Model Question Paper-1 with effect from 2019-20 (CBCS Scheme)

USN

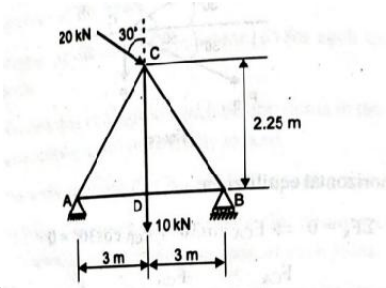
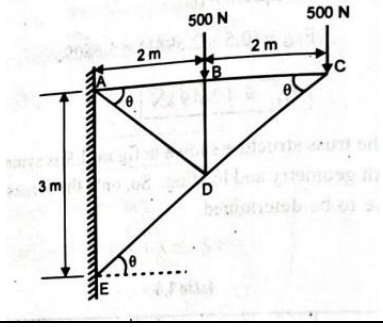
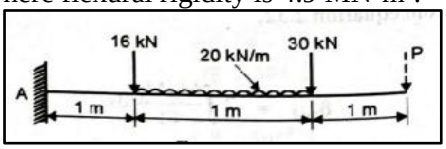
Fourth Semester B.E. Degree Examination

Aerospace Structures-I

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

Note: 01. Answer any **FIVE** full questions, choosing at least **ONE** question from each **MODULE**.
02.
03.

		Module -1	*Bloom's Taxonomy Level	Marks
Q.01	a	Derive expressions of normal and shear stresses under uni-axial and bi axial systems.	L2	10
	b	A mild steel shaft of 100 mm dia. is subjected to a torque of 15 kNm and maximum bending moment of 10 kNm. Find the factor of safety according to theories of failure if elastic limit tension is 240 MPa and poisson's ratio is 0.3.	L3	10
		OR		
Q.02	a	Calculate the normal,shearstresses,maximum shear stresses for the rectangular section under the 100 N/mm^2 along X axis and 50 N/mm^2 along Y-axis and making vertical inclination of 45°.	L3	5
	b	Calculate the normal and shear stresses for a rectangular section of 50 mm * 25 mm is subjected to an axial pull of 25 kN making an inclination 30° with horizontal.	L3	5
	c	A mild steel shaft having 0.1m external dia and 0.05 m internal dia is subjected to a twisting moment of 8000 Nm, bending moment of 2500 Nm. Find the factor of safety according to theories of failure by considering poisson's ratio as 0.3.	L3	10
		Module-2		
Q. 03	a	A circular shaft is subjected to a complete Revere loading of 150 kN. Determine the size of the bar if it is having infinite life and made up of with carbon steel having ultimate tensile strength of 800 N/mm^2, yield tensile strength of 600N/mm^2 Assume that surface finishing factor of 0.8, size factor 0.85, reliability of 90% and stress concentration of 0.9.	L3	10
	b	Calculate the maximum stress of the thin plate is subjected to bending moment of 10 Nm and twisting moment of 15 Nm where the rectangular thin plate having width of 50 mm, thickness of 10 mm by considering a hole of dia 10mm located at the centre of the plate by considering stress concentration into account.	L3	10
		OR		
Q.04	a	Explain and derive expressions of Goodman and soderberg relations with the help of neat graph.	L1	10
	b	Define and derive impact stress due to bending loads.	L2	5
	c	Find the impact stress in a circular bar if it is subjected to torsional loading.	L3	5
		Module-3		
Q. 05	a	Illustrate the loads on aircraft.	L1	10
	b	Write a note on metal materials in aircraft manufacturing.	L1	10
		OR		
Q. 06	a	Explain about symmetric manoeuvre loads.	L1	10
	b	Write a note on functions of all structural components of any particular commercial aircraft.	L1	10

		Module-4		
Q. 07	a	Explain Clapeyron's three moment equation.	L2	10
	b	Write a note on method of sections of truss analysis.	L1	5
	c	Write about method of joints of truss analysis.	L1	5
		OR		
Q. 08	a	Determine the forces in each member for the following truss system and state that forces are compressive or tensile. 	L3	10
	b	Determine the forces in all members of the following cantilever truss. 	L3	10
		Module-5		
Q. 09	a	Proove the Castigliano's theorems.	L2	10
	b	Explain and derive Euler's column curve.	L2	6
	c	Write a note on South well plot.	L1	4
		OR		
Q. 10	a	Show that the strain energy U due to bending of a cantilever of length 'L' with a concentrated load P at the free end is given by $U=(P^2L^3/6EI)$. Hence find the maximum deflection and further show that for rectangular cross section the strain energy can be expressed as $U=[(Stress)^2/18E]$* Volume of the beam. Also give the ratio of strain energies when the beam is loaded axially where the ratio of the length to depth of the beam is 6.	L2 & L3	10
	b	Determine the deflection at free end of the given cantilever beam by using Castigliano'stheorm where flexural rigidity is 4.9 MN-m^2. 	L3	10

*Bloom's Taxonomy Level: Indicate as L1, L2, L3, L4, etc. It is also desirable to indicate the COs and POs to be attained by every bit of questions.