

BHAVNAGAR UNIVERSITY
B.E.SEMESTER –V PRODUCTION ENGINEERING
P- 501 MACHINE DESIGN & DYNAMICS OF MACHINES

| Teaching Scheme | | Examination Scheme | | | | |
|---------------------|-----------|--------------------|----------------|-------------------------|-----------------------|----------------|
| Theory Hrs. Hrs. | Practical | Marks | Theory Hrs. | Practical/Oral Marks | Term work Marks | Total Marks |
| 04 | 02 | 100 | 04 | 25 | 25 | 150 |

A. THEORY

PART –I DYNAMICS OF MACHINES

1. FORCE ANALYSIS OF MECHANISMS

Concept of free body and its equilibrium, static force analysis, friction effects, forces on gear tooth, D-Alembert's principles, Dynamic force analysis, Inertia force in Mechanisms.

2. STATIC AND DYNAMIC BALANCING

Need for balancing, methods of balancing, Balancing of revolving and reciprocating masses in the same and different planes, Balancing machines.

3. KINEMATICS OF GEARS

Tooth gearing, cycloidal and involute teeth, standard proportions, comparison of conjugate profiles, part of contact, arc of contact, Interference, Under cutting, Corrected gear tooth profiles.

4. MECHANICAL VIBRATIONS

Fundamentals of Vibrations, Undamped free Vibrations, damped free vibrations and forced vibrations of single degree of freedom systems, Vibration transmissibility and isolations. Concepts of two degrees freedom systems, critical speed of shaft.

PART –II MACHINE DESIGN

1. Stresses in Machine Parts : Cyclic Stresses, fluctuating and dynamic stresses; Endurance limit & fatigue limit, Combined and variable stresses, Soderberg & Goodman diagram.

2. Design of Gears: Design of Spur gears, Helical gear, Bevel gear, Worm and Worm-Wheels.

3. Design of Material Handling Equipments

Design of chains, sprockets, Hooks, wire ropes drums etc.

4. Design of brakes and clutches :

Design of different types of Block, Shoes and Band brakes, Design of friction clutch.

B. TERM WORK

Term work to be prepared by the candidate will be based on the topics of above syllabus with equal weightage to Part –I & Part –II. The term work shall consist of

1. Practical work on Part –I of above syllabus.

2. Design and drawing work for one major design problem from Part-II of above syllabus. Also candidate will prepare details and assembly drawings on two A2 size drawing sheets.

3. Preparation of design report on Part-II above and design calculations of any two minor design problems from the Part- II of above syllabus.

Term work will be assessed on continuous assessment.

C. PRACTICAL / ORAL

Examination will be based on term work done on (I) (II) & (III) above and topics covered in syllabus of Part- I, Part –II.

D. REFERENCE BOOKS : (1) DYNAMICS OF MACHINES

1. Theory of Machines By Bellani D.L.
2. " " By Jagdishlal
3. " " By R.S. Khurmi
4. " " By Dr. Pandya & Dr. Shah
5. " " By Ratan
6. Mechanical Vibrations By Grower G.K.

(2) MACHINE DESIGN

1. Machine Design Vol. II By R.C. Patel
2. Machine Design By Dr. Pandya & Dr. Shah
3. Machine Design By Sharma & Agrawal
4. Machine Design By R.s.Khurmi.
5. Machine Design By Sunder Raj Murthy
6. Machine Design By Bhandari

BHAVNAGAR UNIVERSITY
B.E.SEMESTER –V PRODUCTIO ENGINEERING
P- 502 MANUFACTURING PROCESS-I

| Teaching Scheme | | Examination Scheme | | | | |
|---------------------|-----------|--------------------|----------------|-----------------------------|-----------------------|----------------|
| Theory Hrs. Hrs. | Practical | Marks | Theory Hrs. | Practica l/Oral Marks | Term work Marks | Total Marks |
| 04 | 02 | 100 | 03 | 25 | 25 | 150 |

A. THEORY

1. FRACTURE, CREEP & FATIGUE

Mode & Types of fractures and its influence in service life of part, concept of creep, method to improve creep resistance, Material suitable for high temperature application, failure of material by fatigue and its causes, Fatigue failure curves, fatigue tests of material & method to improve fatigue Resistance.

