SATHYABAMA
INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)
Accredited with "A" Grade by NAAC
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School of Mechanical Engineering

Department of Mechanical Engineering

Minutes of meeting of Board of Studies Virtual meet held on 30th November 2019

The following Members are participated in the meeting:

1. Dr.L.Vijayaraghavan, Professor- IIT Madras - External Member
2. Er.James Michael Amulu, Director- SAP - External Member
3. Dr.G.Arunkumar, Professor and Head- Mechanical Engineering - Internal Member
4. Dr.S.P.Venkatesan, Associate Professor- Mechanical Engineering - Internal Member
5. Dr.G.Senthilkumar, Associate Professor- Mechanical Engineering - Internal Member
6. Dr. J.Jayaprabhakar, Associate Professor- Mechanical Engineering- Internal Member
7. Dr.S.Ganesan, Associate Professor – Mechanical Engineering- Internal Member
8. Mr.Abhishek Singh Chauhan, Alumni- Internal Member.

The Chair Person welcomed the members of BoS and placed the agenda for the thoughts of the members. The following deliberations were made as per the items of the circulated agenda.

1. Agenda item # 1 Addition of new Courses for Bachelors of Engineering– Mechanical Engineering

The Head of the department highlighted the feedback received from the Alumni for the inculsion of few elective courses to focus on emerging technologies and the suggestion from Dr.L.Vijayaraghavan is to include few elective courses like Precision Engineering. Er.James Michael Amulu suggested few elective courses like Rapid Prototyping. Based on BOS members suggestion, Department proposed the following new elective courses for the incorporation from 2016 batch onwards.

Course 1: Rapid Prototyping

Course 2: Precision Engineering

Resolutions:

The BOS resolved to recommend for approval of the suggested courses for inclusion in B.E

Programme of Mechanical Engineering.

2.Agenda item # 2 Addition of Skill in the professional domains in order to promote industry ready competency among learners.Necessity of introduction of certification courses from competent Government authorities for improving the domain knowledge and thus improving core placement counts.

Head pointed out that the workshop offered by the Department such as Six Sigma certification and Advanced Machining process

Resolutions: The BoS members appreciated the same and suggested to follow in future also for making the industry ready competency among the students.

3.Agenda item # 3 Any other points with the permission of Chair -Academic flexibilities with extra credits acquired through either advanced study of some courses or with accumulation of additional credits from additional courses as per students' choice.

Head asked for the suggestions from the External members for students pursuing different specialization.

Resolutions: The BoS recommended that NPTEL courses. It can be selected based on the students specialization. Also recommend that the students can select the courses at the end of the fourth semester subject to the condition prescribed by the Board of Management time to time.

With the above discussion, the Head expressed his deep sense of gratitude to all members for an academic vibrant discussion on various matters. Since there was no other agenda, the meeting ended with the Vote of thanks to the Chair.

Member	Designation	**Signature**
Dr.L.Vijayaraghavan	Professor	
Er.James Michael Amulu	Director	
Dr.G.Arunkumar	Professor and Head	
Dr.S.P.Venkatesan,	Associate Professor	
Dr.G.Senthilkumar	Associate Professor	
Dr. J.Jayaprabakar	Associate Professor	
Dr.S.Ganesan	Associate Professor	
Mr.Abhishek Singh Chauhan	Alumni Member	

SPR1616	RAPID PROTOTYPING	L	T	P	Credits	Total Marks
		3	0	0	3	100

COURSE OUTCOMES:

On completion of the course, student will be able to

CO1: Demonstrate an understanding of the concepts of Rapid Prototyping and their description. CO2: Explain the key characteristics of stereo lithography process and applications.

CO3: Analyze and select a rapid manufacturing technology for a given component.

CO4: Evaluate LENS, BPM processes; point out the application of RP system in medical field define virtual prototyping and identify simulation components.

CO5: Identify the errors during generation of STL files and minimize them.

CO6: Develop the RP system with Optimization techniques.

UNIT 1 INTRODUCTION 9 Hrs.

Need for the compression in product development, history of Rapid Prototyping systems, survey of applications, and growth of RP industry and classification of RP systems.

