

**B.TECH. (AEROSPACE ENGINEERING)
(BTAE)**

Term-End Examination

December, 2013

BAS-010 : MACHINE DESIGN

Time : 3 Hours

Maximum Marks : 70

Note : Attempt any seven questions. Assume missing data, if any. Use of calculator is permitted. Use of machine Design Data Book is permitted.

1. (a) What are necessary steps involved in the Procedure of Machine design ? 7
- (b) Distinguish between a brittle and ductile material. 3

2. A line shaft rotating at 200 rpm is to transmit 20 K.W . The shaft may be assumed to be made of mild steel with an allowable shear stress of 42 MPa. Determine the Diameter of the shaft, neglecting the Bending moment on the shaft. 10

3. (a) Explain the function of a brake and give example of a Self locking band brake. 5
- (b) Distinguish between a band brake and a band and block brake. 5

4. The nominal diameter of a triple- threaded Square screw is 50 mm, while the pitch is 8 mm. It is used with a collar having outer diameter of 100 mm and inner diameter is 65 mm. The co-efficient of friction at the threaded surface as well as the collar surface can be taken as 0.15. The screw is used to raise a load of 15 KN. Using uniform wear theory for collar friction, Calculate :
- Torque required to raise the load
 - Torque required to lower the load, and
 - The force required to raise the load, if applied at a radius of 500 mm.
- 10
5. (a) Why are tolerances provided on dimensions of the Component ? Explain each type of fit with suitable examples. 5
- (b) A journal of nominal diameter 79 mm rotates in a bearing. The upper and lower deviations in hole diameter are 0.05 mm and 0.00 mm respectively, while those for shaft are -0.03 mm and -0.07 mm respectively. Calculate :
- Extreme diameters of hole and shaft
 - Tolerances of hole and shaft (indicate, if unilateral or bilateral)
 - Maximum and minimum clearances.
- 5
6. (a) What do you understand by eccentric loading of a riveted Joint ? Explain with the help of sketch. 5
- (b) What are the different modes of failure of riveted Joints ? 5

7. A Spring of a truck has 10 leaves of graduated length. The spring supports are 1.06 m apart and the Central band is 87.5 mm wide. The central load is to be 500 N with a permissible stress of 300 N/mm² Determine the width and thickness of the steel spring leaves and the deflection , when loaded. The spring should have a ratio of total depth to width of about 2.5. 10
8. (a) Discuss the design Procedure of Journal bearing. 5
 (b) What do you mean by hydrodynamic lubricated bearings ? List the assumptions used in the theory of hydrodynamic lubrication. 5
9. A Bronze Spur pinion rotating at 600 rpm drives a Cast iron Spur gear at a transmission ratio of 4 : 1. The allowable static stresses for the bronze pinion and cast iron gear are 84 MPa and 105 MPa respectively. 10
 The pinion has 16 teeth of standard 20° full depth involute teeth of module 8 mm. The face width of both the gears are 90 mm. Find the power that can be transmitted from stand point of strength.
 Take tooth form factor $y = 0.154 - \frac{0.912}{T}$ and
 the velocity factor $C_v = \frac{3}{3+v}$ Where v is expressed in m/s.
10. Write short notes on any five of the following : 2x5=10
 (a) Common Spring Materials
 (b) Fatigue failure and failure theories
 (c) Ergonomics
 (d) Tribology
 (e) Need of factor of safety
 (f) Standardisation