

17 A reinforced concrete beam, supported on columns at ends, has a clear span 5m and 0.5m effective depth. It carries a total uniformly distributed load 100kN.m. The design shear force the beam is

- OP 1 : 250 kN
- OP 2 : 200 kN
- OP 3 : 175 kN
- OP 4 : 150 kN

18 Shrinkage in a concrete slab

- OP 1 : Causes shear cracks
- OP 2 : Causes tension cracks
- OP 3 : Causes compression cracks
- OP 4 : Does not cause any cracking

19 Diagonal tension reinforced is provided as

- OP 1 : Longitudinal bars
- OP 2 : Bent up bars
- OP 3 : Helical reinforced
- OP 4 :  $90^\circ$  bent at the end.

20 Diagonal tension in a reinforced concrete beam:

- OP 1 : Is maximum at neutral axis.
- OP 2 : Decreases below neutral axis and increases above neutral axis.
- OP 3 : Increase below neutral axis and decreases above neutral axis
- OP 4 : Remains constant throughout the depth.

21 In RCC section of effective depth 'd', if vertical stirrups are provided to resist shear, their maximum spacing measured along the axis of the member as per IS:456-2000 should not exceed

- OP 1 : 0.25 d
- OP 2 : 0.50 d
- OP 3 : 0.75 d
- OP 4 : 1.00 d

22 In a singly reinforced beam, if the concrete is stressed to its allowable limit earlier than steel the section is said to be

- OP 1 : Economical section
- OP 2 : Over reinforced section
- OP 3 : Balanced section
- OP 4 : Under reinforced section

23 Which of the following statement is correct?

- OP 1 : Shear cracks start due to high diagonal tension in case of beams with their webs and high prestressing force
- OP 2 : shear design for a prestressed concrete beam is based on elastic theory
- OP 3 : In the zone where bending moment is dominant and shear is insignificant, cracks occur at  $20^\circ$  to  $30^\circ$
- OP 4 : After diagonal cracking, the mechanics of shear transfer in a prestressed concrete member is very much different from that in reinforced concrete members.

24 Pickup the correct statement from the following:

- OP 1 : The bent up bars at a support resist the negative bending moment
- OP 2 : The bent up bars at a support resist the shearing force
- OP 3 : The bending of bars near support is generally  $45^\circ$  degree
- OP 4 : All options are correct

25 Diagonal tension in beam\_\_\_\_\_

- OP 1 : Is maximum at neutral axis
- OP 2 : Decreases below the neutral axis and increases above the neutral axis
- OP 3 : Increase below the neutral axis and decreases above the neutral axis
- OP 4 : Remains the same in both above and below the neutral axis

26 Pick up the incorrect statement from the following. The intensity of horizontal shear stress at the element part of a beam section, is directly proportional to

- A : Shear force
- B : Area of the section
- C : Distance of the C.G. of the area from its neutral axis
- D : Moment of inertia of beam section about its neutral axis.

27 Dimension of a beam need be changed if the shear stress is more than

- A :  $5 \text{ kg/cm}^2$
- B :  $10 \text{ kg/cm}^2$
- C :  $15 \text{ kg/cm}^2$
- D :  $20 \text{ kg/cm}^2$

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: 28 The maximum shear stress in concrete of a reinforced cement concrete beam is

A : Shear force/(lever arm x width)

B : Lever arm/(shear force x width)

C : Width/(lever arm x shear force)

D : None of these

: 29 The length of the straight portion of a bar beyond the end of the hook should be at least

A : Twice the diameter

B : Thrice the diameter

C : Four times the diameter

D : Seven times the diameter

: 30 Lap length in compression shall not be less than:

A : Less than  $15\phi$

B : Less than  $20\phi$

C : Less than  $24\phi$

D : Less than  $30\phi$

: 31 Tension bars in a cantilever beam must be enclosed in the support up to:

A :  $L_d$

B :  $L_d/3$

C :  $12\phi$

D :  $d$

: 32 The bearing stress at bends for limit state method compared to working stress method of design is

A : 1.5 times more

B : 2.5 times more

C : 2.5 times less

D : 1.5 times less

: 33 Pick up the incorrect statement from the following :  
Tensile reinforcement bars of a rectangular beam\_\_\_\_\_.

A : Are curtailed if not required to resist the bending moment.

B : Are bent up at suitable places to serve as shear reinforcement.

C : Are bent down at suitable places to serve as shear reinforcement.

D : Are maintained at bottom to provide at bottom to provide at least local bond stress.

: 34 If the average bending stress is  $6 \text{ kg/cm}^2$  for M15 grade concrete, the length of embedment of a bar of diameter  $d$  according to IS 456 specification is

A : 28  $d$

B : 38  $d$

C : 48  $d$

D : 58  $d$

: 35 The length of lap in tension reinforcement should not be less than  $x$  times the bar diameter (actual tension).

A : 18 times diameters

B : 24 times diameter

C : 30 times diameters

D : 36 times diameters

: 36 If  $S_b$  is the average bond stress on a bar of diameter  $d$  subjected to maximum stress  $t$ , the length of the embedment  $\ell$  is given by

A :  $\ell = dt/S_b$

B :  $\ell = dt/(2S_b)$

C :  $\ell = dt/(3S_b)$

D :  $\ell = dt/(4S_b)$

: 37 The clear distance between the lateral restraints for a simply supported or continuous beam to ensure lateral stability should not exceed:

A :  $60 b^2$  or  $b^2/d$  whichever is more

B :  $60 b$  or  $d^2/b$  whichever is less

C :  $60 b$  or  $d^2/b$  whichever is more

D :  $60 b$  or  $b^2/d$  whichever is less

: 38 Minimum spacing between horizontal parallel reinforcements of different sizes should not be less than

A : One diameter of thinner bar

B : One diameter of thicker bar

C : Sum of the diameter of thinner and thicker bars

D : Twice the diameter of thinner bar

: 39 According to IS 456:2000, the maximum depth of stress block for balanced section of beam of effective depth  $d$  using steel with  $f_y=250$ , is given by :

A :  $0.43 d$

B :  $0.53 d$

C :  $0.68 d$

D :  $0.73 d$

: 40 Minimum percentage of tension steel in an RCC beam for Fe 500 steel is :

A : 0.12

B : 0.17

C : 0.22

D : 0.8

: 41 If the modular ratio is 'm', stress ratio in steel and concrete is 'r', and then the critical neutral axis constant 'k' is given by :

A :  $m/(m-r)$

B :  $m/(m+r)$

C :  $(m+r)/m$

D :  $M^2$

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Q. 17 : Ans : 1

Q. 18 : Ans : 2

Q. 19 : Ans : 2

Q. 20 : Ans : 1

Q. 21 : Ans : 3

Q. 22 : Ans : 2

Q. 23 : Ans : 2

Q. 24 : Ans : 4

Q. 25 : Ans : 1

Q. 26 : Answer : 4

Q. 27 : Answer : 4

Q. 28 : Answer : 4

Q. 29 : Answer : 3

Q. 30 : Answer : 3

Q. 31 : Answer : 1

Q. 32 : Answer : 1

Q. 33 : Answer : 3

Q. 34 : Answer : 4

Q. 35 : Answer : 3

Q. 36 : Answer : 4

Q. 37 : Answer : 4

Q. 38 : Answer : 2

Q. 39 : Answer : 2

Q. 40 : Answer : 2

Q. 41 : Answer : 2



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