SUBJECT : THEORY OF STRUCTURES & BUILDING MATERIALS – III

Day : Tuesday   Time : 10·00 A·M. To 1·00 P.M

Date : 05·05·2015   Max. Marks : 100

N.B.:

1) Attempt **ANY THREE** questions from Section – I.
2) Answers to both the sections should be written in **SEPARATE** answer books.
3) Draw illustrative sketches **WHEREVER** necessary.
4) Use of non programmable **CALCULATOR** is allowed.
5) Figures to the right indicate **FULL** marks.
6) Assume suitable data if necessary.

SECTION – I

Q.1   a)   Find slope and deflection at free end of cantilever beam as shown in the figure   [12] by double integration method. The cross section of beam is 100 mm wide and 200 mm deep. E = 11 GPa.
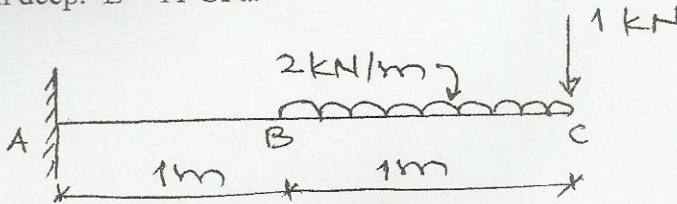
     b)   Give different methods to determine slope and deflection of a beam. Explain   [08] any one.

Q.2   a)   What is effective length of a column? For different end conditions of column   [08] give effective length.

     b)   A mild steel tube 22 mm ϕ, 3mm thick is 2m long. It is used as a strut hinged   [12] at two ends. Calculate the crippling load by Euler's formula. E = 200 GPa.

Q.3   a)   Compare singly reinforced beam and doubly reinforced beam.   [08]

     b)   A simply supported slab 4m × 10m clear span in mild environment carries a   [12] floor finish of marble and is used as a living room in a residential house. Design the slab using M_{20} conc. and Fe – 415 steel.

Q.4   a)   Explain two hinged arch and three hinged arch in detail.   [10]

     b)   A working load of 800kN acts on a column of size 300 mm × 350mm. The   [10] effective height of column is 3.5m. Design the column. Given conc. = M_{20}, steel = Fe – 415.

SECTION – II

Answer **ANY TWO** from **Q.5, Q.6 and Q.7**:

Q.5   Explain steel with its properties as a reinforcing material.   [10]

Q.6   Explain stucco plastering for internal and external wall finishes.   [10]

Q.7   Explain different types of paints and for exterior and interior surfaces.   [10]

Q.8   Write short notes on **ANY FOUR** of the following: [20]
     a) Good Aggregates
     b) Colouring agents as admixtures
     c) Ingredients of varnish
     d) Constituents of paints
     e) Plater on Lath

Day: Wednesday
Date: 04-05-2016

Time: 2:00 P.M. TO 5:00 P.M
Max Marks. 100

N.B.

1) Attempt any **THREE** questions from Section – **I** and any **FOUR** questions from Section – **II**.
2) Answer to both the section should be written in **SEPARATE** answer books.
3) Draw illustrative sketches **WHEREVER** necessary.
4) Use of non programmable calculator is **ALLOWED**.
5) Figures to the right indicate **FULL** marks.
6) Assume suitable data if necessary.

SECTION - I

Q.1 Solve any **FOUR** of the following (20)
   a) Compare Euler's method & Rankine's method.
   b) Compare 'L' beam and rectangular beam.
   c) Give I.S. code provision for R.C.C. column.
   d) Explain double integration method for slope and deflection of a beam.
   e) Explain different end conditions of two way slab.

Q.2 A simply supported rectangular beam of 4m span carries a uniformly (20)
distributed characteristics load including self weight of 20 KN/m. The beam
section is 230 × 450 mm overall. Design the beam. Concrete M20, steel – Fe
415.

Q.3 A drawing room of a residential building measures 4.3 m × 6.55 m It is (20)
supported on 350 mm thick walls on all four sides. The slab is simply
supported at edges with no provision to resist torsion at corners. Design the
slab using M20 concrete & Fe 415 steel.

Q.4 a) A beam is 8 m long & is simply supported at its ends. It carries a u.d.l. of 12 (10)
KN/m over a span of beam. Calculate the deflection at midpoint by double
integration method.
$E = 200 \text{ KN/mm}^2$, $I = 12 \times 10^8 \text{ mm}^4$.
   b) Give I.S. code provisions for a doubly reinforced beam in detail. Explain with (10)
the help of dig.

SECTION – II

Q.5 Explain in detail role of water in concrete. (10)

Q.6 What do you mean by concrete admixtures ? Name three types of admixtures (10)
stating their application.

