 S" Semester Regular / Back Examination 2019-20 DESIGN OF MACHINE ELEMENTS BRANCH : MECH Max Marks : 100 Time : 3 Hours C.CODE : HRB234 Answer Question No.1 (Part-1) which is compulsory, any EIGHT from Part-II and any TWO from Part-II. ato ato from Part-II. ato ato ato from Part-II. ato ato ato ato ato ato ato ato ato ato	10		210	210	210	210	210	210	210
 Total Number of Pages : 02 "5" Semester Regular / Back Examination 2019-20 "6" Only Short Answer Type Questions (Answer All-10) What do you mean by Preferred Numbers? Give example of series R5. "6" Only Short Answer Type Questions (Answer All-10) "7" What do you mean by Preferred Numbers? Give example of series R5. "6" Only Short Answer Type Questions (Answer All-10) "7" Show failure of cotter in bending. "9" White the advantages of set and advantages of woodruff key. "9" Define stress concentration and notch sensitivity. "10" Define stress concentration and notch sensitivity. "10" Define stress concentration and hydrodynamic bearings. "10" Only Focussed-Short Answer Type Questions- (Answer Any Eight out of Twelve) "10" Only Focussed-Short Answer Type Questions and limits of sizes for the shart designated as 40 H 8/17. "10" A rectangular cross-section bar is welded to a support by means of fillet welds as shown in Fig. Determine the size of the welds, if the permissible shear stress in the weld is limited to 75 MPa. "20" 20" 20" 20" 20" 20" 20" 20" 20" 20"			Reai	stration No :					
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		i)	A ball bearing is subjected to a radial load of 5 kN is expected to have a life of 8000 hours at 1450 rpm with a reliability of 99%. Calculate the dynamic load carrying capacity of the bearing so that it can be selected from the manufacturer's catalogue	
210		j) 0	based on reliability of 90% In a journal ² bearing the load ¹ on the journal is ³ 3kN, diameter ² 50 mm, length 75 ³ mm, speed 1600 rpm, diametral clearance 0.001 mm, ambient temperature 15.50C and oil film temperature is 600C. Determine the heat generated and dissipated. Absolute viscosity of oil is 0.014kg/ms.	210
		k)	A 45mm diameter shaft is made of steel with a yield strength of 400MPa. A parallel key of size 14mm wide and 9mm thick made of steel with a yield strength of 340 MPa is to be used. Find the required length of key if the shaft is loaded to transmit the maximum permissible torque. Use maximum shear stress theory and assume a factor of safety of	
210		210 I)	2.210210210210Describe the design procedure of a knuckle joint with neat sketch.	210
			Part-III	
210	Q3	210	Only Long Answer Type Questions (Answer Any Two out of Four) Design a double riveted butt joint with two cover plates for the longitudinal seam of a boiler shell 1.5 m in diameter subjected to a steam pressure of 0.95 N/mm2. Assume joint efficiency as 75%, allowable tensile stress in the plate 90 MPa ; compressive stress 140 MPa ; and shear stress in the rivet 56 MPa. 210 210	(16) 210
210	Q4	210	A shaft is supported on bearings A and B, 800 mm between centres. A 20° straight tooth spur gear having 600 mm pitch diameter, is located 200 mm 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 2000 N. The maximum belt tension is 3000 N and the tension ratio is 3:1 ₂₁₀ Determine the maximum bending moment and the necessary shaft diameter if the allowable shear stress of the material is 40 MPa.	(16) 210
	Q5		Design a helical spring for a spring loaded safety valve (Rams bottom safety valve) for	(16)
210		210	the following conditions: Diameter of valve seat = 65 mm ; Operating pressure = $0.7N/mm^2$; Maximum pressure when the valve blows off freely = $0.75N/mm^2$; Maximum lift of the valve when the pressure rises from 0.7 to 0.75 N/mm ² = 3.5 mm ; Maximum allowable stress = 550 MPa ; 210 210 210 210	210
			Spring index = 6. Draw a neat sketch of the free spring showing the main dimensions.	
210	Q6	210	Design and draw a protective type of cast iron flange coupling for a steel shaft transmitting 15 kW at 200 r.p.m. and having an allowable shear stress of 40 MPa. The working stress in the bolts should not exceed 30 MPa. Assume that the same material is used for shaft and key and that the crushing stress is twice the value of its shear stress. The maximum torque is 25% greater than the full load torque. The shear stress for cast iron is 14 MPa.	(16) 210

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