

## Ways to prevent the disease COVID-19

1. Wash Your Hands For 20sec.
2. Cover Nose & Mouth When Sneezing.
3. Use hand sanitizer if soap and water are not available.
4. Avoid Crowded Places (Social Distancing)
5. Avoid Contact With Sick People
6. Stay At home
7. Don't visit outside unnecessarily

## Subject: Advanced Design of Reinforced concrete structures

Instructor: Engr. Fawad Ahmad

Total Marks: 30

### Note:

1. Attempt all questions. **R** is your class id.
2. ACI tables and values used in design must be referred while solving your design problem.
3. Use correct class Id R.

### Q.NO (01)

(10)

A	<p>Determine the values of <math>\epsilon_t</math>, <math>\phi</math> and <math>\phi M_n</math> for the sections shown below:</p> <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;"> <p>3 #11 bars 14 in. 18 in. 21 in. 3 in. <math>f_y = 75,000</math> psi <math>f'_c = 5,000</math> psi</p> </div> <div style="text-align: center;"> <p>4 #10 bars 18 in. 12 in. 15 in. 3 in. <math>f_y = 60,000</math> psi <math>f'_c = 4,000</math> psi</p> </div> </div> <p style="color: red;">Also discuss the strength analysis. Does the reinforcement is done according to design standard or not. Defend your design analysis.</p>	5
B	<p>Design a doubly reinforced beam for <math>M_D =</math> [First three Digits of R] ft-K and <math>M_L = 410</math> ft-K, if <math>f_c' = 4000</math> psi and <math>f_y = 6000</math> psi. Appropriate diagram is must in design.</p> <p style="color: red;">Assume the maximum permissible beam dimensions other than done in notes or Text book.</p>	5

### Q.NO (02)

(10)

A	<p>Design a short square column for the following conditions: <math>P_u =</math> [First three Digits of R] k, <math>M_u =</math> [First two Digits of R] ft-k, <math>f_c' = 4000</math> psi, and <math>f_y = 60,000</math> psi.</p> <p>Place the bars uniformly around all four faces of the column. Appropriate diagram is must in design.</p>	10
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### Q.NO (03)

(10)

A	<p>Design a square column footing for a 16 inch square tied interior column that supports a dead load <math>P_D =</math> [First three Digits of R]K and live load of <math>P_L = 160</math>K. The column is reinforced with #8 bars the base of the footing is 5feet below, the soil weight is 100 lf/ft<sup>3</sup>, <math>f_y = 60,00</math> psi and <math>f_c' = 3000</math>psi and <math>q_a =</math> [First four Digits of R]psf. Development length for main bars is also to be done in footing design.</p> <p>Appropriate diagram is must in design.</p>	10
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\*\*\*\*\* Best of Luck- Stay Safe\*\*\*\*\*