Q.P. Code: 19CE1021 **R19**

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SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

M.Tech II Year I Semester Regular Examinations January 2021

DESIGN OF PRESTRESSED CONCRETE STRUCTURES

(Structural Engineering)

Time: 3 hours Max. Marks: 60

(Answer all Five Units **5 x 12 = 60** Marks)

UNIT-I

1	**a**	Define the following terms: (i) Externally prestressed members. (ii) Internally prestressed members. (iii) Circular prestressing.	**6M**
	b	Write short note on Freyssinet system with neat sketch.	**6M**
		OR	
2	**a**	Write short note on Prestressed concrete versus Reinforced concrete.	**6M**
	b	Write short note on Merits and demerits of Prestressed Concrete.	**6M**

UNIT-II

3		A post-tensioned concrete beam, 100mm wide and 300mm deep, is prestressed by three cables, each with a cross-sectional area 50mm^2 and with an initial stress of 1200 N/mm^2. All the cables are straight and located 100mm from the soffit of the beam. If the modular ratio is 6, calculate the loss of stress in the three cables due to elastic deformation of concrete for the only the following cases. Simultaneous tensioning and anchoring of all three cables and successive tensioning of the three cables, one at a time. Assume μ =0.35 and K=0.0015/M.	**12M**
		OR	
4		A straight post tensioned concrete member 15m long with a cross section of 400 * 400mm^2 is prestressed with 900mm^2 of steel wires. This steel is made of four tendons with 225 mm^2 per tendon. The tendons are tensioned to a stress of 1050N/mm^2. Determine the loss of prestress in each tendon due to elastic shortening of concrete. Find also the average percentage loss of prestress. If it is desired that after the last tendon is tightened, a stress of 1050 N/mm^2 be maintained in each tendon, compute the actual stresses to which the individual tendons should be tightened. Take m=16.	**12M**

UNIT-III

5		A concrete beam with a cross section area of 32*10mm3 and radius of gyration of 72mm is prestressed by a parabolic cable carrying an effective stress of 1000 N/mm^2. The span of the beam is 8m. The cable, composed of 6 wires of 7mm diameter has an eccentricity of 50mm at the Centre and zero at the supports. Neglecting all the losses, and the central defection of the beam as follows: a) Self weight + prestress. b) self-weight + prestress + live load of 2 kN/m.	**12M**
		OR	
6	**a**	Explain short term deflections of un-cracked members.	**6M**
	b	Explain about prediction of long time deflections.	**6M**

UNIT-IV

7 Explain briefly about shear and principal stresses due to torsion in members. **12M**

OR

8 A pretensioned, T-section has a flange which is 300mm wide and 200mm thick. The rib is 150mm wide by 350mm deep. The effective depth of the cross-section is 500mm. Given Ap = 200mm^2, fck= 50N/mm^2 and fp=1600N/mm^2, estimate the ultimate moment of the T-section using the Indian standard code regulations. **12M**

UNIT-V

9 Explain briefly about shear strength of composite sections. **12M**

OR

10 The cross-section of a composite beam is of T- section having a pretensioned rib, 80mm wide and 240mm deep, and an in situ cast slab, 350mm wide and 80mm thick. The pre-tensioned bean is reinforced with eight wires of 5mm diameter with an ultimate tensile strength of 1600N/mm^2, located 60mm from the soffit of the beam. The compressive strength of concrete in the in situ cast and precast elements is 20 and 40 N/mm^2 respectively. If adequate reinforcements are provided to prevent shear failure at the interface, estimate the flexural strength of the composite section. **12M**

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