Stereo lithography Systems- Principle, process parameters, process details, data preparation, data files and machine details, applications. Fused Deposition Modeling- Principle, process parameters, path generation, applications

UNIT 2 RAPID PROTOTYPING TECHNIQUES 9 Hrs.

Selective Laser Sintering-Types of machines, principles of operation, process parameters, data preparation for SLS, applications. Laminated Object Manufacturing-Principle of operation, LOM materials, process details, applications. Solid Ground Curing- Principle of operation, machine details, applications.

UNIT 3 CONCEPT MODELERS 9 Hrs.

Principle, Thermo jet printer, Sander's model market, 3-D printer, Genisys Xs printer, object Quadra system. Laser Engineered Net Shaping (LENS) - Net shaping development at Sandia National Lab.

UNIT 4 RAPID TOOLING 9 Hrs.

Indirect rapid tooling - silicone rubber tooling, aluminum filled epoxy tooling, spray metal tooling, direct rapid tooling - quick cast process, sand casting tooling.

Software for RP- STL files, overview of solid view, magics, mimics and internet based software's.

UNIT 5 RAPID MANUFACTURING PROCESS OPTIMIZATION 9 Hrs.

Factors influencing accuracy, data preparation errors, part building errors, errors in finishing, influence of part build orientation.

Allied Processes-Vacuum casting, surface digitizing, and surface generation from point cloud, surface modification, data transfer to solid models.

Max. 45 Hrs.

TEXT / REFERENCE BOOKS:

1) Terry Wohlers, "Wohlers Report 2001", Wohlers Associates, 2008.
2) Pham D T and Dimov S S, "Rapid Manufacturing", Verlag, 2001.
3) Paul F Jacobs, "Stereo lithography and other RP&M Technologies", SME, 1996.
4) FDM Maxum User Guide.
5) FDM 1650 User Guide.
6) Sinterstation 2500 plus System User Guide.
7) MK-Technology Gmbh. System User Guide.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100 **Exam Duration: 3 Hrs.**

PART A: 2 Questions each from CO1-CO4, 1 question each from CO5 and CO6 No choice **20 Marks**

PART B: 4 Questions each with internal choice from CO1-CO4, 1 question from CO5 and CO6 with internal choice, each carrying 16 marks

SPR1619	PRECISION ENGINEERING	L	T	P	Credits	Total Marks
		3	0	0	3	100

COURSE OUTCOMES:

On completion of the course, student will be able to

CO1: Understand the concepts of measurements and instruments used for it

CO2: Analyze the deformation and thermal stability during machining process

CO3: Familiarize with dimensioning standards and tolerance limits

CO4: Understand the principle of micro fabrication techniques

CO5: Familiarize with smart materials and micro machining technique

CO6: Get hands-on training with the related components of the technology

UNIT 1 CONCEPTS OF ACCURACY IN MACHINE TOOLS 10Hrs

Accuracy & Errors of machine tools, Spindle and Displacement Accuracies, Errors due to Numerical Interpolation Displacement Measurement System and Velocity Lags. Accuracy of N.C system, Errors in the NC machines feed stiffness zero stability. Setting errors -Location of rectangular prism, cylinder - Basic type of tests Measuring instruments used for testing machine tools. Alignment tests-Straightness, Flatness, Parallelism, Squareness, Circularity, Cylindricity.

UNIT 2 STIFFNESS, THERMAL EFFECTS AND FINISH MACHINING 9 Hrs.

Overall stiffness of Machine Tools- compliance of work piece errors caused by cutting forces deformation in turning boring milling heat sources thermal effects Finish Turning, boring, grinding Surface roughness.

UNIT 3 DIMENSIONING 8 Hrs.

Definition of terms- Key dimension Superfluous dimension dimensional stepped shaft assigning tolerances in theconstituent dimensions dimensional chains.

UNIT 4 MICRO-MACHINING AND MICRO FABRICATION 9 Hrs.

Micro Machining Photo resist process- Lithography LIGA Process Optical, processing of materials electron beam machining micro forming, diamond turning micro positioning devices etching physical vapour deposition Chemical vapour deposition

UNIT 5 SMART STRUCTURES, MATERIALS AND MICRO ACTUATORS 9 Hrs.

Smart structures Smart materials types and applications - smart sensors micro valves- MEMS Micro motors Micropumps micro dynamometer micro machines micro optics micro nozzles.