2. FOUNDRY PROCESSES

Types of foundry & foundry process characteristics, Application of theory of gate & riser location & design in actual casting, Design criteria's for preparing casting from blue print drawing considering pattern making, core making mould making, cleaning & machining stage of casting, standard s and tests & analysis, casting defects, their causes & remedies, Testing & inspection methods of casting Non destructive testing of casting.

3. SAND CASTING FOR SMALL & LARGE QUANTITY PRODUCTION

Sand mold making, planning of new pattern, Materials, removable pattern. Types & uses, Different pattern such as segmental, skeleton & gated, Molding techniques for larger molds, pit molding, loam molding & molding materials, Molding machines, jointing machines, squeezing machine, pattern draw molding machines, Mold blowing machine & other molding, machines, Testing & inspection of casting.

4. FOUNDRY MECHANISATION

Modern development in mechanization of foundry, Modern developments in foundry processes, Application of I.E. Principles in foundry.

5. ADVANCE CASTING PROCESSES

Special casting processes with regard to typical characteristics; merits demerits and field application along with the process detail of casting processes such as Resin bonded casting techniques, Shell moulding technique , Centrifugal casting technique, Die casting technique , Investment Casting technique and Continuous Casting Process.

B. TERM-WORK

It shall consist of experiments industrial case studies and exercise problem solved by computer. Assessment of term work will be on continuous bases.

C. PRACTICAL / ORAL

It shall be based on term work prepared and on syllabus topics as above.

D. REFERENCE BOOKS

1. A text Book of material science & Metallurgy - By O.P. Khanna
2. Engineering & Material Science Metallurgy - By S. P. Nayak
3. Manufacturing Technology foundry forming & Welding. - By P.N. Rao TMH Edision
4. Principles of Manufacturing Materials & Processes - By J.S. Campbell TMH Edition.
5. Production Technology By O.P. Khanna & M. Lal
6. Fundamental of Metal casting Technology - By Dr. P.C. Mukharji
7. Advance Casting Processes BY O.P. Khanna & M. Lal

BHAVNAGAR UNIVERSITY
B.E.SEMESTER –V PRODUCTION ENGINEERING
P- 503 MANUFACTURING PROCESSES-II

| Teaching Scheme | | Examination Scheme | | | | |
|---------------------|-----------|--------------------|----------------|-----------------------------|-----------------------|----------------|
| Theory Hrs. Hrs. | Practical | Marks | Theory Hrs. | Practical/ Oral Marks | Term work Marks | Total Marks |
| 04 | 02 | 100 | 03 | 25 | 25 | 150 |

A. THEORY

1. INTRODUCTION TO METAL JOINING PROCESSES Basic Principles of metal joining techniques, Soldering & Brazing techniques; Applications of different metal joining processes.

2. WELDING AND ALLIED PROCESSES

Welding compared to the other fabrication methods, classification based on source of energy, classification as per AWS. Gas Welding, fusion welding, Arc welding, Initiation & maintenance of welding arc. Static arc characteristics, metal transfer, Arc welding Consumables and related I.S.I., Shielded metal arc welding & submerged arc welding, electro slag & electro gas welding; safety standards in welding. Brazing, Soldering and their variations; Safety aspects in welding; Welding Joints, standard symbols; Power sources for welding; Welding metallurgy of various metals; Pre and Post weld treatments; Welding procedure specification; welding procedure qualification.

3. WELD DEFECTS & TESTS

Metallurgical defects in weld- causes & remedies, welding distortion, methods to relieve welding stress, thermo mechanical treatment, overstressing techniques, types of weld test as per commercial standards, non destructive testing, different types & detailed operational procedure & analysis.

