SIDDHARTH GROUP OF INSTITUTIONS :: PUTTUR
Siddharth Nagar, Narayanavanam Road – 517583

QUESTION BANK (DESCRIPTIVE)

Subject with Code : DDRCS-II(13A01502) **Course & Branch**: B.Tech - CE

Year & Sem: III-B.Tech & I-Sem **Regulation:** R13

UNIT –I

1. A R.C. rectangular beam of M20 grade concrete is 300mm wide and 600mm deep (overall). It is reinforced with 3 numbers of 20mm dia. Mild steel bars in the tension zone with an effective cover of 40mm. determine the moment of resistance of the section by using working stress method.
2. A cantilever beam of span 4 m is subjected to a live of 20 kN/m. Design reinforcement detail if the size of the cross-section is 200 by 300 mm using M20 concrete and HYSD-Fe415 bars.
3. A R.C T-beam has a flange of 2000 mm × 100 mm and web of 300 mm × 420 mm. It is reinforced with 4 numbers of 25 mm dia. steel bars in the tension zone with a clear cover of 27.5 mm. Determine moment of resistance of T-beam.
4. Design a reinforced concrete simply supported beam of clear span 4.5 m subjected to an imposed load of 30 kN/m and dead load of 20 kN/m in addition to the self-weight. The supports are 350 mm wide. Use M20 concrete and Fe 415 steel
5. What are the assumptions for the design of a reinforced concrete section for limit state of collapse in bending? Derive the stress block parameters for a rectangular cross-section.
6. Explain the stress-strain relationship for concrete and steel (with sketches) used in limit state method of design.
7. Draw stress-strain diagram for a rectangular beam section and calculate the limiting depth of the neutral axis for Fe 415 steel & Fe 500.
8. An R.C.C beam 300 mm x 500 mm (effective) is carrying a factored moment of 175 kN m. Determine the area of steel required if M20 concrete and Fe415 steel is used.
9. Determine the ultimate moment of resistance of a rectangular beam 300 mm x 600 mm (effective), reinforced with 5 bars of 25 mm diameter in tension zone and 2 bars of 25 mm diameter in compression zone. Use M20 concrete and Fe 415 steel. Take $d' = 60$ mm.
10. (a) Differentiate between working stress method and limit state method.
    (b) Distinguish between balanced, under reinforced and over reinforced section.

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QUESTION BANK (OBJECTIVE)

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1. The modulus of rupture of concrete gives [ ]

   a) The direct tensile strength of the concrete

   b) The direct compressive strength of the concrete

   c) The tensile strength of the concrete in bending

   d) The characteristic strength of concrete

2. The yield stress of a twisted bar as compared to an ordinary mild steel bar is nearly [ ]

   a) 50% more b) 25% more c) 50% less d) 255 less

3. The ratio of direct tensile strength to compressive strength of concrete is taken as [ ]

a) 0.05 b) 0.15 c) 0.25 d) 0.35

4. The split tensile strength of M15 grade concrete when expressed as a percentage of its compressive strength is [ ]

a) 10 to 15% b) 15 to 20% c) 20 to 25% d) 25 to 30%

5. Compared to mild steel plain bars, high yield strength deformed bars are [ ]

a) Less ductile but more strong b) More ductile but less strong

c) More ductile and strong d) none

6. The ratio of 7 days and 28 days strength is [ ]

a) 0.5 b) 0.6 c) 0.75 d) 0.85

7. Compared to 15 cm cube strength 10cm cube strength is [ ]

a) Less b) More c) Equal d) None

8. As the cube size increases, the strength of concrete reduces due to [ ]

a) Increases in slenderness ratio b) Chances of more weak spots

c) Inferior compaction d) none of the above

9. Approximate value of shrinkage strain of concrete is [ ]

a) $3x10^{-3}$ b) $3x10^{-4}$ c) 0.0035 d) 0.002

10. High yield strength deformed bars have a [ ]

a) A definite yield value

b) chemical composition different from mild steel

c) % elongation less than that of mild steel

d) % elongation more than that of mild steel

11. Tensile strength of concrete is measured by [ ]

a) Direct tension test in the universal testing machine

b) Applying compressive load along the diameter of the cylinder

c) Applying third point load on a prism

d) Applying tensile load along the diameter of the diameter of the cylinder

12. Minimum grade of concrete for water tank is [ ]

a) M_{15} b) M_{20} c) M_{25} d) M_{30}

13. A concrete cube of 15 cm and a cylinder of 15cm diameter and 15cm height are tested for compressive strength the strength of cube compared to cylinder will be [ ]

a) Higher b) lower c) equal d) difficult to assess

14 .The flexure strength of M_{30} concrete as per IS: 456-2000 [ ]

a) 3.83Mpa b) 5.47Mpa c) 21.23Mpa d) 30.0Mpa

15. concrete strength determined from 150 mm dia x 150 mm height cylinder as compared to that of 150dia x 300mm height cylinder is [ ]

a) More b) less c) equal d) varies

16. Flexural strength of M_{25} grade concrete is [ ]

a) 1.5Mpa b) 1.8Mpa c) 2.8Mpa d) 3.5Mpa

17. According to IS 456-2000 the modulus of elasticity of concrete E_C can be expressed as [ ]

a) $E_C = 5700\sqrt{fck}$ b) $E_C = 5000\sqrt{fck}$ c) $E_C = 5700fck$ d) $E_C = 5000fck$

