Code No: RT31033 **R13** SET - 1

III B. Tech I Semester Supplementary Examinations, May - 2018

DESIGN OF MACHINE MEMBERS – I

(Mechanical Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**
(Data books may be allowed)

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PART –A

1	a)	Write about preferred numbers?	[3M]
	b)	How will you reduce stress concentration in shaft with keyway?	[4M]
	c)	Write the advantages and limitations of bolted joints?	[4M]
	d)	Write the applications of spigot and socket joint?	[4M]
	e)	What is the importance of split muff couplings?	[3M]
	f)	List the classification of springs?	[4M]

PART -B

2	a)	Explain the manufacturing considerations in design?	[8M]
	b)	How do you understand failure? Explain the various theories of failure?	[8M]
3	a)	A torsion bar spring has a solid round 20 mm diameter section which blends smoothly at each end with a larger splined section. It is subjected to a completely reversed nominal torsional stress of 210 MN/m^2. Stress concentration is negligible, and the surfaces are machined. Estimate the fatigue life corresponding to each of the following materials : i) steel= 250 HB, ii) Cast iron Su= 350 MN/m^2.	[12M]
	b)	Describe the estimation of endurance strength?	[4M]
4	a)	How is the allowable stress calculated for a riveted joint subjected to alternating type of load?	[6M]
	b)	The end of a receiver, cylindrical in shape is closed by a lap joint using rivets. The maximum pressure in the receiver is 1 MPa. The axial length of the receiver is limited to 2 m while its storing capacity is 2 m^3. Design the suitable lap joint giving a neat sketch. The permissible stresses in shear and crushing of rivets may be taken as 30 MPa and 70 MPa. The permissible tensile stress for the plate material is 80 MPa.	[10M]
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5	a)	A machinery shaft supported on a bearing 2.4 metre apart is to transmit 187.5 kW at 200 rev/min. It is subjected to a bending load of 5000 N located at a distance of 0.66 metre from one bearing. Safe stress in shear is 42 MPa and in bending 84 MPa. i.) Determine the shaft diameter for steady loading ii.) Determine the shaft diameter if the transverse load is steady and the torsional load is suddenly applied.	[12M]
	b)	Write the importance and applications of jib and cotter joints?	[4M]
6		A propeller shaft is made-up by joining together number of solid shafts. The joint is made by forging the ends of the shaft in the form of a flange, and bolting the flanges together by means of 8 bolts. If the shaft transmits 60kW at 120 rpm, determine the size of the shaft, the diameter and thickness of the flange and the diameter and pitch circle diameter of bolts. Permissible stresses are τ = 35MPa ; σc = 45MPa.	[16M]
7		A rail carriage weighing 200kN and running at 5 km/hour is brought to rest by four buffer springs of close coiled helical type during connection with another carriage which is already at rest. The mean coil diameter is 5 times the wire diameter. The deflection of each spring is 220 mm, to bring the carriage to rest. Safe shear stress for the spring material is 400 N/mm^2. Calculate the maximum load on the spring, diameter of wire and coil, number of turns and free length of spring. Assume the ends of spring are squared and ground. Take G= 0.8×10^{4}N/mm^2.	[16M

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