4. INDUSTRIAL FABRICATIONS

Methods of sheet metal, pressure vessel, pipe heat exchanger, welded joints of valve flange connections & their fabrication considerations & related cost estimations. Non-metallic fabrication methods for plastics, their characteristics & process details.

5. ADVANCE JOING TECHNOLOGY

Need for advance welding processes, Principle of working, equipments and ditsy characteristics, special process parameters, materials being welded, Advantages and limitations of solid state welding such as cold diffusion, ultrasonic, explosive, friction and inertia welding; Plasma Arc welding, arc stud welding; thermo chemical welding such as termite and atomic hydrogen welding; Radiant Energy welding such as Electron Beam and Laser Beam welding inclusive of safety standards and under water welding. Application and process selection decision for above processes.

B. PRACTICAL /ORAL

It will be based on term work prepared and on topics of subject as above.

C. TERM WORK

It will consist of journal writing on topics of non destructive testing for welded joints & topics of tooling of semi automats, automats, thread manufacturing & gear manufacturing, in details, and industrial visit report based on observation of welding processed. Gear manufacturing, thread manufacturing, exercise problems.

D. REFERENCE BOOKS

1. Machine Tool Design – Vol. II By Son & Bhattacharya
2. Capstan & Turret Lathes By Durmey.
3. Technology of Gear Cutting By A. Bhattachaya
4. Workshop Technology By Hajra Choudhary
5. Production Technology By O.P. Khanna & M.Lal

6. Manufacturing Technology By P.N. Rao TMH Edision
7. Metal working Technology By Richard L. Little
8. Pressure Vessel Design By M.V. Joshi.
9. Welding Technology BY Dr. R.S. Parmar

BHAVNAGAR UNIVERSITY
B.E.SEMESTER –V (PRODUCTION)
P- 504 STATISTICAL METHODS FOR MANAGEMENT

| Teaching Scheme | | Examination Scheme | | | | |
|-----------------|----------------|--------------------|-------------|----------------------|-----------------|-------------|
| Theory Hrs. | Practical Hrs. | Marks | Theory Hrs. | Practical/Oral Marks | Term work Marks | Total Marks |
| 04 | 02 | 100 | 03 | 25 | 25 | 150 |

A. THEORY

1. DECISION MAKING-OVERVIEW

Meaning of Quantitative Technique, classification of Statistical Methods, QT in business and Management.

MODELS: Decision making process, Management science approach to decision making, meaning and benefits of models, use of models for analysis of system characteristics: planning, organizing and controlling operation by modeling for production/ operation Management, Industrial dynamics- introduction and use of elementary models in long range planning and predicating the system performance.

2. DATA COLLECTION AND ANALYSIS

Collection and presentation of data, Common patterns of variations, Frequency distributions, Measures of central tendency, dispersion and skew ness & peaked ness along with their properties and use.

3. PROBABILITY DISTRIBUTION & STATISTICS

Basics of probability, Conditional probability, Baye's theorem, Binomial, Poisson, Exponential and Normal distribution with their properties and application. Random variables- discrete and continuous probability distribution functions, probability density functions, mean, median, mode, moment and moment generating functions of Binomial, Poisson and geometric & hyper geometric distributions.

SAMPLING DISTRIBUTION AND TESTING OF HYPOTHESIS: Elementary theory & practice of sampling, standard error of means and variance, tests of significance, T-test, F- test, Z-test and χ^2 test along with their application, Goodness of fit, Testing of Hypothesis and decision making, Analysis of variance (ANOVA).

4. CORRELATION AND REGRESSION ANALYSIS

Curve –fitting correlation and regression analysis, Autocorrelation, Multiple regression, statistical Inference & Estimation applied to Industrial problems.

5. SIMULATION & COMPUTER APPLICATIONS

Nature and meaning of simulation, Monte Carlo technique, Use of random number in Monte Carlo simulation, Monte Carlo simulation applied to queuing processes, Elementary case study on simulations.

Computer application for sampling and frequency distribution (discrete probability distribution), Curve fitting, correlation, T- tests of significance, analysis of variance and queuing process-simulation.

