R15/R13

Code No: 126VD/126ED

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech III Year II Semester Examinations, March/April - 2021
DESIGN OF MACHINE MEMBERS – II
(R15-Mechanical Engineering; R13-Mechanical Engineering)

Time: 3 hours **Max. Marks: 75**

Answer any five questions
All questions carry equal marks
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Illustrate your answers with NEAT sketches wherever necessary.

1. Distinguish between hydrostatic and hydro dynamic bearing. What is the importance of McKee's investigation? [15]

2. What procedure would you follow while designing a journal bearing? Explain. [15]

3.a) At what angle, the twisting moment is maximum in the crank shaft? Explain.
b) Determine the diameter of the connecting rod of 150 mm length, subjected to an axial compression load of 180 kN, taking to be freely hinged at the ends. Take the factor of safety to be 7, and $E = 2.15 \times 10^5$ N/mm^2. [7+8]

4. Design a cast iron piston for a four stroke I.C engine, for the following specifications: Cylinder bore = 120 mm; Stroke length = 150 mm; Maximum gas pressure = 5 MPa; Brake mean effective pressure = 0.7 MPa; Fuel consumption =0.25 kg/kW/hr; Speed = 2400 rpm. Assume any other data necessary for the design. [15]

5. Select a wire rope for a vertical mine hoist to lift a load of 20 kN from a depth of 500 m. A rope speed of 3 m/s is to be attained in 10 seconds. [15]

6.a) What are the advantages and disadvantages of V-belt drive over flat belt drive?
b) A belt pulley made of grey cast iron FG 150, transmits 10 kW of power at 720 rpm. The diameter of the pulley is 500 mm. The pulley has four arms of elliptical cross-section, in which the major axis is twice the minor axis. Determine the dimensions of cross-section of the arm, if the factor of safety is 5. [7+8]

7. A pair of bevel gears is required to transmit 25 HP at 600 rpm. The output shaft speed is 300 rpm, and it is at right angles to the input shaft. Both gears are carried on overhanging shafts supported in the housing very close to the gears. The gear is of C.I. and the pinion is of steel. Design the gear wheel and prepare its dimensioned sketch. The static strength of C.I. is 55 N/mm^2, and the pitch line velocity should not exceed 500 m per minute. [15]

8. Derive the expression for the torque required to raise the load by a power screw. [15]

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