Max.45 Hrs.

TEXT / REFERENCE BOOKS: (Alignment and visibility)

1. Murthy R.L. "Precision Engineering in Manufacturing", New Age International Pvt. Limited.
2. Juliar W.Gardner. Vijay K. Varadan, 'Micro sensors, MEMS and Smart Devices, John Wiley and sons, 2001.
Stephen A.Campbell, "The Science and Engineering of Microelectronic Fabrication", Oxford University Press, 1996.
Raady Frank, "Understanding smart sensors", Artech House, Boston, 1996. 5. MEMS Hand Book, CRC Press, 2001

3.
5. Nakazawa, H. Principles of Precision Engineering, Oxford University Press, 1994.
6. Institute of Physics Publishing, Bristol and Philadelphia, Bristol, BSI 6BE U.K.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100 **Exam Duration: 3 Hrs.**

PART A: 2 Questions each from CO1-CO4, 1 question each from CO5 and CO6 No choice **20 Marks**

PART B: 4 Questions each with internal choice from CO1-CO4, 1 question from CO5 and CO6 with internal choice, each carrying 16 marks

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SATHYABAMA
INSTITUTE OF SCIENCE AND TECHNOLOGY
SCHOOL OF MECHANICAL ENGINEERING

Department of Mechanical Engineering

Minutes of Board of Studies Virtual meeting held on 27th June 2020

Due to the pandemic the virtual meeting has been planned as per the Government guidelines.

The following members were participated in the meeting:

1. Dr. L. Vijayaraghavan, Professor- IIT Madras - External Member
2. Er. James Michael Amulu, Director- SAP - External Member
3. Dr.G.Arunkumar, Professor and Head- Mechanical Engineering - Internal Member
4. Dr. S. P. Venkatesan, Associate Professor- Mechanical Engineering - Internal Member
5. Dr. G. Senthilkumar, Associate Professor- Mechanical Engineering - Internal Member
6. Dr. J. Jayaprabakar, Associate Professor- Mechanical Engineering- Internal Member
7. Dr. S. Ganesan, Associate Professor – Mechanical Engineering – Internal Member
8. Mr.Abhishek Singh Chauhan, Alumni- Internal Member.

At the outset, the Chair Person Dr.G.Arunkumar greeted the members of BoS and discussed the agenda for the consolidated views of the members. The following recommendations were made as per the items of the circulated agenda.

1.Agenda item # 1 Modifications proposed for 2017 batch Bachelors of Engineering– Mechanical Engineering course syllabus:

Head of the department informed that the need of revising the syllabus of SMEX1022– Fluid power systems, as per the recent advancements in the field and the following modifications have been considered.

Inclusion of the following topics in Unit I: Advantages of fluid power - Application of fluid power system. Types of fluid power systems - Properties of hydraulic fluids – General types of fluids – Fluid power symbols. Basics of Hydraulics-Applications of Pascal's Law- Laminar and Turbulent flow – Reynolds's number – Darcy's equation – Losses in pipe, valves and fittings.

Inclusion of the following topics in Unit V: Development of hydraulic / pneumatic circuits applied to machine tools, presses, material handling systems, automotive systems, packaging industries, manufacturing automation. Maintenance in fluid power systems – preventive and breakdown. Maintenance procedures. Trouble shooting of fluid power systems - fault finding process, equipments, tools used, causes and remedies. Safety aspects involved

Resolutions: The External members considered the revision as necessary as it broadly involved in application and safety. The changes mentioned under inclusion had been approved by all and modification in curriculum had been reflected. Also it was decided to implement for 2017 batch onwards.

2.Agenda item # 2 Addition of a few new Courses for Bachelors of Engineering– MechanicalEngineering and Master of Engineering– Thermal Engineering

The Head of the department highlighted the feedback received from the Alumni and Industrial experts and requested for the necessary new elective courses introduction on emerging technologies. Dr.L.Vijayaraghavan and Er.James Michael Amulu suggested to focus on Design for Manufacture and Assembly as the Industries look for the enhanced skills in the manufacturing industries. Also they pointed out to introduce Industrial Safety Engineering course so as to have completeness in skill addition during the study.

Based on the feedback, the following courses had been coined and were decided to be offered as elective courses from July 2019 onwards.

