JABALPUR ENGINEERING COLLEGE, JABALPUR (MP)
(An Autonomous Institute of Govt. of M.P.)
Affiliated to Rajiv Gandhi Technological University, Bhopal (MP)
Scheme of Study and Examination (w.e.f. July 2010)

B.E. Fourth Year Branch: Industrial & Production SEM: Seventh

Course Code	Subject	Periods			EVALUATION SCHEME					Credits
		L	T	P	SESSIONAL EXAM			ESE	SUB TOTAL	
					TA	CT	TOTAL			
IP-30	Supply Chain & Quality Management	3	1	-	10	20	30	70	100	4
IP-32	Industrial Robotics & Mechatronics	3	1	-	10	20	30	70	100	4
IP-33	Industrial Engineering	3	1	-	10	20	30	70	100	4
IP-35	Vibrations & Maintenance Engineering	3	1	-	10	20	30	70	100	4
Refer Table	Elective - I	3	1	-	10	20	30	70	100	4
(PRACTICAL/DRAWING/DESIGN)										
IP- 31L	Supply Chain & Quality Management Lab	-	-	2	20	-	20	30	50	2
IP-34L	Industrial Engineering Lab	-	-	2	20	-	20	30	50	2
IP-36L	Vibrations & Maintenance Engineering Lab	-	-	2	20	-	20	30	50	2
IP-39L	Major Project Planning	-	-	4	40	-	40	60	100	4
IP- 40L	Industrial Training – II*	-	-	2	50	-	50	-	50	2
	Total	15	5	12	200	100	300	500	800	32

*Students will go for Industrial Training after VI semester in the summer vacations and will be assessed in VII semester.

T.A. = Teachers Assessment, CT= Class Test, ESE= End Semester Examination

Total Marks= 800, Total Periods= 32, Total Credits= 32

Elective-I					
IP-037A	1. Project Management	IP-037B	2. Material Management & Product Design	ME-46	3. Automobile Engineering

COURSE CONTENT & GRADE (w.e.f. July 2010)

Course	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
BE	**SUPPLY CHAIN AND QUALITY MANAGEMENT**	IP-30	Min "D"	Min "D"	5.0

SUPPLY CHAIN AND QUALITY MANAGEMENT

Unit-I : Basic concepts and approach : Introduction, Definition and Concepts of Quality, Quality Evolution, Contribution of Leading Quality Gurus, Deming's Fourteen Points,Dimensions of Quality, Quality Cost, Quality Circle, Key success factors of TQM,PDCA Cycle, PDSA Cycle, Kaizan. Business Process Re-engineering (BPR), Taguchi loss function, cost of quality, 5S Practices, Waste Identification and Reduction, Vendor Rating

Unit –II : **Process Control :** Seven Quality Control Tools - Process Flow Chart, Histogram, Pareto Diagram, Cause and Effect Diagram, Scatter Diagram, Tally Sheet, Control Charts, Acceptance Sampling, Process Capability Indices, cause-effect, Goalpost and kaizen view of quality, quality of design, conformance and performance; Taguchi loss function, Ishikava, interrelationship, systematic and matrix diagrams; change concepts and waste elimination

Six Sigma

Concept, Definition, Origin, DMAIC Methodology, Process model for Design of New Product - DMADV Methodology, Six Sigma Implementation, Case study.

Unit – III : Inventory models : Necessity of inventory in process and safety stock, problem of excess inventory and cycle time (=WIP/ Throughput), JIT/ lean mfg; basic EOQ/ EPQ models for constant review Q-system(S,s); periodic review, base stock P-system; service level, lead time variance and safety stock;; ABC, VED and other analysis based on shelf life, movement, size, MRP technique and calculations, lot sizing in MRP, linking MRP with JIT;

Unit- IV : Introduction: Logistics and SCM**,** Definition, Working of SCM, integration of inbound, outbound logistics and manufacturing to SCM; Customer service, Supply chain integration, Bull-whip effect; Impact of centralized demand information, customer value; IT, info-sharing and strategic partnerships; Drivers of SCM

