1289

Register No.:

October 2024

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.
3. PSG Design Data Book or Approved Data Book permitted.]

PART – A

1. Define factor of safety.
2. Draw the creep curve and indicate its various stages.
3. List out the types of keys.
4. What is the purpose of coupling?
5. Define speed ratio.
6. What is known as ply in flat belts? Draw the cross section of four ply belt.
7. List out the classifications of bearing.
8. Name the materials used for gear manufacturing.
9. What are the benefits of CAD?
10. What is solid modelling?

PART – B

11. (a) Design a sleeve and cotter joint to connect two rods for transmitting a maximum tensile load of 100 kN. The rods, sleeve and cotters are made of same material and the permissible stress in the materials can be taken as 65 N/mm^2 in tension, 130 N/mm^2 in compression and 60 N/mm^2 in shear.

(Or)

(b) Design a knuckle joint to sustain a maximum pull of 100 kN. The permissible stresses of the rod material are 75 MPa in tension and 70 MPa in shear. The permissible compressive stress for the pin material is 95 MPa.

[Turn over.....

12. (a) A line shaft is driven by means of a motor placed vertically below it. The pulley on the line shaft is 1.6 m in diameter and has belt tension 5.6 kN and 2.0 kN on the tight side and slack side of the belt, respectively. Both of these tensions may be assumed to be vertical. If the pulley be overhang from the shaft, the distance of the centre line of the pulley from the centre line of the bearing being 420 mm, find the diameter of the shaft. Assuming maximum allowable shear stress as 42 MPa.

(Or)

(b) A marine type coupling is used to transmit 65 kW at 100 rpm. The allowable shear stress in the shaft and bolt may be taken as 33 MPa and permissible crushing stress in the bolt is 35 MPa. Design the coupling by assuming the number of bolts used as 8

13. (a) Select the flat belt from the manufacturer catalogue to transmit a power of 25 kW at 960 rpm. The speed of the driven pulley is 500 rpm. Centre distance between the shaft is 1.5m. Apply intermittent load.

(Or)

(b) Design a V-belt drive from the following data: Diameter of driven pulley = 600 mm, Diameter of driving pulley = 200mm, Centre distance between pulleys = 1000 mm (approximately), Speed of driven pulley = 400 rpm, Speed of driving pulley = 1200 rpm, Power transmitted = 10 kW. Assume service factor = 1.5

14. (a) A steam turbine shaft 200 mm diameter rotates at 1800 rpm and is supported in a journal bearing on which the total load is 90 kN. The room temperature is 30°C. If the bearing temperature is 60°C and allowable bearing pressure 1.5 N/mm^2, determine the length of bearing and amount of heat to be removed by lubricant per minute. Take viscosity of the oil at 60°C as 21 centipoise. Assume C/D = 0.001

(Or)

(b) (i) Write down the general steps to be followed in the design of spur gear based on Lewis equation. (10)

(ii) Write a short note on speed reducer. Also state its types. (4)

15. (a) Explain concurrent engineering with a neat sketch. Also state its needs and benefits.

(Or)

(b) (i) Explain about constructive solid geometry with relevant sketch. (10)

(ii) Draw the flowchart of steps involved in Finite Element Analysis. (4)
