Total No. of Questions : 4]

SEAT No. : [ ]

P8976

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Oct-22/BE/Insem-39

B.E. (Civil)

DESIGN OF PRESTRESSED CONCRETE STRUCTURES

(2019 Pattern) (401004 E) (Semester - VII) (Elective - IV)

Time : 1½ Hour] ***[Max. Marks : 30***

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4.***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Use of electronic pocket calculator is allowed.***
5) ***IS 1343:2012 code of practice is allowed.***
6) ***Assume suitable data, if necessary.***

Q1) a) Write different forms of prestressing steel. **[7]**

b) Explain stress concept, strength concept and load balancing concept with suitable example. **[8]**

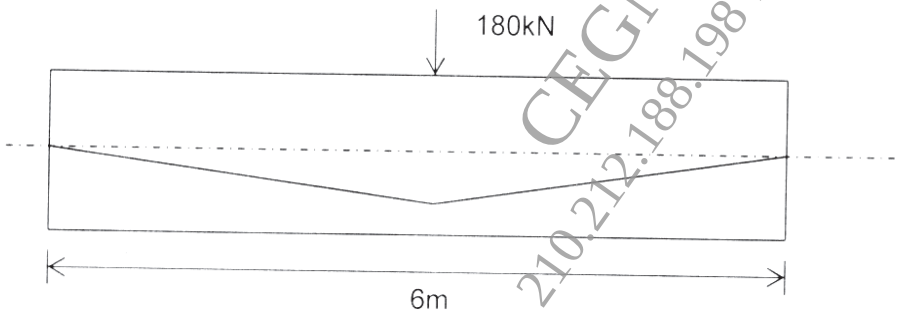
OR

Q2) a) Explain load balancing concept with the help of neat sketches and examples. **[7]**

b) Explain composite construction of prestressed and in situ concrete. State its advantages. **[8]**

OR

Q3) a) A prestressed concrete beam of section 400mm wide by 600 mm deep is used over an effective span of 6m to support a concentrated load of 180kN excluding the self-weight of the beam. The beam is prestressed by a bent tendon carrying a force of 1200 kN and located at 160 mm from the soffit of beam at the central span. Determine the extreme fibre stresses in concrete at the mid-span section by load balancing concept. **[7]**



P.T.O.

b) A 12m long post tensioned concrete beam of rectangular cross section 400mm ×500mm is prestressed by strands carrying an initial prestressing force of 800 kN. The c/s area of strands is 40mm^2. All the 10 strands are tensioned simultaneously. Calculate the percentage loss due to shrinkage for relative humidity 50% at the end of eight months. M40 grade of concrete is used with the transfer of the stress taking place at 21 days. **[8]**

OR

Q4) a) A prestressed concrete beam of section 400mm wide by 600mm deep is used over an effective span of 6m to support a uniformly distributed load of 30 kN/m including the self-weight of the beam. The beam is prestressed by a parabolic tendon carrying a force of 900 kN and located at 150 mm from the soffit of the beam at the central span. Determine the extreme fibre stresses in concrete at the midspan section by load balancing concept. **[8]**

b) A prestressed concrete beam of section 400mm wide by 500 mm deep has Span = 7m, Live Load = 5 kN/m, Unit weight of Concrete = 24 kN/m^3 **[7]**

Prestressing force P = 500 kN located at 50 mm from the soffit of the beam

Assume Loss ratio = 0.8. Find extreme fibre stresses (top & bottom) at the end span and mid-span of the beam for the following load conditions Using stress concept.

i) At transfer

ii) At service loads

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