Course 1: Design for Manufacture and Assembly

Course 2: Industrial Safety Engineering

Resolutions: The BOS approved the suggested courses for inclusion in B.E. Mechanical Engineering programme curriculum. Dr. L. Vijayaraghavan and Mr. James Michael Amulu highlighted the importance of Design for Manufacture and Assembly & Industrial Safety Engineering for the ease of manufacturing in Industries and unanimously the syllabi developed by the team members were approved.

3.**Agenda item # 3.** Need of skills up in the professional domains to promote industry ready competency among learners. Necessary certification courses suggestion were taken for consideration to improve the domain knowledge.

Dr. S.P. Venkatesan pointed out that the knowledge and skill on converting product in to patent will help the students to get the patent approval. Dr Ganesan also suggested the knowledge and skill on Non destructive testing methods will increase the employment opportunity in core Engineering fields. The members reviewed the requirements and suggested to plan workshops on Patent filing procedures and hands on training on Non Destructive Testing (NDT).

Resolutions: The BoS recommended and approved the agenda for enhancement of industry ready competency among learners.

4.Any other points with the permission of Chair :

Academic flexibilities with extra credits acquired through either advanced study of same courses or with procuring additional credits from additional courses as per students' choice

Internal members suggested the students' enrollment in NPTEL courses for completeness in learning . Dr L Vijayaraghavan pointed out that the completeness of learning fullfilled with the blend of curricular courses and NPTEL courses.

Resolutions: The BoS recommended and approved for introduction of advanced courses/NPTEL courses and it can be selected based on the specialization. Also the team recommended that creating awareness was necessary among the students and the students could select any of these courses at the end of the fourth semester.

With the above discussion, the Head expressed his deep sense of gratitude to all members for an academic active discussion on the discussed contents. The members were thanked by the HoD and the meeting was smoothly completed.

Member	Designation	**Signature**
Dr.L.Vijayaraghavan	Professor	
Er.James Michael Amulu	Director	
Dr.G.Arunkumar	Professor and Head	
Dr.S.P.Venkatesan,	Associate Professor	
Dr.G.Senthilkumar	Associate Professor	
Dr. J.Jayaprabakar	Associate Professor	
Dr.S.Ganesan	Associate Professor	
Mr.Abhishek Singh Chauhan	Alumni Member	

1.Agenda item # 1 Modifications proposed for SME1302 – Fluid power systems Course.

SMEX1022	FLUID POWER SYSTEMS	L	T	P	Credits	Total Marks
		3	0	0	3	100

UNIT I GENERAL INTRODUCTION **10 hrs.**

Introduction to fluid power – review of fundamental principles of fluid power – construction, operation and characteristics of gear pump, vane pump, variable displacement pump, piston pump. Fluid power actuators, linear androtary – computation of force – flow requirement – cushioning – cylinder mountings – relative merits – selection criteria for specific applications – power pack design

UNIT II CONTROL SYSTEM COMPONENTS AND ACCESSORIES **10 hrs.**

Valves – non return valve for pressure control, direction control and flow control – servo valves and proportional control valves – valve actuation techniques – pressure, electrical and limit switches, Relief valve – brake valve –counter balance valve. Fluid power maintenance – filters – seals – reservoirs, selection of accumulators, hoses and couplings. Safety regulations as per BIS

UNIT III HYDRAULIC SYSTEMS **10 hrs.**

Fluid power symbols, hydraulic Circuits – regenerative – intensifier – metering out – bleed off. Design of circuits for specific applications – vehicle suspension systems – hydraulic press – low cost automation. Programmable logiccontrol. Electrical control for FPCs. Temperature control in hydraulic circuits.

UNIT IV HYDRAULIC CIRCUIT **10 hrs.**

circuits and selection of components with specification for the following applications – hydraulic or pneumatic systems for shapers – lift – hydraulic press – automatic reciprocating system – hydraulic cranes and earth moving equipments.

UNIT V PNEUMATIC SYSTEMS **10 hrs.**

Basic principles of pneumatic circuits – merits and demerits over hydraulic systems, pneumatic conditioners – filters – regulators – lubricators – mufflers – air dryers. Types of Air compressors – pneumatic actuators – control of pneumatic circuits – valves. Introduction to pneumatic logic control – pneumatic hydraulic circuits.

