

GUJARAT TECHNOLOGICAL UNIVERSITY

M.E Semester: 1

Mechanical Engineering (CAD/CAM)

Subject Name Advanced Machine Design

| Sr.No | Course content |
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| 1. | General design procedure for design problems, design concepts, product design and development, Product design specifications, Product life cycle, Protection of intellectual property, Bench marking, Brainstorming, Ethics in Engineering design, Whistle blowing. |
| 2. | Design for strength & rigidity. |
| 3. | Design based on - Fatigue, Fracture, Creep criteria, safe life v/s fail safe design. |
| 4. | Dynamic design of Mechanical equipments: Modelling of machine tools, Aircraft and Automobiles etc. for determining dynamic characteristics and extraction of Modal parameters for dynamic design. |
| 5. | Design for manufacturing including assembly aspects & other aspects, reliability based design of mechanical components. |
| 6. | Recent developments in pressure vessel design, testing of pressure vessels as per standards. Computer aided design of pressure vessels |
| 7. | Rotating disc and rotating cylinder:- Disc with uniform thickness – disc for uniform strength – stresses in rotating cylinders with and without internal pressure. |
| 8. | Thermal stress, creep and stress rupture; Dynamic and fatigue behaviour |
| 9. | Friction theories, wear & types of wear, Lubrication, different modes of lubrication -hydrodynamic, hydrostatic & Elasto-Hydrodynamic, porous bearings, determination of static load capacity of bearing (Stribek's equation), bearing design & testing. Lubrication problems at certain extreme environmental conditions pressure, temperature & vacuum |
| 10. | Recent trends in materials handling equipment design, basic principles of design, main girder design, structure analysis , loading patterns, service factors & environmental conditions, testing as per BIS, etc. |
| 11. | Advances in gear design, gear materials, corrective gear design, gear rating calculation as per BIS, etc |
| 12. | Quality Function Deployment – Concurrent engineering |

Reference Books:

1. Machine Design – An Integrated Approach by Robert L Norton, Pearson Education.
2. Mechanical System Design by Farzad Haidery.
3. Engineering Design by George E. Dieter, McGraw Hill.
4. Material handling equipment by P.Rudenko, MIR Publication.
5. Handbook of Gear design by G.M. Maitra, vol. –I & II.
6. Mechanical analysis & design by Burr and Cheatham.
7. Mechanical Vibrations by S.S.Rao.
8. Pressure Vessel Design by Bednar.
9. Process Equipment Design by Joshi.