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SEVENTH SEMESTER B.TECH. (ENGINEERING) [09 SCHEME] DEGREE EXAMINATION, NOVEMBER 2014

ME/PTME/AM 09 701—MACHINE DESIGN

Time : Three Hours

Maximum : 70 Marks

Assume data wherever necessary.
Use of design handbook is permitted.

Part A

*Answer **all** questions.*
Each question carries 2 marks.

1. What is the polygon action in roller chain ?

2. What are the advantages of silent chain ?

3. What are the functions of bearing ?

4. What is Pitting ?

5. What are the advantages of working drawings ?

(5 × 2 = 10 marks)

Part B

*Answer any **four** questions.*
Each question carries 5 marks.

6. What is the general design procedure of a flat belt ?

7. What is the principle of hydrodynamic lubrication ?

8. The radial load acting on a ball bearing of a shaft rotating at 1500 r.p.m. is 10 kN. Calculate the dynamic load carrying capacity of bearing if the expected life for 90% of bearing is 10000 hours.

9. 1 kW of power is transmitted to the worm shaft at 720 r.p.m. The number of threads of worm is four with 50 mm. pitch circle diameter. The worm wheel has 30 teeth with 5 mm. module. Calculate the rubbing velocity.

10. What is virtual or formative bevel gear ?

11. How working drawings be prepared ?

(4 × 5 = 20 marks

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Part C

Answer all questions.
Each question carries 10 marks.

12. A single plate clutch consists of one pair of contacting surfaces. The inner and outer diameters of the friction disk are 125 mm. and 250 mm. respectively. The coefficient of friction is 0.25 and the total axial force is 15 kN. Calculate the power transmitting capacity of clutch at 500 r.p.m. using uniform wear theory and uniform pressure theory.

Or

13. A double block brake consists of two symmetrical pivoted shoes. The diameter of the brake drum is 300 mm. and the angle of wrap for each shoe is 90 degree. The pivot of the shoe is located in such a way as to avoid the couple due to frictional force. Determine the distance of pivot from the axis of the brake drum.

14. The load of a hydrostatic thrust bearing is 500 kN, shaft speed is 720 r.p.m., shaft diameter is 500 mm, recess diameter is 300 mm, film thickness is 0.015 mm. kinematic viscosity of lubricant is 34 centistokes and specific gravity 0.86. Determine supply pressure, flow requirement, power loss in pumping and frictional power loss.

Or

15. Design a self-aligning ball bearing for a radial load of 7000 N and a thrust load of 2100 N. The desired life of the bearing is 160 millions of revolutions at 300 r.p.m. Assume uniform and steady load.

16. Design a spur gear drive required to transmit 45 kW at a pinion speed of 800 r.p.m. The velocity ratio is 3.5 : 1. The teeth are 20° full-depth involute with 18 teeth on the pinion. Both the pinion and gear are made of steel with a maximum safe static stress of 180 MPa. Assume a safe stress of 40 MPa for the material of the shaft and key.

Or

17. A pair of parallel helical gears consists of a 18 teeth pinion meshing with a 45 teeth gear and 75 kW power at 2000 r.p.m. is supplied to the pinion. The normal module is 6 mm. and pressure angle 20°. Determine the tangential, radial and axial components of the resultant tooth force between the meshing teeth, if the helix angle is 23°.

18. What are the general design considerations for rolled sections ?

Or

19. Explain the design recommendations for forgings.

(4 × 10 = 40 marks)