708 Register No.: _____

October 2018

Time – Three hours
(Maximum Marks: 75)

[N.B: (1) Answer all questions choosing either (a) or (b) of each question.
(2) All question carry 15 marks.
(3) P.S.G. Data book and approved data books are permitted.]

			Marks
I.	(A)	(i) Define creep strain and creep curve. (ii) Define stress concentration. Write its causes and remedies.	5
		(Or)	
	(B)	Design a sleeve and cotter joint to withstand a tensile load of 60kN. All parts of the joint are made of the same material and the permissible stresses are given below. $f_t = 60N/mm^2$, $f_c = 125N/mm^2$; $f_s = 70N/mm^2$.	15
II	(A)	A shaft is supported on bearing A and B 800 mm between centres. A 20° straight tooth spur gear with 600mm pitch diameter is located 200mm to the right of the left hand bearing A and a 700 mm diameter pulley is mounted 250 mm towards the left of bearing B. The gear is driven by a pinion with a downward tangential force while the pulley drives a horizontal belt having 180° angle of wrap. The pulley also serves as a flywheel and weighs 2000N. The maximum belt tension is 3000N and the tension ratio is 3:1. Determine the maximum bending moment and the necessary shaft diameter, if the allowable shear stress of the material is 40 N/mm².	15
		(Or)	
	(B)	Design a protective type flange coupling to connect two shafts to transmit 7.5kW at 720 rpm. The permissible shear stress for the shaft, bolts and key materials is 33N/mm², permissible crushing strength for bolt and key material is 60N/mm² and permissible shear stress for cast iron is 15N/mm².	15
III	(A)	Select a flat belt from manufacturer's catalogue to transmit power of 15kW at 1200rpm. The speed of the driven pulley is 450rpm. Maximum centre distance between the shaft is 2m. Assume steady load.	15
		(Or)	

Marks

(B) Design a V-belt drive using manufacturers data to the following specifications: Power to be transmitted = 80kW; Speed of driving wheel = 1350rpm; Speed of driven wheel = 450rpm; dia. of driving wheel = 300mm; Centre distance = 2.4m; small pulley factor k_d=1.2; Service factor, k_s=1.4. 15

IV (A) (i) Describe the various properties of sliding contact bearing materials. 15

(ii) A 80 mm long journal bearing supports a load of 2800N on a 50mm diameter shaft. The bearing has a radial clearance of 0.05mm and the viscosity of the oil is 0.021kg/ms at the operating temperature. If the bearing is capable of dissipating 80J/s, determine the maximum safe speed.

(Or)

(B) (i) Define bearing? How are bearings classified? 15

(ii) Design a suitable journal bearing for a centrifugal pump from the following available data: Load on bearing = 13.25kN; Diameter of the journal = 80mm; Speed = 1440rpm; Average oil (SAE 40) temperature = 75°C; Permissible bearing pressure = 0.7 to 1.4N/mm²; Ambient temperature = 30°C; Specific heat of oil = 1710J/kg°C; Calculate also cooling requirements. Assume L/D = 1.6 K_a=0.273 for heavy construction and well ventilated bearings and Δt_o=8°C.

V (A) Design a cranked lever having a length of handle as 0.5m, length of lever arm as 0.45m and overhang of the journal as 0.1m. The lever is used for operating hoisting winch and is operated by two persons exerting a maximum force of 500N at a distance of 0.4 times the length of the handle from free end. The bending stress in lever should not exceed 50N/mm² and shear stress in lever should not exceed 50N/mm². Shear stress in the shaft should not exceed 40N/mm². 15

(Or)

(B) (i) What are the factors to be considered while selecting the gear material? 15

(ii) A gear drive is required a maximum power of 22kW. The velocity ratio is 1:2 and rpm of the pinion is 200. The approximate centre distance between the shafts may be taken as 600mm. The tooth has 20° stub involute profiles. The material used for the gear is C.I. Find the module, face width and number of teeth on each gear.