Unit –V:Strategic alliance and integration: Outsourcing benefits and risks; dependency on capacity and knowledge; modular and integral products; framework for make/ buy decision based on dependency and modular/ integral products; issues to be addressed in strategic alliance; use and merit/demerit of third party (3PL) logistic; push, pull and push-pull based supply chains; push-pull boundary, appropriate strategy on matrix of demand uncertainty and economy of scale; coordination and leadership issues; change of purchasing role and vendor rating, variability from multiple suppliers; supply contracts and revenue sharing;

Reference Books:

1. Total Quality Management by Subburai Ramasamy, TMH
2. Total Quality Management by Besterfield, Dale H. et al, Printice Hall
3. Total Quality Management by L. Suganthi and Anand A. Samuel, PHI
4. Total Quality Management: A Practical approach by H. Lal, Wiley, New Delhi
5. Essentials of SCM; Deshmukh & Mohanty; Jaico Publishing House
6. Designing and Managing the Supply Chain; Levi DS & ES, Kaminsky P; TMH
7. Supply Chain Management; Chopra, Meindl, Kalra; Pearson Education
8. Exploring the Supply Chain by Upendra Kachru, Excel Books
9. Supply Chain Management, by Janat Shah, Pearson Education
10. Manufacturing planning and control for SCM; Vollman, Berry et al; TMH.
11. Supply Chain Logisti Mgt; Bowersox DJ, Closs DJ, Cooper MB;TMH
12. World Class SCM; Burt DN, Dobler DW, StarlingSL;TMH

COURSE CONTENT & GRADE (w.e.f. July 2010)

Course	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
BE	**INDUSTRIAL ROBOTICS AND MECHATRONICS**	IP-32	Min "D"	-	5.0

INDUSTRIAL ROBOTICS AND MECHATRONICS

Unit I

Introduction to Robotics: Introduction, Definition, Automation and Robotics, Need and importance, basic concepts, Anatomy of Robots, Structure and classification of Robots, Robot configurations, Comparative advantages of different configurations, Resolution, Accuracy, Repeatability.

Unit II

Structure of Robotic System : Robot links, Joints in Robots, Robot Specification, Performance Parameters, Robot Drive Systems, Hydraulic Actuators, Pneumatic Actuators, Electric Drives, Steeper Motors, Comparison of Characteristics of robot Drive Systems, Wrist and Motions, Designs of Gripper Fingers, Gripper Mechanisms, Force Analysis of Gripper Mechanism, Selection Consideration of Gripper.

Unit III

Robot Sensors and Vision: Introduction, Classification of Sensors and their functions, Touch Sensors, Binary Sensors, Analog Sensors, Tactile Sensors, Desirable Features for Sensors and Transducers, Proximity Sensors, Range Sensors, Force and Torque Sensors, Robot Vision, Block Diagram of Vision System, Constructional Features of Vidicon Camera, Analog to Digital Conversion, Image Storage, Image Processing and Analysis, Feature Extraction, Object Recognition.

Unit IV

Robot Programming: Introduction, Lead through Programming, Manual, Walk through, off line Programming Concepts, Requirement of Good Programming Language, VAL Commands with description, Definition and Statements of AL AND AML, Programming Languages features and applications, Program for Pick and Place Activity.

Unit V

Mechatronics: Transducers, Applications and Selection, Application of Proximity Switch, Application of Photoelectric Sensor, Sensor Array, Wrist Sensors, Compliance Sensing, Range Sensing, Guidelines for Selection, Active and Passive Sensors, Basic Requirements of a Sensor/Transducer.

Text Books

1. Groover M.P. Weiss M. Industrial Robotics, Tata McGraw Hill Publication.
2. Groover M.P.Cam and Automation, PHI Learning Publicing Ltd.
3. Ganesh S.Hegde. A Text Book on Industrial Robotics. Laxmi Publication.

References

1. Ghosal Ashitava. Robotics Fundamental Concepts and Analysis, Oxford Publication.
2. Shimon K. Handbook of Industrial Robots, John Willey& Sons.
3. Fu, Gonzalez, Lee, Robots Control, Sensing, Tata McGraw Hill Publication.

