

(CONTINUED FROM SEMESTER 1st)

TECHNICAL VISITS
B.E. (Mech/Prod/Auto)

Examination scheme:
Termwork : 50 marks

Minimum one industrial visit should be arranged (in academic year) by the college in any three industry (1-Large scale + 1-Medium scale + 1-Small scale) and a report regarding the same should be prepared and submitted in the form of journal at the end of semester-8.

Report should consist of managerial, technical and financial aspect of the industry.

Xerox copy of certificate of HRD manager or equivalent post should be enclosed in the journal.

One staff member should accompany with every 10 students.
