

JK LAKSHMIPAT UNIVERSITY, JAIPUR

INSTITUTE OF ENGINEERING AND TECHNOLOGY

End Term Examination (Special), January 2016
B. Tech, Civil Engineering, Semester V

Roll No.....

CE 507: Design of RCC Structure

Time: 3 hours

Max. Marks: 100

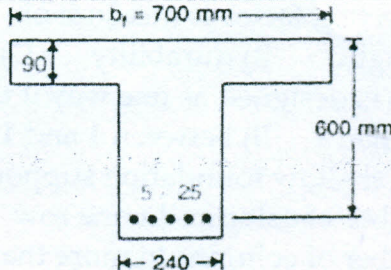
Instructions to students:

1. Do not write anything other than your roll number on question paper.
2. Assume suitable data wherever required and mention it clearly.
3. Writing appropriate units, nomenclature, and drawing neat sketches/schematics/ flow chart wherever, required are an integral part of the answer.
4. IS:456 : 2000 Plain and Reinforced Concrete - Code of Practice is allowed in the exam.

Q.1A Objective type multiple choice questions (10 questions @ 1 mark)

10

- i. Which of the statement is correct -
 - A) $P_{t,lim}$ is independent of grade of concrete and steel
 - B) $P_{t,lim}$ is independent of grade of concrete & depends on grade of steel
 - C) $P_{t,lim}$ is independent of grade of steel & depends on grade of concrete
 - D) $P_{t,lim}$ is dependent on grade of concrete and steel
- ii. The T-beam is considered as rectangular beam for the design for -
 - A) Mid span of continuous beam where Bending Moment is positive
 - B) Over intermediate support of continuous beam where Bending Moment is negative
 - C) At the point of zero bending moment
 - D) Over the supports of a simply supported beam.
- iii. For a particular grade of steel and with increasing the grade of concrete, the $X_{u,max}/d$
 - A) Increases
 - B) Decreases
 - B) C) Remains constant
 - D) Sometime increases sometime decreases
- iv. The partial factor of safety for steel as per IS:456-2000 is-
 - A) 1.50
 - B) 1.15
 - C) 0.446
 - D) 0.87
- v. If compaction factor is measure of-
 - A) strength
 - B) durability
 - C) workability
 - D) creep
- vi. The slab is designed as one way if the ratio of long span to short span is
 - A) less than 1
 - B) between 1 and 1.5
 - C) between 1.5 and 2
 - D) greater than 2
- vii. Mat is a shallow foundation supporting
 - A) number of columns in one row
 - B) only one column
 - C) number of columns in more than one row
 - D) piles
- viii. The average permissible stress in bond for plain bars in tension is
 - A) increased by 10% for bars in compression
 - B) increased by 25% for bars in compression
 - C) decreased by 10% for bars in compression
 - D) decreased by 25% for bars in compression
- ix. When shear stress exceeds the permissible limit in a slab, then it is reduced by
 - A) increasing the depth
 - B) providing shear reinforcement
 - C) using high strength steel
 - D) using thinner bars but more in number

x. The diameter of ties in a column should be A) more than or equal to one fourth of diameter of main bar B) more than or equal to 5 mm C) more than 5 mm but less than one-fourth of diameter of main bar D) more than 5 mm and also more than one-fourth of diameter of main bar	
Q.2 Short answer type questions (4 questions @ 2.5 marks) i. What is reinforced concrete? Why it is popular in the construction industry? ii. What do you mean by characteristic strength? iii. Define safe bearing capacity of soil. iv. Draw the sketch of mat foundation.	10
Q.3A Draw stress strain relationship curve for concrete mentioning the main features.	05
Q.3B What is the meaning of under reinforced, over reinforced and balanced section. Which section is preferred for design and why?	05
Q.4A A simply supported beam of size 300 mm x 750 mm overall depth is reinforced with 4 bars of 16mm dia. Calculate the safe UDL on the beam in addition to its self-weight on a span of 4.5 m. Take materials M20 grade of concrete and HYSD reinforcement of grade Fe 415. Consider mild exposure condition.	05
Q.4B A rectangular reinforced concrete beam is simply supported on two masonry walls, 230 mm thick and 6 m apart (center to center). The beam has to carry, in addition to self weight, a distributed live load of 10 kN/m and a dead load of 5 kN/m. Design the beam section for maximum moment at mid span. This beam is provided with 8 mm plain bar U stirrups at a uniform spacing of 200 mm for shear. Check the adequacy of the shear at supports and mid span. If necessary revise the design. Take clear cover = 30 mm. Use Fe415 and M25 grade of material.	15
Q.5 Calculate the moment of resistance for flanged beam having effective width of flange = 700 mm, depth of flange = 90 mm, effective depth of beam = 600 mm, width of web = 240 mm, reinforcement of 5 bars of 25 mm dia is provided. Use Fe415 grade of steel and M15 grade of concrete.	
OR	
Q.5 Design a RC slab for a room having inside dimensions 3m x 7m. The thickness of supporting wall is 300 mm. The slab carries 75 mm thick lime concrete at its top. The unit weight of which may be taken as 20 kN/m³. The live load on the slab may be taken as 2 kN/m². Assume the slab to be simply supported at the ends. Use M20 grade of concrete and Fe415 grade of steel.	10
Q.6A A column is reinforced with 4 bars of 20 mm dia. Determine the ultimate load carrying capacity of the column, using M20 grade of concrete, Fe415 grade of steel, if the size of the column is 450mm x 450mm.	05

Design a short axially loaded square column, 500 mm x 500 mm for a service load of 2000 kN. Use M20 grade of concrete and Fe415 grade of steel. 15

OR

Q.6 A column 300 mm x 400 mm has an unsupported length of 3 m and effective length of 3.6 m. it is subjected to $P_u = 1100$ kN and $M_u = 230$ kNm about the major axis. Determine the longitudinal steel using M25 grade of steel and Fe415 grade of concrete. 20

Q.7 Design a RC slab for a room having inside dimensions 4m x 5m. The live load on the slab may be taken as 2000 N/m^2 and is finished with 20 mm thick granolithic topping. The unit weight of which may be taken as 24 kN/m^3 . Assume the slab to be simply supported at the ends. Use M20 grade of concrete and Fe415 grade of steel. 20