COURSE CONTENT & GRADE (w.e.f. July 2010)

Course	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
BE	**INDUSTRIAL ENGINEERING**	IP-33	Min "D"	Min "D"	5.0

INDUSTRIAL ENGINEERING

Unit – I : Reliability Engineering: Introduction and objectives of Reliability Engineering, System Reliability, Achieving Reliability, Failure Rate, Hazard Rate, Failure Modes and the 'Bath-tub' curve, Series Structure, Parallel Structure, Combination Structure, Design , Important Aspect of Reliability, Maintainability, Availability, Improving Reliability.

Unit- II : Capacity Planning: Measurement of Capacity, Estimating Future capacity, Factors influencing effective capacity, Factors Favoring over capacity and under capacity, Business Process Reengineering, Definition, Characteristics of BPR, Need for Re-engineering, Steps in Re-engineering, Process of Re-engineering, Industrial Engineering and Re-engineering, Success factors in reengineering, Advantages of Re-engineering.

Unit- III : Sequencing Models: Introduction, Assumptions, Gantt chart for Solving Sequencing Problems, Processing n jobs through 2 machines, Johnsons Algorithm, Loading, Sequencing and Scheduling, Visual load Profile, Priority Sequencing, Assignment Problems, Principles of scheduling, Inputs to scheduling, Scheduling strategies, Forward scheduling and backward scheduling, Finite Loading, Critical ratio loading, Index method.

Unit – IV : Marketing Management: Marketing Function, Marketing Management Process and Marketing Planning, Market Research, Consumer Behavior, Product Life Cycle, Product, Product Lines and Brands, Physical Distribution Channels, Sales Promotion & advertising programs.

Unit – V : Human Resource Management: Definition, Objective of Human Resource Management, Characteristics, Functions/Scope, Principles of Human Resource Management, and Manpower Planning –factors Affecting Manpower Planning, Steps in Manpower Planning, recruitment and Selection procedure of Manpower. Training and Development of Manpower: Need of Training, Benefits of Training, Method of Training Workers, Foreman or Supervisory Training, Executive/Managers Training and Development, learning curves and classifications.

Text Books

1. Khanna O. P., "Industrial Engineering and Management", Dhanpat Rai and sons, 2007.
2. Banga T. R. and Sharma S. C., "Industrial Organization & Engineering economics", 23ed., Khanna Publishers, 2001, ISBN 81-7409-078-9.
3. Mahajan M., "Industrial Engineering and Production Management" Dhanpat rai and Sons Publishers, 2005, ISBN-81-7700-047-0
4. Chabra T. N., "Principles & Practices of Management", Dhanpat lal & company.
5. Srinath N., "Reliability Engineering", East West Publication Ltd.

Reference Books

1.Koontz Harold and Weihrich Heinz, "Essentials of management", 7ed, Tata McGraw - Hill publishing, 2008, ISBN 0-07-0623030-x.
2. Luthans f., "Organizational Behaviour", McGraw-Hill Company, 2008, ISBN 81-317- 05021.
3. Kotler Philip & Keller K.L., "Marketing Management. Dorling Kindersley pvt.Ltd.,2008, ISBN-978-81-317-1683-0
4. Cynthia L.Greene , "Entrepreneurship: Ideas In Action", Thomson, ISBN-981-243-257-1.
5. Mamoria C.B. and Gankar S.V., "Personnel Management", Himalaya Publishing House, 20

COURSE CONTENT & GRADE (w.e.f. July 2010)

Course	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
BE	**VIBRATIONS AND MAINTENANCE ENGINEERING**	IP-35	Min "D"	Min "D"	5.0

VIBRATIONS AND MAINTENANCE ENGINEERING

Unit – I : Fundamental Aspects of Vibrations : Vibration, main causes, advantages and disadvantages; engineering applications of vibration; vector method of representing harmonic motion; characteristics of vibration, harmonic analysis and beats phenomenon, work done by harmonic forces on harmonic motion;; elements of vibratory system; lumped and distributed parameter systems, degreed of freedom.

