AKU B.E./B.Tech MECH Sem 6 syllabus

Design of Machine Elements

Design of Machine Elements

Module: 1
Introduction to design: Steps in design process, design factors, practical considerations in design,
selection of materials, strength of mechanical elements, impact load, shock load, fatigue loading,
effects of surface, size, temperature and stress concentration, consideration of creep and thermal
stress in design. (Lectures8)
Module: 2
Design of shafts: stresses in shafts, design of static loads, combined stresses, reversed bending and
steady loads, design of shafts based on deflection and strength, critical speed of shafts. Analysis and
design of sliding and rolling contact bearings,
Module: 3
Riveted joint: Stresses in riveted joint, design of riveted joints with central and eccentric loads,
boiler and tank joints, structural joints.
Bolt Joints: Stresses in bolt joint, design of bolt joints with central and eccentric loads.
Welded joints: types of welded joints, stresses, design of welded joints subjected to axial, torsional
and bending loads, welds subjected to fluctuating loads.
Module: 4
Design of Clutches: Friction clutches, uniform wear and uniform pressure assumptions, centrifugal
clutches.
Brakes: Design of internal expansion elements, assumptions, design of external contraction
elements, band type brakes.

Module: 5
Design of transmission elements: spur, helical, bevel and worm gears;
Springs: stresses in helical springs, deflection of helical compression and tension springs, springs
subjected to fatigue loading, concentric and helical torsion spring, critical frequency of springs, leaf
springs, and design of automotive leaf springs.

Dynamics of Machinery

PCC-ME 306 Dynamics of Machinery

Module: 1
Force analysis of mechanism: Dynamics of plane motion of a rigid body, dynamically equivalent two mass system, correction torque, forced in mechanism and machines.

Module: 2
Turning moment diagram: Fluctuations of crankshaft speed and energy in a direct acting engine mechanism, flywheels.

Module: 3
Cams: Classification of cams and followers, types of follower and retardation, cam profile and generation of concentric and offset radial cam profiles by graphical method. Cams with specified contours tangent cam with roller follower, circular arc cam with flat follower.

Module: 4
Analysis of gyroscopic motion : Principle of gyroscope, gyroscopic couple and gyroscopic reaction couple, Gyroscopic effects on the movement of ships, aeroplanes, two wheeled and four wheeled vehicles, gyrostabilizers.

Module: 5
Effects of inertia of reciprocating masses on engine frame: Unbalanced primary and secondary forces and couples, balancing of primary and secondary forces, partial balancing of locomotives, balancing of multicylinder in line and radial engines, direct and reverse cranks methods for balancing of radial engines.

Module: 6
Mechanical vibrations : Basic concepts degree of freedom, types of

damping and viscous damping; natural free, damped free and damped forced vibrations of a single degree of freedom spring mass system, reciprocating and rotating unbalance, vibration isolation and transmissibility, whirling of shaft, elementary treatment of two degree of freedom systems torsional vibrations of single rotor and two rotor systems, transverse vibration of simply supported beam energy method, Rayleigh's and Dankerley method.

Text/References Books:

1. Theory of Machines / S.S Ratan/ Mc. Graw Hill Publ.
2. Mechanism and machine theory by Ashok G. Ambedkar, PHI Publications.
3. Mechanism and Machine Theory / JS Rao and RV Dukkipati / New Age.
4. Theory of Machines / Shiegly / MGH
5. Theory of Machines / Thomas Bevan / CBS Publishers
6. Theory of machines / Khurmi / S.Chand.

Speech and Audio Processing

100904 - Speech and Audio Processing

Introduction- Speech production and modeling - Human Auditory System; General structure of speech coders; Classification of speech coding techniques – parametric, waveform and hybrid ; Requirements of speech codecs –quality, coding delays, robustness.

Speech Signal Processing- Pitch-period estimation, all-pole and all-zero filters, convolution; Power spectral density, periodogram, autoregressive model, autocorrelation estimation.

Linear Prediction of Speech- Basic concepts of linear prediction; Linear Prediction Analysis of non- stationary signals –prediction gain, examples; Levinson-Durbin algorithm; Long term and short-term linear prediction models; Moving average prediction.

Speech Quantization- Scalar quantization–uniform quantizer, optimum quantizer, logarithmic quantizer, adaptive quantizer, differential quantizers; Vector quantization – distortion measures, codebook design, codebook types.

Scalar Quantization of LPC- Spectral distortion measures, Quantization based on reflection coefficient and log area ratio, bit allocation; Line spectral frequency – LPC to LSF conversions,

quantization based on LSF.

Linear Prediction Coding- LPC model of speech production; Structures of LPCencoders and decoders; Voicing detection; Limitations of the LPC model.

Code Excited Linear Prediction- CELP speech production model; Analysis-by-synthesis; Generic CELP encoders and decoders; Excitation codebook search – state-save method, zero- input zero-state method; CELP based on adaptive codebook, Adaptive Codebook search; Low Delay CELP and algebraic CELP.

Speech Coding Standards-An overview of ITU-T G.726, G.728 and G.729standards

Text/Reference Books:

1. “Digital Speech” by A.M.Kondoz, Second Edition (Wiley Students‟ Edition), 2004.
2. “Speech Coding Algorithms: Foundation and Evolution of Standardized Coders”, W.C. Chu, Wiley Inter science, 2003.

Manufacturing Technology

PCC-ME 307 Manufacturing Technology

Module:1

Tooling for conventional and non-conventional machining processes: Mould and die design, Press tools, Cutting tools; Holding tools: Jigs and fixtures, principles, applications and design; press tools – configuration, design of die and punch; principles of forging die design.

Module:2

Metrology: Dimensions, forms and surface measurements, Limits, fits and tolerances; linear and angular measurements; comparators; gauge design; interferometry; Metrology in tool wear and part quality including surface integrity, alignment and testing methods; tolerance analysis in manufacturing and assembly. Process metrology for emerging machining processes such as microscale machining, Inspection and workpiece quality.

Module:3

Assembly practices: Manufacturing and assembly, process planning, selective assembly, Material handling and devices.

Module:4

Unconventional Machining Processes: Abrasive Jet Machining, Water Jet Machining, Abrasive Water Jet Machining, Ultrasonic Machining, principles and process parameters. Electrical Discharge Machining, principle and processes parameters, MRR, surface finish, tool wear, Dielectric, power and control circuits, wire EDM; Electro-chemical machining (ECM), etchant & maskant, process parameters, MRR and surface finish. Laser Beam Machining (LBM), Plasma Arc Machining (PAM) and Electron Beam Machining.

Text Books:

1. Kalpakjian and Schmid, Manufacturing processes for engineering materials (5th Edition)- PearsonIndia, 2014.
2. Taha H. A., Operations Research, 6th Edition, Prentice Hall of India, 2003.
3. Shenoy G.V. and Shrivastava U.K., Operations Research for Management, Wiley Eastern, 1994.