Dr. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD
Ref.No. Exam/PET2020/53-55 Date: 27-05-2020
Ph.D. Entrance Test 2020 Syllabus of Paper II

Subject:

Sr. No.	Name of The Unit	Detailing
01	Research Methodology	Objectives of Research, Research Approaches, Significance of Research, Research Methods versus Methodology, Research and Scientific Method, Research Process, Criteria of Good Research, Defining the Research Problem, Selecting the Problem, Technique Involved in Defining a Problem, Research Design, Important Concepts Relating to Research Design, Developing a Research Plan, Literature review. Introduction to Optimization Techniques-Types and their Application
02	Manufacturing	Various Manufacturing processes and their applications Computer Integrated Manufacturing, Basic concepts of CAD/CAM and their integration tools. Production Planning and Control, Mechanics of machining, Non-traditional machining processes, Machine tool engineering – Merchant's force analysis; Taylor's tool life equation; conventional machining; NC and CNC machining process; jigs and fixtures. Engineering Materials, Structure and properties of engineering materials, Machining and Machine Tool Operations, Metrology and Inspection, Production Planning and Control, Forecasting models, aggregate production planning, scheduling, materials requirement planning. Inventory Control, Deterministic models, PERT and CPM.
03	Material strength and Theory of machines	Mechanics of rigid and deformable bodies- Equations of equilibrium, moments of area, friction, Hook's law, axial, shear and bearing stress, beams, principle stresses and strain, stresses in pressure vessel, design factors for dynamic loading, impulse and momentum, energy formulations and collisions. SFD and BMD, deflection, torsion, columns, energy methods. Theory of Machines- Kinematics and dynamics, mechanism, displacement, velocity and acceleration analysis, dynamic analysis of reciprocating parts, cam & follower, flywheel and governors, static and dynamic balancing and gyroscope.
04	Machine Design and vibrations	Machine Design- Static and dynamic loading, failure theories, fatigue strength, S-N diagram, principles of design of machine elements, design of joints. Vibrations- Free and force vibrations, damping, vibration isolation, resonance, critical speeds and whirling of shaft.
05	Thermal Engineering	Fluid Mechanics- Fluid properties and statics, kinematics and dynamics, differential analysis, dimensional analysis and model studies, boundary layer, turbulent flow, and flow through pipes. Thermodynamics- Basic concepts, pure substances, concepts of laws of thermodynamics, thermodynamic cycles, ideal gas mixtures, concepts of entropy and reversibility, availability, unavailability and irreversibility, thermodynamic relations. Heat Transfer- Conduction, convection, radiation, fins, lumped analysis, thermal boundary layer, dimensionless parameters, correlations, LMTD, NTU, radiation analysis. Thermal systems- Power plants, I.C. Engines, refrigeration and air-conditioning and turbo machinery.

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Dr U.V. Hambire Dr Subhash Lahane Dr S.A. Patil

Reference Books:

Unit 01: Research Methodology

1) Research Methodology-Methods and Techniques", New Age International Publishers, New Delhi By C.R.Kothari
2) Research Methodology-Text and cases with SPSS applications, International Book House Pvt. Ltd., New Delhi. By Gupta S.L. and Gupta Hitesh
3) Research Design: Qualitative, Quantitative, and Mixed Methods Approaches, by John W. Creswell
4) Qualitative Research: A Guide to Design and Implementation , by Sharan B. Merriam, Elizabeth J. Tisdell

Unit 02: Manufacturing

1) Material Science and Metallurgy by U. C. Jindal
2) Production engineering by Amitabh Ghosh
3) Industrial engineering by O.P.Khanna

Unit 03: Material strength and Theory of machines

1. Mechanics of materials by R. C. Hibbeler, Pearson education
2. Mechanics of Solids by A K Singh, Prentice Hall India Learning Private Limited
3. Theory of Machines by S S Rattan, McGrawhill Education

Unit 04: Machine Design and vibrations

1. Design of Machine Elements by V. B. Bhandari, McGrawhill education
2. Mechanical engineering design by Joseph E. Shigley, Charles R. Mischke, Richard G. Budynas, McGraw Hill Education
3. Schaum's Outline of Machine Design by Alfred Hall, A. Holowenko, H. Laughlin

Unit 05: Thermal Engineering

1. Fluid mechanics: fundamentals and applications by Yunus A. Çengel, John M. Cimbala, McGraw Hill Education
2. Heat transfer by J. P. Holman, McGraw Hill Education
3. Thermodynamics: an engineering approach by Yunus A. Çengel, Michael A. Boles, McGraw Hill Education
4. IC Engine Fundamentals by J B Heywood, McGraw Hill Education

Name & Signatures of Syllabus Committee:

Dr Umesh V.Hambire	**Dr. Subhash Lahane**	**Dr. S.A. Patil**
(Chairman)	**(Member)**	**(Member)**

Date: 10 June 2020
Place: Aurangabad