Undamped Free Vibrations: Derivation of differential equation of motion: the energy method, the method based on Newton's second law of motion, and Rayleigh's method. Solution of differential equation of motion: Natural frequency of vibration. Equivelent spring stiffness, Systems involving angular oscillations: the compound pendulum.

Unit- II : Damped Free Vibrations: Viscous damping: coefficient of damping; damping ratio; under damped, over damped and critically damped systems; logarithmic decrement; frequency of damped free vibration; frequency, decay rate, systems with two degrees of freedom.

Whirling Motion and Critical Speed : Whirling motion and Critical speed : Definitions and significance, Critical – speed of a vertical, light –flexible shaft with single rotor : with and without damping, Free Transverse Vibration due to a Point Load on a Simply Supported Shaft, Free Torsional Vibration of a Single Rotor System

Unit – III : Maintenance Concepts and Strategies: Introduction, maintenance functions and objectives, maintenance planning and scheduling, maintenance organization.

General Introduction to Maintenance Types: Breakdown, emergency, corrective, predictive, and preventive; maintenance prevention; design-out maintenance, productive maintenance, shutdown maintenance and scheduled maintenance.

Unit - IV : Condition Based Maintenance: Principles of CBM, pillars of condition monitoring, CBM implementation and benefits; condition monitoring techniques- visual monitoring, vibration monitoring, wear debris monitoring, corrosion monitoring, performance monitoring

Unit- V :Reliability Centered Maintenance (RCM):– Concept, methodology, benefits;

Total Productive Maintenance: Evolution of TPM, TPM objectives, concept, pillars of TPM.

Failure Modes and Effects Analysis **(FMEA)/ Failure Modes, Effects and Criticality Analysis, (FMECA)**: Overview, elements of FMECA, applications and benefits, risk evaluation, risk priority numbers, criticality analysis, process FMEA, qualitative and quantitative approach to FMECA; design FMEA and steps for carrying out design FMEA

References:

1- Ambekar A.G., Mechanical Vibrations and Noise Engineering; PHI
2- Meirovitch Leonard; Element of Vibration Analysis; TMH
3- Dukikipati RV Srinivas J Text book of Mechanical Vibrations; PHI
4- Kelly SG and kudari SK; Mechanical Vibrations; Schaum Series;TMH
5- Thomson , W.T., Theory of Vibration with Applications , C.B.S Pub & distributors .
6- Singiresu Rao, Mechanical Vibrations ' , Pearson Education .
7- G.K. Grover, Mechanical Vibration , Nem chand and Bross , Roorkee
8- V. P. Singh, Mechanical vibrations, Dhanpat rai and Co.
9- Sadhu Singh, Mechanical Vibrations, Khanna Publishers.
10- Ebeling CE; An Introduction To Reliability & Maintainability Engg; John Wiley and Sons
11- Mishra R.C; Reliability and Maintenance Engineering; New age International publisher.
12- Kelly Anthony; Maintenance Planning and Control
13- R.C. Mishra and Pathak; Maintenance Engineering and Management;PHI

COURSE CONTENT & GRADE (w.e.f. July 2010)

Course	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
BE	**PROJECT MANAGEMENT**	IP-037A	Min "D"	-	5.0

PROJECT MANAGEMENT

Unit- I : Concepts of Project Management: Meaning, Introduction Project Management Role & Scope of Project Management, Need for Project Management ,definition and characteristics of a project, Project objectives and functions, Project classification, Project life cycle phases, elements of project management, Tools & Techniques in Project Management , roles and attributes for project manager. Methods and techniques for developing project managers.

Unit-II : Project selection and initiation: Project identification, Projection screening and selection criteria. Establishing the project scope, detailed project report, Market and demand study, Primary and secondary information, Nature of Project Decision, The Project Development Cycle, Opportunity Studies, Pre-feasibility and Feasibility Studies, Project feasibility report, Technical Analysis.

