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TEST -3 EXAMINATION

M.Tech. (CM) Ist Semester

COURSE CODE: 10M11CE111 MAX. MARKS: 35

COURSE NAME: Construction Techniques

COURSE CREDITS: 03 MAX. TIME: 2 Hours

Note: *All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means.*

Q.1 For the following data design the formwork for slab and beam. (7 marks)

i. Slab thickness = 200 mm
ii. 12 mm plywood as the sheathing, 100 mm x 100 mm timber beams as secondary and primary beams are available
iii. Floor props CT as the staging.

Section properties of 100 mm x 100 mm timber

i. B = 100 mm
ii. D = 100 mm
iii. Area = 10000 m^3
iv. I = 8333300 mm^4
v. Z_{xx} = 166670 mm^3
vi. E = 7700 N/mm^2

Allowable stresses-
Allowable bending stress = 8 N/mm^2
Allowable shear stress = 0.6 N/mm^2
Bending moment capacity = 1.167 kNm
Shear force capacity = 8 kN
EI = 64.16 kNm^2

For 12 mm thickness plywood-
Permissible bending stress on 12 mm plywood = 14 N/mm^2. Permissible bending moment = 0.2 kN/m. Permissible shear force = 6.16 kN. Permissible deflection = span/360.

Q.2 Design formwork for the slab having thickness of decking 30 mm, concrete slab = 200 mm, live load = 5 kN/m^2 with 30% additional for impact and allowable stress in deck bending = 12 N/mm^2, shear = 0.8 N/mm^2 , E = 10000 N/mm^2, it is decided to use 100 mm x 100 mm batten as joist. (8 marks)
What is the spacing of the joist and what shall be the spacing of the stringer, clear span of the slab is 4m. Maximum permissible bending stress on the timber is 10 N/mm^2, shear = 0.5 N/mm^2, E = 10000 N/mm^2. Use 100 mm x 150 mm batten as the stringer.

Compressive strength normal to the grain = 2.75 N/mm^2. Compression parallel to the grain is 11 N/mm^2, E = 5000 N/mm^2. Permissible deflection in the sheathing is 1.6 mm.

Q.3 Design the formwork for a column of cross section 350 mm x 350 mm, and a height of 4 m. A plywood of 12 mm thickness is available. Permissible bending stress on 12 mm plywood = 14 N/mm^2. Permissible bending moment = 0.2 kN/m. Permissible shear force = 6.16 kN. Permissible deflection = span/360. (6 marks)

Assume two spans, with
Rate of rise = 2.5 m/h
Temperature of concrete = 20° C
$C_w \times C_c = 1$

Q.4 a) What are the different types of constructions related to fire resistive construction? Explain any two. (3 marks)

b) Explain any two fire equipments in detail. (2 marks)

c) For the data given below, compute the lateral pressure on formwork as per CIRIA formula and also draw the design pressure distribution. (3 marks)

D (weight density of concrete)	25 kN/m^3
C_1 (shape constant)	1
R, Rate of rise	1 m/h
C_2 , Concrete constituent factor	0.3
Temperature of concrete	30° C
Temperature co-efficient	0.9
H, Form height	6.15 m
H, pour height	6 m

Q.5 Design a wall formwork (all steel) for casting walls of 8 m height and 1 m thickness. The maximum lateral concrete pressure on the formwork can be assumed as 100 kN/m^2. Following materials are available: Mild steel plates of 4 mm thickness and mild steel flats of 60 mm x 6 mm and 80 mm x 6 mm are available. (6 marks)
Consider,
Maximum permissible bending stress in tension = 180 N/mm^2
K = 0.02720
For waler, Allowable bending moment = 10.8 kNm,
Allowable shear force = 110 kN
Allowable pull in tie rod = 45 kN
Assume any other required value.

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