TEXT / REFERENCE BOOKS:

1. Anthony Esposito, Fluid Power with Applications – Prentice Hall, 1980
2. Prinches M.J., and Ashby John, Power Hydraulics, Prentice Hall, 1980
3. Sullivan James P., Fluid Power Theory and Applications, Prentice Hall, 1989
4. James L Johnson, Introduction to Fluid power, Cengage Delmark Learning Edition, 2009.
5. Srinivasan, Hydraulis and Pneumatics, Tata McGraw Hill, 2nd Edition, 2001
6. Shanthakumar S.R., Fluid power system, Anuradha Publications, 1996.

UNIVERSITY EXAM QUESTION PAPER PATTERN

Max Marks : 80 Exam Duration : 3 hrs.

PART A : 2 Questions from each unit, each carrying 2 marks 20 marks

PART B : 2 Questions from each unit with internal choice, each carrying 12 marks 60marks

SME1302	FLUID POWER SYSTEMS (Common to Mech & M&P)	L	T	P	Credits	Total Marks
		3	0	0	3	100

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 - Perform the complete circuit analysis of the given hydraulic circuit taking into account the energy losses due to friction.

CO2 - Suggest the appropriate system components, such as actuators, pumps, valves, switches, pipes and fittings, to the stated hydraulic applications.

CO3 - Design a suitable hydraulic circuit for a specified application.

CO4 - Suggest the appropriate system components, such as actuators, compressors, valves, switches etc. to the stated pneumatic applications.

CO5 - Design a suitable pneumatic circuit for a specified application.

CO6 - Recommend the safety guidelines, best practices, remedial actions and precautions for increasing the overall life of a hydraulic/ pneumatic applications.

UNIT 1 GENERAL INTRODUCTION OF CONTROL SYSTEM COMPONENTS AND ACCESSORIES 9 Hrs.

Introduction to fluid power - Advantages of fluid power - Application of fluid power system. Types of fluid power systems - Properties of hydraulic fluids – General types of fluids – Fluid power symbols.

Basics of Hydraulics-Applications of Pascal's Law- Laminar and Turbulent flow – Reynolds's number – Darcy's equation – Losses in pipe, valves and fittings. Fluid Power Actuators: Linear hydraulic actuators – Types of hydraulic cylinders – Single acting, Double acting special cylinders like tanden, Rodless, Telescopic, Cushioning mechanism, Construction of double acting cylinder, Rotary actuators – Fluid motors, Gear, Vane and Piston motors – computation of force – flow requirement – cushioning – cylinder mountings

UNIT 2 HYDRAULIC CIRCUITS - I 9 Hrs.

Hydraulic Power – Pump classification – Gear pump, Vane Pump, piston pump – pump performance – Variable displacement pumps. Construction of Control Components : Director control valve – Shuttle valve – check valve – pressure control valve

– pressure reducing valve, sequence valve, Flow control valve – Relief valve – brake valve - counter balance valve - Relays, ladder diagram - pressure, electrical and limit switches. Hydraulic Circuits – regenerative – intensifier – metering out – bleed off. Design of circuits for specific applications – vehicle suspension systems – hydraulic press - hydraulic copying machine circuit – low cost automation. Systems for shapers – lift – automatic reciprocating system – hydraulic cranes and earth moving equipments

UNIT 3 PNEUMATIC SYSTEMS 9 Hrs.

Pneumatic Components: Properties of air – Compressors – Filter, Regulator, and Lubricator Unit – mufflers – air dryers. Air control valves, Quick exhaust valves selection of accumulators. Types of Air compressors – pneumatic actuators – control of pneumatic circuits – valves.

UNIT 4 PNEUMATIC CIRCUITS 9 Hrs.

Basic principles of pneumatic circuits – merits and demerits over hydraulic systems, pneumatic conditioners – Programmable logic control- pneumatic hydraulic circuit. Electrical control for FPCs.

Fluid Power Circuit Design, Speed control circuits, synchronizing circuit, Pneumatic hydraulic circuit, Sequential circuit design for simple applications using cascade method.

UNIT 5 TROUBLESHOOTING AND APPLICATIONS 9 Hrs.