Unit-III : Project planning, **Costing and Financing :** Project planning**,** Project Scheduling Project management system, Work breakdown structure, Schedule development Costing of Projects, Costing and Pricing of Project, Types of Cost Estimates in Projects, Project Scoping Project Financing, Sources of Long Term Rupee Funds, Sources of Long Term Rupee Loans, Sources of Long Term Free Exchange, Sources of Short Term Rupee Funds, Feed forward Project Control.

Unit-IV : Project organization, culture and leadership: Organization structure ,Characteristics of organization, Elements of organization, Process of organization, Principles of organization Types of Organization Structures , Hierarchical Organization Structures ,Functional organization Matrix organization Line and Staff organization, Integrating Projects in Functional Organizations ,comparison of functional, matrix and project organization. Evolution of Organization Structures in Projects, Types of Matrix Organization Structures.

Unit-V : project management performance and close out: Factors influencing project success, factor responsible for project failure, Performance indicator, time overrun, cost overrun, project sickness, Approaches to performance analysis, Project close out, computer project management system(CPMS). Schematic of Planning and Control.

Human Resources: Human Beings as a Resource, Balancing Human Resources, Types of Problems in

Balancing Human Resources, Delegation, documenting project authority, Principles of delegations of authority.

References:

1. Prasana Chandra: Projects: planning Implementation control; TMH.
2. Gray Clifford F And Larson EW; Project The managerial Process; TMH
3. Panneerselven and Serthil kumar; Project management, PHI
4. Burke ; Project Management-Planning and control technics; Wiley India
5. Kamaraju R; Essentials of Project Management; PHI Learning
6. Jack R. Meredith, Project Management: a managerial approach, Wiley.
7. Choudhary ;Project Management; TMH
8. Richman L; Project Management: Step By Step; PHI Learning
9. United Nations Industrial Development Organisation, Guide to practical project appraisal –

COURSE CONTENT & GRADE (w.e.f. July 2010)

Course	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
BE	**MATERIAL MANAGEMENT & PRODUCT DESIGN**	IP-037B	Min "D"	-	5.0

MATERIAL MANAGEMENT & PRODUCT DESIGN

Unit-I : Material Management: Introduction to Material Management Functions, objectives, Integration concept Material classification and coding system importance of writing specifications and variety reduction techniques, Material Planning-importance & techniques, Master & material budget, Quality control in material management, Theory of sampling inspection.

Unit-II : Purchasing: Make or buy decision, Factors, Purchasing objectives, organization of purchase department, responsibilities, Principles of purchasing, purchasing process, Tender system, Negotiation, Vendor rating, Legal aspects of purchasing, International purchasing.

Unit-III : Stores management & Material Handling : Introduction, objective of store keeping, stores functions, stores organization, stores systems and procedures, stores accounting and verification systems, stores location and layout, factor affecting location, centralized and decentralized storing, automated/retrieval storage.Planning and operating principles material handling equipments and classification; belt conveyer, chain conveyers, fork lifts, over head cranes, automated material handling in modern industries.

Unit –IV : Product Design: Design by evolution & innovation, factors of product design, morphology of design, Primary design phases & flow charting, design for safety and reliability, value engineering, role of computer in design process

Unit – V : Product design Practice: Product strategies, analysis of the product , basic design considerations, procedure adopted by industrial designers, role of aesthetics, functional design practice, creativity- process, techniques, group technology, concurrent engineering & reverse engineering.

References:

1. Product design & Manufacturing-A.K. Chitale, R. C. Gupta-third edition
2. Purchasing and materials management-Gopalkrishnan P, TMH
3. Materials Management-Chitale AK and Gupta RC, PHI

COURSE CONTENT & GRADE (w.e.f. July 2010)

Course	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
BE	**AUTOMOBILE ENGINEERING**	**ME-46**	Min "D"	-	5.0

AUTOMOBILE ENGINEERING

Unit-I: Chassis & Body Engg: Types, Technical details of commercial vehicles, types of chassis, lay out, types of frames, testing of frames for bending & torsion on unutilized body frame, vehicle body and their construction, driver's visibility and methods for improvement, safety aspects of vehicles, vehicle aerodynamics, optimization of body shape, driver's cab design, body materials, location of engine, front wheel and rear wheel drive, four wheel drive.

