955

Register No.:

November 2022

Time – Three hours
(Maximum Marks: 100)

[N.B. 1. Answer all questions under Part-A each question carries 3 marks.
2. Answer all the questions either (A) or (B) in Part-B each question carries 14 marks.]

PART – A

1. How are the engineering materials classified? Give two examples of each.
2. Define Fatigue and Endurance Limit.
3. Classify the different types of couplings.
4. What is the purpose of coupling?
5. Sketch open belt drive and crossed belt drive.
6. Sketch the cross section of a V – belt and label its important parts.
7. Define: Bearing.
8. Mention five important types of gears with sketches.
9. Define CAD.
10. What are the advantages of solid modelling?

[Turn over.....

PART – B

11. (a) A hydraulic press exerts a total load of 3.5 MN. The load is carried by two steel rods, supporting the upper head of the press. If the safe stress is 85 MPa and E = 210 kN/mm^2, Find (1) Diameter of the rods and (2) Extension in each rod in a length of 2.5 m.

(Or)

(b) Design a sleeve and cotter joint to withstand a tensile load of 60 kN. All parts of the joint are made of the same material and the permissible stresses are given below. tensile stress [σ_t] = 60 N/mm^2; crushing stress [σ_c] = 125 N/mm^2; shear stress [τ] =70 N/mm^2.

12. (a) A shaft made of mild steel is required to transmit 100 kW at 300 rpm. The supported length of the shaft is 3 m. It carries two pulleys each weighing 1500 N, supported at a distance of 1m. from each end respectively. Assume the safe value of stress as 60 N/mm^2. Determine the diameter of the shaft.

(Or)

(b) Design a C.I rigid flange coupling to transmit 15 kW at 90 rpm from an electric motor to a compressor. The service factor may be assumed as 1.35. The following permissible stresses may be used. Shear stress for shaft, bolt and key material 40N/mm^2; crushing stress for bolt and key = 80 N/mm^2 shear stress for C.I = 8 N/mm^2.

13. (a) Design a fabric belt to transmit 11 KW at 420 rpm of an engine to a line shaft at 20 rps. Engine pulley diameter is 550 mm and the centre distance is 2 m. Assume co-efficient of friction μ = 0.2 and 6 number of plies.

(Or)

(b) Design a V-belt drive and calculate the actual belt tensions and average stress from the following data: (1) Diameter of driven pulley = 500 mm,(2) Diameter of driving pulley =150 mm (3) Centre distance between pulleys = 925 mm (4) Speed of driven pulley = 300rpm (5) Speed of driving pulley = 1000 rpm (6) Power transmitted = 7.5 kW (7) Service factor Kt = 1.3 (8)Co-efficient of friction μ = 0.3

14. (a) A 150mm diameter shaft supporting a load of 10 kN has a speed of 1500 rpm. The shaft runs in a bearing whose length is 1.5 times the shaft diameter. If the diametral clearance of the bearing is 0.15 mm and the absolute viscosity of the oil at the operating temperature is 0.011 kg/ms.Find the power wasted in friction.

(Or)

(b) Design a journal bearing for a centrifugal pump from the following data: Load on the journal is 25 kN, speed of the journal = 1000 rpm; Type of oil used is SAE20 for which the absolute viscosity at 60°C = 22cP; Ambient temperature of air = 20°C; Maximum bearing pressure = 1.7 N/mm^2; Heat dissipation co-efficient = 1232 $J/s/m^2/°C$. Calculate also mass of lubricating oil required for artificial cooling, if rise in temperature of oil is limited to 15°C.

15. (a) Explain the development, advantages and applications of CAD.

(Or)

(b) What do you mean by transformations in geometric modelling.