Development of hydraulic / pneumatic circuits applied to machine tools, presses, material handling systems, automotive systems, packaging industries, manufacturing automation. Maintenance in fluid power systems – preventive and breakdown. Maintenance procedures. Trouble shooting of fluid power systems - fault finding process, equipments, tools used, causes and remedies. Safety aspects involved

Max.

45 Hrs.

TEXT / REFERENCE BOOKS

1. Anthony Esposito, Fluid Power with Applications – Prentice Hall, 2003
2. Prinches M.J., and Ashby John, Power Hydraulics, Prentice Hall, 1988
3. Sullivan James P., Fluid Power Theory and Applications, Prentice Hall, 1998
4. James L Johnson, Introduction to Fluid power, Cengage Delmark Learning Edition, 2009.
5. Srinivasan, Hydraulis and Pneumatics, Tata McGraw Hill, 2nd Edition, 2001.
6. Shanthakumar S.R., Fluid power system, Anuradha Publications, 1996.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100 **Exam Duration: 3 Hrs.**

PART A:	2 Questions each from CO1-CO4, 1 question each from CO5 and CO6 – No choice	**20 Marks**
PART B:	4 Questions each with internal choice from CO1-CO4, 1 question from CO5 and CO6 with internal choice, each carrying 16 marks	**80 Marks**

2.Agenda item # 2 Addition of new Course for Bachelors of Engineering– MechanicalEngineering

SPR1604	DESIGN FOR MANUFACTURE AND ASSEMBLY	L	T	P	Credits	Total Marks
		3	0	0	3	100

COURSE OUTCOMES:On completion of the course, student will be able to

CO1: Understand the concept of a product design procedure and accepted levels of tolerances. CO2: Classify products simply in terms of their basic shape and type of manufacturing process.

CO3: Apply a systematic approach in the field of design and redesigning of components in the manufacture of products.

CO4: Applying the design for assembly rules and application and design for reliability, quality and optimization to design new products

CO5: Understand and apply the concepts of value engineering in the design and manufacture of products.

CO6: Understand and apply the concepts of the reengineering in the design and manufacture of products. Performing case studies, brainstorming sessions to understand the concepts thoroughly to create new products.

UNIT 1 DFM METHOD AND TOLERANCE ANALYSIS 9 Hrs.

Elements of DFM-need for identification and problem definition concept generation and evaluation embodiment design-product architecture-configuration design-parametric design - Process capability - Feature tolerances-non Feature tolerances- Geometric tolerances ANSI symbol- Assembly limits Datum features - Tolerance stacks-computer aided tolerances.

UNIT 2 SELECTION OF MATERIALS AND MANUFACTURING PROCESS 8 Hrs.

Properties of engineering materials materials selections (ASHBY) chart- selections of shapes and co selection of materials and shapes- -design for bulk deformation process- design for sheet metal process design for machining design for powder metallurgy-design for polymer processing case studies

UNIT 3 COMPONENT DESIGN FROM CASTING CONSIDERATIONS AND MACHINING CONSIDERATION 10 Hrs.

Review of casting process-Cast holes- cored holes and machined holes-Possible and probable- parting lines.-Design for reducing /eliminating sand cores-Design considerations for turning, drilling, tapping, milling and grinding operations- provisions for clamping, reduction in machining area-Simplification by separation and amalgamation-productive machines.- redesigning of cast members using elements.

UNIT 4 DESIGN FOR ASSEMBLY AND RELIABILITY 8 Hrs.

Introduction–fits and tolerances. Assembly processes-Handling and insertion process-Manual, automatic and robotic Assembly-Cost of Assembly-Number of Parts-DFA guidelines- exploration of DFA software- failure mode effective analysis- design for reliability design for quality-design for optimization

UNIT 5 VALUE ENGINEERING AND RE- ENGINEERING 10 Hrs.

Value–types–functional– operational aesthetic cost- material design–process value and –worthiness procedure -brainstorming sessions evaluation –case studies value estimation- value analysis - design for value - selection of alternatives -optimization implementation-Re-Engineering-Definition, Need & characteristics-frame work-case studies.

Max. 45 Hrs.

