Q.P. Code: 20CE1021 **R20**

Reg. No: | | | | | | | | | | |

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

M.Tech II Year I Semester Regular Examinations March-2022

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**	Briefly outline the advantages of using high strength concrete & high strength steel in prestressed concrete structures.	**L1**	**6M**
	b	Explain Historical development of prestressed concrete.	**L2**	**6M**
		OR		
2	**a**	Explain Hoyer systems of pre tensioning with sketches.	**L2**	**6M**
	b	Explain Freyssinet system of pre tensioning with sketches.	**L2**	**6M**

UNIT-II

3		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/mm2 be maintained in each tendon, compute the actual stresses to which the individual tendons should be tightened. Take m=16.	**L3**	**12M**
		OR		
4		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.	**L3**	**12M**

UNIT-III

5		A concrete beam having a rectangular section of 100mm wide and 300mm deep is prestressed by a parabolic cable carrying an initial force of 240KN. The cable has an eccentricity of 50mm at the center of the span and is concentric at the supports. If the span of the beam is 10m and the live load is 2KN/m, estimate the short time deflection at the center of the span. Assuming E=38KN/mm^2 and creep co-efficient is 2.0, loss of prestress =20 percent of the initial stress after 6 months. Estimate the long time deflection at the center of span at this stage, assuming that the dead and live loads are simultaneously applied after ate release of prestress.	**L3**	**12M**
		OR		
6	**a**	Explain short term deflections of un-cracked members.	**L1**	**6M**
	b	Explain about prediction of long time deflections.	**L1**	**6M**

UNIT-IV

7	A prestressed concrete beam span of 10m of rectangular section, 120mm wide and 300mm deep, is axially prestressed by a cable carrying an effective force of 180kN. The beam supports a total uniform distributed load of 5kN/m which includes the Self weight of beam. Compare the magnitude of the principal tension developed in the beam with and without the axial prestress.	L3	12M
	OR		
8	Explain briefly about shear and principal stresses due to torsion in members.	L2	12M

UNIT-V

9	A beam of composite section consists of cast in situ flange 325mmX50mm over a 100mmX250mm precast pre-tension unit. The stress distribution for the precast unit alone due to prestressing force is 12.5N/mm^2 . Find the uniformly distributed load for the composite beam on a simply supported span of 6m, for the following two cases: i) The flange is supported independently while it is caste ii) The weight of the flange and shuttering is supported by the pre-tensioned unit at the stage of casting. The weight of the shuttering is removed after the hardening of the flange concrete. The modular ration between flange concrete and the precast concrete is 0.60, the weight of the shuttering is 0.25KN/m, weight of concrete=24KN/m^3.	L3	12M
	OR		
10	Explain the design procedure for the continuous prestessed concrete beams.	L2	12M

*** END ***