KATIHAR ENGINEERING COLLEGE, KATIHAR

DEPARTMENT OF CIVIL ENGINEERING

Subject: Design of concrete structure-I **Maximum Marks:** 05

Time: 40 Minutes **Instructor:** Rashid Mustafa

Test- 02

Q.1 Deflection can be controlled by using the appropriate

(a) aspect ratio (b) modular ratio (c) span/depth ratio (d) water/cement ratio

Q.2 If modular ratio is 'm', effective depth is d and stress ratio is r ($r = \sigma_{st}/\sigma_{cbc}$) , the depth of neutral axis of a balanced section is

(a) $\frac{m}{m-r}\ .d$ (b) $\frac{m}{m+r}\ .d$ (c) $\frac{m+r}{m}\ .d$ (d) $\frac{m}{r}\ .d$

Q.3 The minimum strain at failure in tension steel having yield stress f_y = 415 MPa and young's modulus E_s = 200 GPa, as per limit state method of design is ----------

Q.4 The development length in compression for a 20 mm diameter deformed bar of grade Fe 415 embeded in concrete of grade M 25 whose design bond stress is 1.40 N/mm^2 is ----------mm.

Q.5 For a given concrete cross-section of rectangular R.C beam, B x d = 250 x 415 mm. The tensile steel area to resist an applied factored moment of 70 kN-m when M20 grade of concrete and Fe 415 steel are used.

(a) 521.5 mm^2 (b) 4478.5 mm^2 (c) 645.5 mm^2 (d) 3215.5mm^2

Q.6 Consider the following statements:

In an under-reinforced concrete beam

1. Actual depth of neutral axis is less than the critical depth of neutral axis
2. Concrete reaches ultimate stress prior to steel reaching the ultimate stress
3. Lever arm of resisting couple is less than of balanced section

Which of these statements is/are correct?

(a) 1 and 2 (b) 2 and 3 (c) 1 only (d) 1 and 3

Q.7 The adoptable maximum spacing between vertical stirrups in an RCC beam of rectangular cross-section having an effective depth of 300 mm is ---------- mm

Q.8 The effective depth of a singly reinforced rectangular beam is 30 cm. The section is over reinforced and the neutral axis is 12 cm below the top. If the maximum stress attained by concrete is 50 kg/cm^2 and the modular ratio is 18, then the stress developed in steel would be

(a) 1800 kg/cm^2 (b) 1600 kg/cm^2 (c) 1350 kg/cm^2 (d) 1450 kg/cm^2

Q.9 For a given grade of steel, the limiting percentage steel for a singly reinforced concrete beam is proportional to

(a) f_{ck} (b) f_y (c) f_y / f_{ck} (d) f_{ck} / f_y

Q.10 An RCC beam of rectangular cross section has factored shear of 200 kN at its critical section. Its width b is 250 mm and effective depth d is 350 mm. Assume design shear strength τ_c of concrete as 0.62 N/mm^2 and maximum allowable shear stress $\tau_{c\,max}$ in concrete as 2.8 N/mm^2. If two legged 10 mm diameter vertical stirrups of Fe250 grade steel are used, then the required spacing (in cm, up to one decimal place) as per limit state method will be ----------

Q.11 If the stirrups spacing is equal to 0.75 times the effective depth of an RC beam, then the shear capacity of stirrup steel is equal to

(a) 1.25 (f_y A_{sv}) (b) 1.16 (f_y A_{sv}) (c) 1.00 (f_y A_{sv}) (d) 0.80 (f_y A_{sv})

Q.12 A simply supported RC beam having clear span 5 m and support width 300 mm. If the size of the beam is 250 mm x 400 mm (effective depth).The effective span of the beam as per **IS 456:2000** is ----------mm.

Q.13 The development length of a deformed bar can be expressed as (1/k) ($\phi.\sigma_s/\tau_{bd}$). From the **IS: 456-2000,** the value of k can be calculated as ----------

Q.14 For M25 grade of concrete (Age at loading = 28 days), the long-term static modulus of elasticity (expressed in MPa) as per the provisions of **IS: 456-2000** is ----------

Q.15 In the design of beam for the limit state of collapse in flexure as per **IS 456:2000.** let the maximum strain in concrete be limited to 0.0025 (in place of 0.0035). For this situation, consider a rectangular beam section with breadth as 250 mm, effective depth as 350 mm, and area of tension steel as 1500 mm^2(Take M30 grade of concrete and Fe 250 steel).The depth of neutral axis for the balance failure is ---------- mm

<END OF THE QUESTION PAPER>

NOTE: Solution of class test 02 will be uploaded on the college website **www.keck.ac.in**