18. In M7.5 nominal mix concrete, if the quantity of water used per 50 kg of cement is 45 kg then that used for same workability will be [ ]

a) <45kg b) equal to 45kg

c)>45kg d) quantity of water has no relation to the grade of concrete

19. The maximum distance between expansion joints in concrete structure as per IS: 456-2000 [ ]

a) 20 m b) 30 m c) 45 m d) 60 m

20. The minimum quantity of cement per meter cube of reinforced concrete for mild exposure is [ ]

a) 150kg b) 250kg c) 350kg d) 300kg

21. The environment exposure condition of concrete buried under aggressive sub soil is classified as

a) moderate b) severe c) very severe d) extreme [ ]

22. The compressive strength of 33 grade cement at 7 days should not be less than [ ]

a) 110kg/cm^2 b)175kg/cm^2 c) 220kg/cm^2 d)275kg/cm^2

23. A reinforced concrete structure has to be constructed along a sea coast. The minimum grade of concrete to be used as per IS 456-2000 is [ ]

a) M_{15} b) M_{20} c) M_{25} d) M_{30}

24. The modulus of rupture of concrete in terms of its characteristic cube strength in Mpa according to IS 456-2000

a) 5000fck b) 0.7√fck c) 5000√fck d) 5700√fck [ ]

25. Which of the following is the effective modulus of concrete [ ]

a) $E_C/ (1+ \theta)$ b) $E_C/ (1+2\theta)$ c) $E_C/ (1+3\theta)$ d) $E_C/ (1+5\theta)$

26. The acceptable limit for the safety and serviceability requirements before failure occurs is called

a) Braking point b) failure point c) limit state d) ductility [ ]

27. The maximum strain in the tension R.F in the section at failure shall not be less than [ ]

a) $0.002+(0.87fy/E_s)$ b) $0.0035+(0.87fy/E_S)$

c) $0.0035+ (fy/1.15E_S)$ d) $0.002+(0.85E_S/fy)$

28. The design strength of steel in limit state design is [ ]

a) fy /1.5 b) fy /0.87 c) 0.87fy d) 1.5fy

29. A simply supported beam carries a working live load of 2.5 kN/m and dead load is 3.5 kN/m. the design load for limit state of collapse is, in kN/m [ ]

a) 9 b) 6 c) 7.2 d) 12

30. For steel of grade fy =500 N/mm^2 the value of x_{umax} / d is [ ]

a) 0.48 b) 0.46 c) 0.53 d) 0.53

31. The partial safety factor to be used in limit state of deflection for strength of concrete is [ ]

a) 1.2 b) 1.5 c) 1.0 d) 0.8

32. The partial safety factor for steel in limit state for serviceability is [ ]

a) 1.2 b) 1.5 c) 1.0 d) 0.8

33. In limit state design of concrete structures, the recommended partial safety factor for steel according to IS 456-2000 is [ ]

a) 1.5 b) 1.15 c) 1.0 d) 0.87

34. An RCC beam is subjected to the following moments; Dead load moment=20kN.m; Live load moment=30kN.m; Seismic load moment =10k.N.m; the design moment is [ ]

a) 60 kN.m b) 75 kN.m c) 72 kN.m d) 80 kN.m

35. In LSM columns, the partial safety factor applied to steel and concrete are [ ]

a) 1.15 for concrete and 1.5 for steel b) 1.15for both steel and concrete

c) 1.5 for concrete and 1.15 for steel d) none

36. The centroid of compressive force, from the extreme compression fibre in limit state design lies at a distance of [ ]

a) 0.36 X_u b) 0.416 X_u c) 0.446 X_u d) 0.573 X_u

37. In limit state design of concrete for flexure, the area of stress block is taken as [ ]

a) 0.36 fck X_u b) 0.41 fck X_u c) 0.446 fck X_u d) 0.53 fck X_u

38. In limit state design, the limiting value of depth of neutral axis for M15 and Fe250 is **[ ]**

a) 0.53d b) 0.48d c) 0.45d d) 0.43d

39. The lever arm in limit state design is [ ]

a) d-0.446 X_u b) d-0.87 X_u c) d-0.36 X_u d) d-0.416 X_u

40. For a beam reinforced with steel of fy = 250 N/mm^2.The limiting % of steel is given by [ ]

a) 21.97 fck/fy b) 19.82 fck/fy c) 18.87 fck/fy d) none

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