Unit-II: Steering System: front axle beam, stub axle, front wheel assembly, principles of types of wheel alignment, front wheel geometry viz. camber, Kingpin inclination, castor, toe-in and toe-out, condition for true rolling motion, centre point steering, directional stability of vehicles, steering gear, power steering, slip angle, cornering power, over steer & under steer, gyroscopic effect on steering gears.

Unit-III: Transmission System: Function and types of clutches, single plate, multi-plate clutch, roller & spring clutch, clutch lining and bonding, double declutching, types of gear Boxes, synchroniser, gear materials, determination of gear ratio for vehicles, gear box performance at different vehicle speed, automatic transmission, torque converters, fluid coupling, principle of hydrostatic drive, propeller shaft, constant velocity universal joints, differential gear box, rear axle construction.

Unit-IV: Suspension system : Basic suspension movements, Independent front & rear suspension, shock absorber, type of springs: leaf spring, coil spring, air spring, torsion bar, location of shackles, power calculations, resistance to vehicle motion during acceleration and breaking, power & torque curve, torque & mechanical efficiency at different vehicle speeds, weight transfer, braking systems, disc theory, mechanical, hydraulic & pneumatic power brake systems, performance, self-energisation, airbleeding of hydraulic brakes, types of wheels and tyres, tyre specifications, construction and material properties of tyres & tubes.

Unit-V: Electrical and Control Systems: storage battery, construction and operation of lead acid battery, testing of battery, principle of operation of starting mechanism, different drive systems, starter relay switch, regulator electric fuel gauge, fuel pump, horn, wiper, Lighting system, head light dazzling, signaling devices, battery operated vehicles, choppers. importance of maintenance, scheduled and unscheduled maintenance, wheel alignment, trouble Shooting probable causes & remedies of various systems, microprocessor based control system for automobile, intelligent automobile control systems. Emission standards and pollution control: Indian standards for automotive vehicles-Bharat I and II, Euro-I and Euro-II norms, fuel quality standards, environmental management systems for automotive vehicles, catalytic converters, fuel additives, and modern trends in automotive engine efficiency and emission control.

References:

1. Crouse , Automotive Mechanics TMH.
2. Srinivasan S; Automotive engines; TMH
3. Gupta HN; Internal Combustion Engines; PHI;
4. Joseph Heitner, Automotive Mechanics, Principles and Practices, CBS Pub.
5. Kripal Singh, Automotive Engineering Khanna Pub.
6. Newton & Steeds , Automotive Engineering
7. Emission standards from BIS and Euro –I and Euro-III

COURSE CONTENT & GRADE (w.e.f. July 2010)

Course	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
BE	**SUPPLY CHAIN AND QUALITY MANAGEMENT LAB**	IP-31L	Min "D"	Min "D"	5.0

SUPPLY CHAIN AND QUALITY MANAGEMENT LAB

List Of Experiments (Please Expand it):

1. Case studies and problems related to SCM theory.
2. Construction of Cause & Effect diagram.
3. Construction of Pareto diagram.
4. ABC & VED Analysis.
5. Inventory models for estimating EOQ and EPQ

COURSE CONTENT & GRADE (w.e.f. July 2010)

Course	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
BE	**INDUSTRIAL ENGINEERING LAB**	IP-34L	Min "D"	Min "D"	5.0

INDUSTRIAL ENGINEERING LAB

Laboratory Assignments:

1. To Study Failure rate and Hazard rate of Component (Industry supported case study).
2. To Construct Gantt Chart for the given Scheduling Problems.
3. Estimate Future capacity of the given plant (Industry supported case study).
4. To find the Training needs of the given plant (Industry supported case study).
5. To study Physical Distribution Channels, Sales Promotion & advertising programs of the given product(Industry supported case study).