Q.7 State & explain various components of paint. (10)

Q.8 a) Explain role of reinforcement in concrete. (05)
   b) State & explain various defects found in plaster. (05)

Q.9 Name four types of external renderings (plaster) and state their uses. (10)

Day : Wednesday   Time : 10·00 A.M. To 1·00 P.M.
Date : 06-05-2015   Max. Marks : 100

N.B.:
1) Attempt **ANY THREE** questions from Section – I.
2) Answers to both the sections should be written in **SEPARATE** answer books.
3) Draw illustrative sketches **WHEREVER** necessary.
4) Use of non programmable **CALCULATOR** is allowed.
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SECTION – I

Q.1 A continuous beam ABCD is fixed at A span AB is 6m long and carries a u.d.l [20] of 3kN/m span BC is 4m long and carries a point load of 5kN at a distance 2m from support C. Span CD is 3.5m and carries a point load of 6kN at 1m from D. support D is hinged support. Determine support moment and draw SFD and BMD.

Q.2 Fixed beam of 10 m span is subjected with two point loads of 7.5 kN at 1.2m [20] and 6.5m from left hand support. In addition to it u.d.l is distributed over a span of 3.5m from right support. Determine support members. Draw SFD and BMD.

Q.3 a) Give different types of rivet. Explain failure types of rivet joints. [08]

b) An angle ISA 55 × 55 × 6mm is used as tension member connected by 12mm [12] diameter rivets. Calculate its strength. What will be its strength if it is fillet welded ? $\sigma at = 150 \ N/mm^2$.

Q.4 a) Explain different types of welds with the help of sketch. [08]

b) A simply supported beam has an effective span of 6m and carries a u.d.l of [12] 20kN/m. Taking $f_y = 250 \ N/mm^2$ and $E = 2 \times 10^5 \ N/mm^2$. Design the beam if it is laterally supported.

SECTION – II

Answer **ANY TWO** from **Q.5, Q.6** and **Q.7**:

Q.5 Explain the uses of Ferrocrete in building Industry and interiors of a building. [10]

Q.6 What are the characteristics of Rammed earth blocks? [10]

Q.7 Properties of aluminum that makes it a very eligible material for use nowadays. [10]

Q.8 Write short notes on **ANY FOUR** of the following: [20]
  a) Concrete debri blocks
  b) Difference between Ferrocrete and Portland cement
  c) Properties of steel
  d) Environmental benefits of fly ash bricks
  e) Limitations of CSEB (Cement Stablized Earth Block)
  f) Types of Ferrocrete system

Day: **Thursday**
Date: **05-05-2016**

Time: **10:00AM TO 1:00 P.M.**
Max Marks. 100

N.B.

1) Attempt any **THREE** questions from Section – **I** and any **FOUR** questions from Section – **II.**
2) Answer to both the section should be written in **SEPARATE** answer books.
3) Draw illustrative sketches **WHEREVER** necessary.
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SECTION - I

Q.1   Fixed beam of 20 m span is subjected to u.d.l. of 12 KN/m over entire span and concentrated load of 10KN is acting at midpoint. Determine support moments. Draw S.F.D. & B.M.D.   **(20)**

Q.2   **a)**   Write a short note on flitched beam.   **(05)**
     b)   A timer beam having a clear span of 8 m carries a u.d.l. of 18KN/m including self weight of beam. Assuming the beam to be made of deodar wood. Design the beam .   **(15)**

Q.3   **a)**   Explain design procedure of compression member in steel.   **(08)**
     b)   An angle $75 \times 50 \times 10$ mm is used as a tension member with its longer leg connected by 18 mm dia. Rivets. Calculate its strength. $\sigma_{at} = 150$ N/mm^2.   **(12)**

Q.4   **a)**   Explain different types of weld with the help of sketch.   **(08)**
     b)   A simply supported beam has an effective span of 5m & carries a point load of 100 KN at midpoint. Design the beam if it is laterally supported. $E = 2 \times 10^5$ N/mm^2 $F_y = 250$ N/mm^2.   **(12)**

SECTION – II

Q.5   **a)**   Explain various defects found in structural steel.   **(05)**
     b)   Compare advantages of structural steel against timber in building.   **(05)**

Q.6   Write note on uses of aluminum in building along with finishes applied to aluminum.   **(10)**

Q.7   **a)**   What are advantages of fly ash bricks over traditional clay bricks?   **(05)**
     b)   Write a note on concrete debri block   **(05)**

Q.8   Write notes   **(10)**
     a)   Stabilized earth block
     b)   Rammed earth block

Q.9   Explain ferrocement. Compare ferrocement with R.C.C. construction using steel bars.   **(10)**