Model Question Paper -2

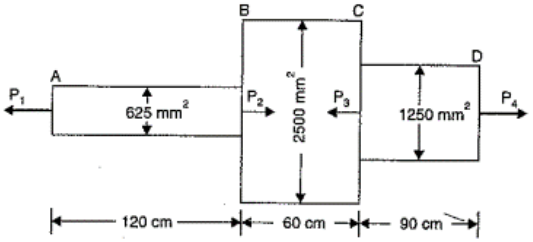
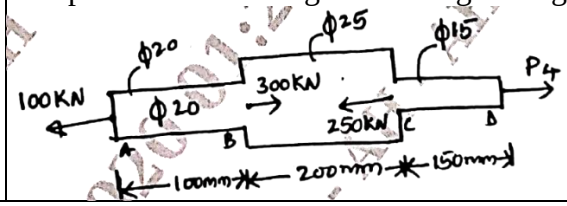
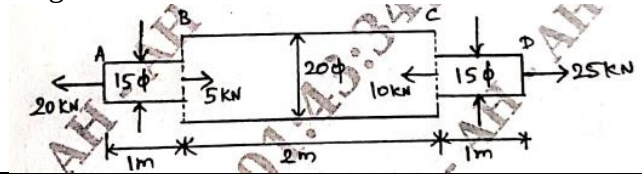
USN | | | | | | | | | | |

Fourth Semester B.E. Degree Examination

Mechanics of Materials

TIME: 03 Hours **Max. Marks: 100**

Note: 01. Answer any **FIVE** full questions, choosing at least **ONE** question from each **MODULE**.

		Module – 1	Marks	CO's	RBTL
Q.1	(a)	Obtain the relation between E, G AND K	10	CO1	2
	(b)	A member ABCD is subjected to point loads P_1,P_2,P_3 and P_4 shown in fig. Calculate the force P_2 necessary for equilibrium if P_1 = 45 KN, P_3 =450KN and P_4=130 KN. Determine the total elongation of the member, assuming the modulus of elasticity to be 2.1 x 10^5 N/mm^2 	10	CO1	3
		OR			
Q.2	(a)	Define Hooke's law. Draw and explain the stress-strain curves for ductile and brittle materials.	10	CO1	2
	(b)	Show that total Elongation in an uniformly tapering circular section bar $\delta_L = \frac{4PL}{\pi E d_1 d_2}$	10	CO1	3
		Module – 2			
Q.3	(a)	Derive the bending stress equation .	10	CO2	2
	(b)	Determine the stresses in various segments of the circular bar shown in Fig. Compute the total Elongation taking Young's modulus to be 195 GPa 	10	CO2	3
		OR			
Q.4	(a)	Derive the equation for deflection ,slope and bending moment radius of curvature .	10	CO2	2
	(b)	A steel bar ABCD 4m long is subjected to forces as shown in fig Find the elongation of the bar. Take E for the steel as 200GPa. 	10	CO2	3

		Module – 3			
Q.5	**(a)**	Explain torsion of shafts and what are the assumptions made for deriving for pure torsion	10	CO2	2
	(b)	Derive an expression for principle of virtual work on a particle.	10	CO2	3
		OR			
Q.6	**(a)**	A hollow shaft is to transmit 200kw at 90rpm If the shear stress is not to exceed 60Mpa and internal diameter is 0.6 of the external diameter. Find the diameters of the shaft.	10	CO2	3
	(b)	A solid shaft of 120mm diameter is required to transmit 200kw at 100rpm.If the angle of twist not to exceed 2 degree find the length of the shaft. Take modulus of rigidity for the material as 90Gpa.	10	CO2	3
		Module – 4			
Q.7	**(a)**	Derive the expression for strain energy due to shear.	10	CO3	3
	(b)	Derive the expression for strain energy due to impact load for axial loa applications	10	CO3	3
		OR			
Q.8	**(a)**	Define the Following: (i) Strain energy (ii) Resilience (iii) proof resilience (iv) Modulus of resilience (v) reciprocity theorem.	10	CO3	1
	(b)	Find the maximum stress deformation and strain energy stored in a 2m long 30 mm diameter beam when an axial load pull of 20kN is applied (i) Gradually (ii) Suddenly on it.Take E=100 Gpa.	10	CO3	3
		Module – 5			
Q.9	**(a)**	Illustrate fatigue and explain the testing method of fatigue failure	6	CO3	2
	(b)	Define creep and explain the stages of creep	7	CO3	2
		OR			
Q.10	**(a)**	Define fatigue and explain the testing method of fatigue failure	7	CO3	2
	(b)	Explain the different types of fracture in detail.	7	CO3	2