INSTITUTE OF AERONAUTICAL ENGINEERING
(Autonomous)

B.Tech VI Semester End Examinations (Regular), November – 2020

Regulation: IARE–R16

MACHINE DESIGN

Time: 2 Hours   (ME)   Max Marks: 70

Answer any Four Questions from Part A
Answer any Five Questions from Part B

PART – A

1. Write the disadvantages of rolling contact bearings compared to journal bearings. **[5M]**

2. Discuss the stress due to whipping action on the connecting rod. **[5M]**

3. Obtain the expression for the length of cross belt drive. **[5M]**

4. Explain the design procedure for the Worm gears. **[5M]**

5. What is self locking screws and write its efficiency? **[5M]**

6. Explain in detail about the design procedure of the connecting rod. **[5M]**

7. What are the required characteristics of piston? Discuss on what considerations piston head is designed. **[5M]**

8. Discuss the uses and construction of wire ropes. How is wire rope ends fastened? **[5M]**

PART – B

9. What are sliding contact bearings ?Discuss the advantages of sliding contact bearings over rolling contact bearing. **[10M]**

10. Design a journal bearing for a centrifugal pump from the following data : Load on the journal = 20kN, journal speed = 900 rpm, type of oil is SAE 10,for which the absolute viscosity at 55^0C = 0.017 kg/m-s, Ambient temperature of oil = 15.5^0 C, Maximum bearing pressure for the pump = 1.5 N/mm^2, Heat dissipation coefficient = 1232 W/m^2/^{0}C. **[10M]**

11. State the function of the following for an internal combustion engine piston: i) Ribs ii) Piston rings iii) Piston skirt and iv) Piston pin. **[10M]**

12. What are the methods and materials used in the manufacture of crankshafts? At what angle of the crank the twisting moment is maximum in the crank shaft? **[10M]**

13. Write the advantages and disadvantages of the chain drive over belt and rope drive. **[10M]**

14. Under what circumstances a fiber rope and a wire rope is used? What are the advantages and disadvantages of a wire rope over fiber rope? **[10M]**

15. Explain design of spur gear for dynamic and wear considerations. **[10M]**

16. Mention four important types of gears and discuss their applications and their materials used. **[10M]**

17. On what factors does the thread bearing pressure depend in the design of power screw? Explain. **[10M]**

18. A power screw having double start square threads of 25 mm nominal diameter and 5 mm pitch is acted upon by an axial load of 10 kN. The outer and inner diameters of screw collar are 50 mm and 20 mm respectively. The coefficient of thread friction and collar friction may be assumed as 0.2 and 0.15 respectively. The screw rotates at 12 RPM. Assuming uniform wear condition at the collar and allowable thread bearing pressure of 5.8 N/mm^2, find: i) The torque required to rotate the screw ii) The stress in the screw and iii)The number of threads of nut in engagement with screw. **[10M]**

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