

## JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

## TEST -2 EXAMINATION, Oct-2019

M.Tech. (CM) 1<sup>st</sup> Semester

COURSE CODE: 10M11CE111

MAX. MARKS: 25

COURSE NAME: Construction Techniques

COURSE CREDITS: 03

MAX. TIME: 1Hour 30 Min

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

**Q.1** Design a wall formwork (all steel) for casting walls of 6 m height and 0.8 m thickness. The maximum lateral concrete pressure on the formwork can be assumed as  $80 \text{ kN/m}^2$ . 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. **(8 marks)**

Consider,

Maximum permissible bending stress in tension =  $165 \text{ N/mm}^2$

$K = 0.02720$

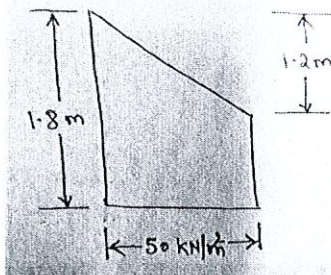
For waler, Allowable bending moment =  $10.2 \text{ kNm}$ ,

Allowable shear force =  $103 \text{ kN}$

Allowable pull in tie rod =  $50 \text{ kN}$

Assume any other required value.

**Q.2** Design the typical foundation wall form for given wall. The height of concrete foundation wall is 1.8 m. The concrete pressure diagram is given in figure. It can be noticed that the maximum pressure on the formwork is  $50 \text{ kN/m}^2$ . **(7 marks)**



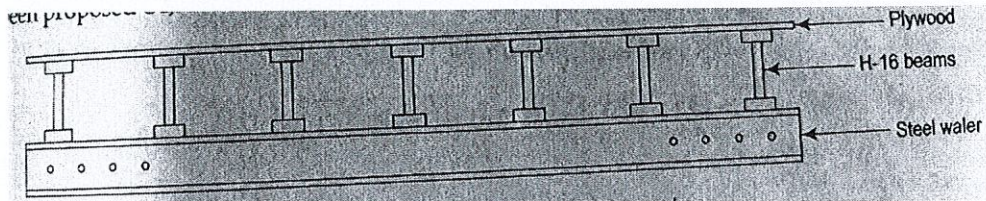
Let's assume that following materials are available-

1. 19 mm plywood and 50 mm x 100 mm studs and plates, tie rods of capacity 2000 kg.
2. For 19 mm plywood, the allowable bending is  $0.35 \text{ kNm/m}$ , the allowable shear is  $10 \text{ kN/m}$ , and permissible EI value is  $2.73 \text{ kNm}^2$ .
3. For timber used, consider following values:  
 $E = 7 \times 10^3 \text{ N/mm}^2$ , permissible bending stress =  $10 \text{ N/mm}^2$ , permissible

shear stress =  $1 \text{ N/mm}^2$ .

Assume any other required value.

- Q.3** Check the adequacy of the wall formwork shown in figure. As can be seen, 12 mm thick plywood has been used as sheathing, H-16 @250 mm centre to centre distance has been used as studs. Waler have been used @1200 mm centre to centre distance. Tie rods have been proposed @1200 mm centre to centre. **(7 marks)**



The following design inputs are also available-

1. Weight density of concrete =  $25 \text{ kN/m}^3$
2. Rate of rise =  $1.5 \text{ m/h}$
3. Temperature of concrete =  $22^\circ \text{ C}$
4. Vertical form height =  $6.15 \text{ m}$
5. Pour height =  $6 \text{ m}$
6. Cantilever portion of H-16 =  $0.6 \text{ m}$
7. C1, shape constant = 1
8. C2, concrete constituent factor = 0.3

For 12 mm plywood, consider

Allowable moment carrying capacity =  $0.3 \text{ kNm/m}$

Allowable shear =  $6.5 \text{ kN/m}$

Permissible EI =  $1.5 \text{ kNm}^2/\text{m}$

Permissible deflection =  $0.75 \text{ mm}$

For H-16 beam, consider

Depth of H-16 beam =  $160 \text{ mm}$

Flange of H-16 beam =  $65 \text{ mm}$

Allowable moment carrying capacity =  $3 \text{ kNm}$

Allowable shear =  $5 \text{ kN}$

Permissible EI =  $150 \text{ kNm}^2$

Permissible deflection =  $L/360$

The tie rod is rolled from 16 mm ST 58 to form 18x5 pitch. The yield stress for tie rod is  $360 \text{ N/mm}^2$

- Q.4** Write all the basic elements in footing formwork. Explain any two. **(3 marks)**

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