B. TERM WORK

It shall be in form of exercise problems and industrial case studies related to topics as above and will be solved by use of computers.

C. PRACTICAL/ ORAL

It shall be used both on term work prepared as well as on syllabus topics .

D. REFERENCE BOOKS

1. Statistical Management By Lewis
2. Computer Oriented Statistical & Numerical Methods By E. Balagurusamy
3. Introduction to Operation Research By Billy E. Gillett.
4. Probability & Statistics for Engineers. By Freund & Mille.

5. Introduction to Probability & Statistical Application By P.A. Meyer
6. Handbook of Industrial Engineering By Salvendy
7. Modern Production Management By Elweed S. Buffa.
8. Hand Book of Numerical Analysis Application By Jaroslav Panchner.

BHAVNAGAR UNIVERSITY
B.E.SEMESTER –V PRODUCTION ENGINEERING
P- 505 COMPUTER PROGRAMMING & APPLICATIONS IN PRODUCTION
ENGINEERING

| Teaching Scheme | | Examination Scheme | | | | |
|-----------------|----------------|--------------------|-------------|----------------------|-----------------|-------------|
| Theory Hrs. | Practical Hrs. | Marks | Theory Hrs. | Practical/Oral Marks | Term work Marks | Total Marks |
| 04 | 02 | 100 | 03 | 25 | 25 | 150 |

A. THEORY

1. INTRODUCTION

Importance of computers, History of computer, types & Classification of Computer, Flow charting and algorithm. Useful programming languages, & their comparative features, operating system MS – DOS & its use full commands.

2. PROGRAMMING WITH ‘C’ LANGUAGE

Overview of C, Constants, variables, data types operators and expression, Managing input & output operators, Decision making & branching, Decision making & looping, Arrays and handling of character string. User define function.

3. ADVANCE ‘C’ PROGRAMMING

pointers, structures & unions, File management using C. Various sorting and searching techniques along with their complexity. Graphics in ‘C’.

4. NUMERICAL METHODS

Introduction to numerical analysis, its scope and utility in computer application, Bisection method, direct iteration method, of false position, Taylor’s series method, curve fitting.

B. PRACTICAL / ORAL

Practical work shall be done with equal emphasis on theory topics (1), (2), (3) & (4) and shall have relevance to engineering Industrial problems.

C. TERM WORK

Term work shall consist of report on practical work done in the form of a journal containing computer output sheets.

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D. REFERENCE BOOKS

- | | | |
|----|--------------------------------|--|
| 1. | Programming in C | By E. Balaguruseami |
| 2. | The C Programming language | By B.W. Kernigham & D.M. Ritchie. |
| 3. | Higher Engineering Mathematics | By B.S. Grewal |
| 4. | Programming with C language | By Robert C. Hatchison & Steven B. Just. |
| 5. | Numerical Methods | By. S.S. Shastri |
| 6. | Computer Graphics | By Yashwant Kanitkar |

BHAVNAGAR UNIVERSITY
B.E.SEMESTER –V PRODUCTION ENGINEERING
P- 506 INDUSTRIAL VISIT

| Teaching Scheme | | Examination Scheme | | | | |
|-----------------|-----------|--------------------|-------------|----------------------|-----------------|-------------|
| Theory Hrs. | Practical | Marks | Theory Hrs. | Practical/Oral Marks | Term work Marks | Total Marks |
| ** | ** | ** | ** | 25 | 25 | 50 |

GENERAL GUIDELINES

Students of production engineering are to visit different industries to observe the different basic manufacturing processes carried out in the industries. Student shall understand the processes and prepare a brief note about company, its product, machines and processes they have observed. Aim behind organization of tour is to provide students practical aspects of different manufacturing processes which will be very much essential for them as a part of course curriculum.

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TERM WORK

Term work shall consist of brief technical report about company, its product, processes etc.. in the form of journal containing computer output sheets, which will be assessed at the end of term. Students can use the literature provided by the company.

PRACTICAL / ORAL

Practical oral examination work shall be based on above term work report of Industrial Visit.