

**The Assam Royal Global University, Guwahati**

**Royal School of Engineering & Technology**

**B.Tech. 6<sup>th</sup> semester**

**Semester End Examination, August 2021**

**Course Title : Design of Concrete Structures**

**Course Code : CEE022C602**

**Time: 3 Hours**

**Maximum Marks: 70**

**Note: Attempt all questions as per instructions given.**

*The figures in the right-hand margin indicate marks.*

---

**Section – A**

1. Attempt **all** questions. (Maximum word limit 50) 2 x 8
- a. Where is concrete of grades lower than M20 used?
  - b. What do you mean by limit state of collapse and limit state of serviceability?
  - c. What do you mean by shear stress?
  - d. Why are stirrups used in RCC structures?
  - e. When is doubly reinforced section used in RCC?
  - f. What do you mean by nominal cover to reinforcement?
  - g. Define column and a strut.
  - h. What is slenderness ratio?
2. Attempt **any two** of the following: 6 x 2
- a. Write a note on comparison between working stress method and limit state method.
  - b. Determine moment of resistance of the beam having dimensions as 300x550mm (effective). The beam is reinforced with 1963mm<sup>2</sup> of steel in the tension zone. Use M20 concrete and Fe415 steel. Also comment on the design of the beam.
  - c. Explain different types of steel reinforcement.
3. Attempt **any two** of the following: 7 x 2
- a. What are various types of shear reinforcement? Explain with diagram.
  - b. A simply supported beam 300mmx600mm (effective) is reinforced with 5-25mm diameter bars. It carries a udl of 80kN/m (including its own weight) over an effective span of 6m. Out of 5 main bars, two bars can be bent up safely near the supports. Design the shear reinforcement for the beam. Use M20 grade of concrete and Fe415 steel.
  - c. Do you understand by term development length? Write an expression to find development length of bars in tension.

**The Assam Royal Global University, Guwahati**

**Royal School of Engineering & Technology**

**B.Tech. 6<sup>th</sup> semester**

**Semester End Examination, August 2021**

**Course Title : Design of Concrete Structures**

**Course Code : CEE022C602**

**Time: 3 Hours**

**Maximum Marks: 70**

**Note: Attempt all questions as per instructions given.**

*The figures in the right-hand margin indicate marks.*

---

**Section – B**

4. Attempt **any two** of the following: 7 x 2
- a. An RCC beam is required to carry a udl of 25kN/m inclusive of its own self weight. The effective span of beam is 8m. Design the beam for flexure using Fe415 steel and M30 grade of concrete.
  - b. An RCC beam 250mmx500mm (effective) is provided with tension steel of 5-28mm diameter bars and compression steel of 2-25mm diameter bars. The effective cover to compression steel is 50mm. Calculate the ultimate moment capacity of the section using Fe250 steel and M20 grade of concrete.
  - c. An isolated simply supported T beam has flange width of 2400mm and flange thickness of 120mm. The effective span of beam is 3.6m. The effective depth of beam is 580mm and its width is 300mm. It is reinforced with 8-20mm diameter Fe 415 bars. Determine moment of resistance of the section. Use M20 concrete.
5. Attempt **any one** of the following: 14 x 1
- a. Design a short RCC column to carry an axial load of 1600kN. It is 4m long, effectively held in position and restrained against rotation at both ends. Use M20 and Fe415 steel.
  - b. Write a note on classification of columns.