

**B.Tech. DEGREE EXAMINATION, MAY - 2015**

**(Examination at the End of Fourth Year)**

**MECHANICAL ENGINEERING**

**Paper - II : Advanced Machine Design**

**Time : 3 Hours**

**Maximum Marks : 75**

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*Answer question No.1 compulsory*

*(15)*

*Answer ONE question from each unit*

*(4 × 15 = 60)*

- 1) a) List out different types of spring materials.
- b) List out different types of Brakes.
- c) Sketch the parallel reliability system.
- d) What are the materials used for lining of friction surfaces?
- e) What is the main function of a fly wheel in an engine?
- f) Write short notes on Optimum design?
- g) Discuss standardization of design process.

**UNIT - I**

- 2) a) Explain one method of avoiding the tendency of a compression spring to buckle.
- b) A helical spring 'B' is placed inside the coil of a second helical spring 'A', having the same number of coils and free length. The spring are made of the same material. The composite spring is compressed by an axial load of 2300 N which is shared between them. The mean diameter of the spring 'A' and 'B' are 100 mm and 70 mm respectively and wire diameters are 13 mm and 8 mm respectively. Find the load taken and the maximum stress in each spring.

OR

- 3) a) Classify springs according to their shapes. Draw neat sketches indicating in each case whether stresses are induced by bending (or) by torsion.

- b) A helical spring is to support a load of 1000N. The spring is guided by a rod of 50mm diameter. The spring undergoes a deflection of 40mm under the load. Determine the diameter of the wire and the number of turns required, Use C-60 steel with a factor of safety 2?

## UNIT - II

- 4) A multi disc clutch consists of steel and bronze plates. It transmits 15 kW power at 1400 rpm. The inner and outer diameters of contacting surfaces are 100 and 200 mm respectively. The coefficient of friction is 0.15 and the permissible intensity of pressure is 0.5 N/mm<sup>2</sup>. Assume uniform wear theory. Calculate the number of steel and bronze disks.

OR

- 5) A differential band brake acting on the  $\frac{3}{4}$ <sup>th</sup> of the circumference of a drum of 450mm diameter is to provide a braking torque of 250Nm. One end of the band is attached to a pin 100mm from the fulcrum of the lever and the other end to another pin 25mm from the fulcrum on the other side of it where the operating force is also acting. If the operating force is applied at 500mm from the fulcrum and the coefficient of friction is 0.2 find the two values of the operating force corresponding to the two directions of rotation of the drum?

## UNIT - III

- 6) a) Explain the considerations given in the design of pistons for IC Engines.  
b) Design a trunk piston for an IC engine. The piston is made of cast iron with an allowable stress of 38.5 MPa. The bore of the cylinder is 200 mm and the maximum explosion pressure is 0.4 MPa. The permissible bending stress of the material of the gudgeon pin is 100 MPa, The bearing pressure in the gudgeon pin bearing of the connecting rod is to be taken as 200 MPa.

OR

- 7) a) State how the size of the flywheel calculated?  
b) Write down the design procedure for a flywheel?

## UNIT - IV

- 8) a) Explain the importance of the reliability and life expectancies.  
b) Explain series, and parallel and series reliability analysis.

OR

9) Explain the following :

- a) Human aspects of a design with a suitable example.
- b) Optimum design with a suitable example.

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