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

Question Paper Code: 95T21

M.E. DEGREE EXAMINATION, JAN 2020

Elective

Structural Engineering

15PSE521- DESIGN OF PRESTRESSED CONCRETE STRUCTURES

(Regulation 2019)

Duration: One hour Maximum: 30 Marks

PART A - (6 x 1 = 6 Marks)

(Answer any six of the following questions)

1. Prestressing is possible by using CO1- R

   (a) mild steel (b) high-strength deformed bars

   (c)high-tensile steel (d) none of the above

2. The grade of concrete for prestressed members should be in the range of CO1- R

   (a) M20 to M30 (b)M30 to M60 (c)M80 to M100 (d)M40 to M60

3. The moment of resistance of a rectangular section depends upon CO2- R

   (a) ultimate strain in concrete (b)area of high tension tendons

   (c)tension stress in concrete (d) none of the above

4. The maximum effective reinforcement ratio of a bonded prestressed concrete beam at failure according to IS1343 is limited to a value of CO2- R

   (a) 0.15 (b)0.40 (c)0.25 (d) none of the above

5. In comparison with simply supported structures, continuous prestressed concrete structure exhibit CO3- R

   (a) no change in the ultimate strength (b) Lower ultimate strength

   (c) Higher ultimate strength (d) none of the above

6. The economical proportion of diameter to height of circular cylindrical prestressed concrete tank is CO3- R

   (a) 1:4 (b)4:1 (c)2:1 (d) 1:2

7. Circular prestressing of concrete tank induces CO4- R

(a) Hoop tension (b) Hoop compression

(c) Flexural compression (d) All the above

8. The serviceability limit state of cracking in prestressed concrete tanks is easily satisfied because they are designed as CO4- R

(a) Type-3 members (b)Type-1 members

(c)Type-2 members (d) Type -4 members

9. Reduction in the size of the composite structures results in ------ structures CO5- R

(a) heavier (b)lighter (c)both (a) and (b) (d) none of these

10. The most common type of composite construction is CO5- R

(a) T section (b) box section (c) circular section (d) All of the above

PART – B (3 x 8= 24 Marks)

(Answer any three of the following questions)

11. A prestressed concrete beam of section 120mm wide by 300 mm deep is used over an effective span of 6 m to support a uniformly distributed load of 4 kN/m, which includes the self - weight of the beam. The beam is prestressed by a straight cable carrying a force of 180kN and located at an eccentricity of 50mm. Determine the location of the thrust-line in the beam and plot its position at quarter and central span sections. CO1- U (8)

12. A post tensioned beam with unbonded tendons is of rectangular section 400 mm wide with an effective depth of 800 mm. the cross sectional area of prestressed steel is 2840 mm^2. Effective prestress after all losses is 900 N/mm^2. The effective span of the beam is 16 m. If f_{ck}= 40 N/mm^2, estimate the ultimate moment of resistance using IS code recommendations. CO2- U (8)

13. Briefly explain the various steps involved in the design of continuous prestressed concrete beams CO3- U (8)

14.	A prestressed concrete pipe is to be designed to withstand a fluid pressure of 1.6 N/mm^2 .The diameter of the pipe is 1200mm and shell thickness is 100mm .The maximum compressive stress in concrete at transfer is 16 N/mm^2.A residual compression of $1N/mm^2$ is expected to be maintained at service loads. Loss ratio is 0.8 high tensile wires of 5mm diameter initially stressed to $1KN/mm^2$ are available for use. Determine: (a)The number of turns of wire per meter length (b) The pitch of wire winding	CO4- U	(8)
15.	Briefly explain the necessity of using composite section in PSC structures. Also discuss about the shear in composite beams. What are the provisions usually made to counteract the effects	CO5- U	(8)