TEXT / REFERENCE BOOKS:

1. Harry Peck, Designing for Manufacture, Pitman Publications, 1983
2. George E Dieter, Engineering Design, McGraw-Hill Int Editions, 2000
3. Michael F. Ashby, Materials Selection in Mechanical Design, Fourth Edition

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100 **Exam Duration: 3 Hrs.**

PART A: 2 Questions each from CO1-CO4, 1 question each from CO5 and CO6 No choice 20 Marks

PART B: 4 Questions each with internal choice from CO1-CO4, 1 question from CO5 and CO6 with internal choice, each carrying 16 marks

SPR1607	INDUSTRIAL SAFETY ENGINEERING	L	T	P	Credits	Total Marks
		3	0	0	3	100

COURSE OUTCOMES:

On completion of the course, student will be able to

CO1: Understand the functions and activities of safety engineering department.

CO2: Explain the important legislations related to health, Safety and Environment and for the requirements mentioned in factories act for the prevention of accidents.

CO3: Understand the statutory requirements for an Industry on registration, license and its renewal.

CO4: Illustrate the role of hazardous waste management and use of critical thinking to identify and assess environmental health risks.

CO5: Analyze the accident indices, frequency rate, severity rate, frequency severity-incidence, incident rate, accident rate, safety "t" score, safety activity rate and problems.

CO6: Evaluate the safety performance of an organization from accident records and identify various agencies, support institutions and government organizations involved in safety training and promotion.

UNIT 1 INTRODUCTION 9 hrs

Evaluation of modern safety concepts - Safety management functions - safety organization, safety department - safety committee, safety audit - performance measurements and motivation - employee participation in safety - safety and productivity.

UNIT 2 OPERATIONAL SAFETY 9 hrs

Hot metal operation - safety in Cutting - safety in welding - safety in Boilers- Pressure vessels Furnace (all types) - Heat treatment processes shops electroplating grinding forming processes- rolling forging - surface hardening casting Moulding coiling. Operational safety (cold metal operation), Safety in Machine shop - Cold bending and chamfering of pipes - metal cutting - shot blasting, grinding, painting - power press and other machines.

UNIT 3 SAFETY, HEALTH, WELFARE AND LAW 9hrs

Features of Factory Act explosive Act boiler Act ESI Act – workman's compensation Act Industrial hygiene occupational safety diseases prevention ergonomics - Occupational diseases, stress, fatigue - Health, safety and the physical environment - History of legislations related to Safety-pressure vessel act-Indian boiler act - The environmental protection act - Electricity act - Explosive act.

UNIT 4 SAFETY PERFORMANCE MONITORING 9hrs

Permanent total disabilities, permanent partial disabilities, temporary total disabilities -Calculation of accident indices, frequency rate, severity rate, frequency severity- incidence, incident rate, accident rate, safety "t" score, safety activity rate problems.

UNIT 5 SAFETY MANAGEMENT 9hrs

Methods of promoting safe practice Safety organization- OSHA–Safety controls. visible and latent hazards - human factors and safety - safety audit - Case study roll of management and roll of Govt. in industrial safety - safety analysis Industrial fatigue- role of industrial psychology- risk analysis - safety training - accident and near miss investigations- promotional measures to avoid accidents - human reliability - safety management characteristics-industrial safety policies and implementation

Max. 45 Hrs.

TEXT / REFERENCE BOOKS:

1. Deshmukh, Industrial Safety Management, Tata McGraw Hill, 2008.
2. Krishnan N.V., "Safety in Industry", Jaico Publisher House, 1996
3. Nair P M C, Industrial safety and the law" Attam Publisher's, 1994
4. Roland P.Blake, Industrial Safety, Prentice Hall, 1963
5. Rollin.H.Simonds, John V, Grimaldi, Technology and Engineering, 1989
6. Roy Asfatil C, David W Rieske, Industrial safety and Health Management, Prentice Hall, 2009.
7. Joseph F. Gustin, Safety Management: A Guide for facility Management, The Fairmont Press, Inc., 2008

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100 **Exam Duration: 3 Hrs.**

PART A: 2 Questions each from CO1-CO4, 1 question each from CO5 and CO6 – No choice **20 Marks**

PART B: 4 Questions each with internal choice from CO1-CO4, 1 question from CO5 and CO6 with internal choice, each carrying 16 marks 80 Marks