COURSE CONTENT & GRADE (w.e.f. July 2010)

Course	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
BE	**Vibrations & Maintenance Engineering Lab**	IP-36L	-	Min "D"	5.0

Vibrations & Maintenance Engineering Lab

1. To verify the relation T=2π√L/g.

2. To determine the radius of gyration 'K' of given compound pendulum and to verify the relation , T=$2\pi\sqrt{k^2 + (0G)^2/g(0G)}$
   (where 0G is distance of g.g of rod from support.)

3. To study the longitudinal vibration of helical spring and to determine the frequency of period of vibration (oscillation)theoretically and actually by experiment.

4. To study undamped free vibration of equivalent spring mass system.

5. To study the forced vibration of equivalent spring mass system.

6. To study the torsional vibration undamped of single rotor shaft system.

7. To study the free vibration of twe rotor system and to determine the natural frequency of vibration theoretically anrd experimentally.

8. To study various condition monitoring techniques
   1) Study of TPM methodology
   2) Study of near debris monitoring techniques.

COURSE CONTENT & GRADE (w.e.f. July 2010)

Course	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
BE	**MAJOR PROJECT PLANNING**	IP-39L	-	Min "D"	5.0

MAJOR PROJECT PLANNING

The Major Project Work provides students an opportunity to do something on their own and under the supervision of a guide. Each student shall work on an approved project, which should be selected from some real life problem as far as possible, which may involve fabrication, design or investigation of a technical problem. The project work involves sufficient work so that students get acquainted with different aspects of manufacturing, design or analysis. The students also have to keep in mind that in final semester they would be required to implement whatever has been planned in the major project in this semester. It is possible that a work, which involves greater efforts and time, may be taken up at this stage and finally completed in final semester, but partial completion report should be submitted in this semester and also evaluated internally. At the end of semester, all students are required to submit a synopsis.

COURSE CONTENT & GRADE (w.e.f. July 2010)

Course	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
BE	**INDUSTRIAL TRAINING-II***	IP-40L	-	Min "D"	5.0

INDUSTRIAL TRAINING

SCHEME OF STUDIES

Duration: 4 weeks after the VI semester in the summer break, Assessment in VII semester.

1.1 OBJECTIVE OF INDUSTRIAL TRAINING

The objective of undertaking industrial training is to provide work experience so that student's engineering knowledge is enhanced and employment prospects are improved. The student should take this course as a window to the real World of Work and should try to learn as much as possible from real life experiences by involving and interacting with industry staff. Industrial training also provides an opportunity to students to select an engineering problem and possibly an industry guide for their Major Project in final semester. Industrial training of the students is essential to bridge the wide gap between the classroom and industrial environment. This will enrich their practical learning and they will be better equipped to integrate the practical experiences with the classroom learning process.

1.2 LEARNING THROUGH INDUSTRIAL TRAINING

During industrial training students must observe following to enrich their learning: - Industrial environment and work culture. - Organizational structure and inter personal communication. - Machines/ equipment/ instruments - their working and specifications. - Product development procedures and phases. - Project planning, monitoring and control. - Quality control and assurance. - Maintenance system. - Costing system. - Stores and purchase systems. - Layout of Computer/ EDP/MIS centers. - Roles and responsibilities of different categories of personnel. - Customer services. - Problems related to various areas of Work etc. Faculty and TPO are supposed to plan industrial training in such a manner that students get exposure on most of the above arena in the field (world of work). Students are supposed to acquire the knowledge on above by -

1. Observation,
2. Interaction with officials at the workplace
3. Study of Literature at the workplace (e.g. User Manual, standards, maintenance schedules, etc.)
4. "Hand's on" experience
5. Undertaking / assisting project work.
6. Solving problems at the work place.
7. Presenting a seminar.
8. Participating in-group meeting/ discussion.
9. Gathering primary and secondary data/ information through various sources, Storage, retrieval and analysis of the gathered data.
10. Assisting officials and managers in their working.
11. Undertaking a short action research work.
12. Consulting current technical journals and periodicals in the library.
13. Discussions with peers.