

6E3032

Roll No. _____

Total No of Pages: 7

6E3032

B. Tech. VI Sem. (Main & Back) Exam., May/June-2014

Civil Engineering

6CE1 Theory of Structures-II

Time: 3 Hours

Maximum Marks: 80

Min. Passing Marks: 24

Instructions to Candidates:-

Attempt any five questions, selecting one question from each unit. All Questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly.

Units of quantities used/ calculated must be stated clearly.

*Use of following supporting material is permitted during examination.
(Mentioned in form No. 205)*

1. _____

2. _____

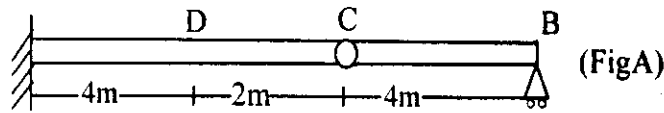
UNIT-I

Q.1. For the beam shown in (fig. A) draw influence line diagram for the following-

- (i) Reaction V_B at B,
- (ii) Reaction V_A at A
- (iii) Reaction Moment M_A at A
- (iv) Shear Force at D and
- (v) Bending Moment at D

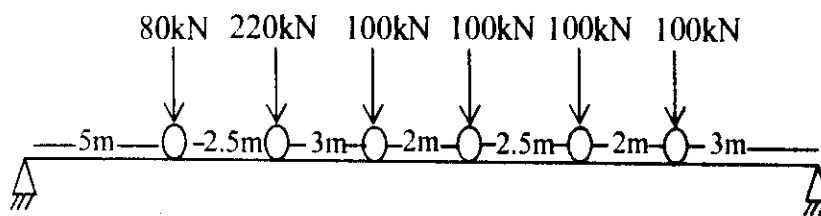
Find also the maximum values of these quantities due to a live load of 20kN/m.

[16]



OR

- Q.1. (a) The load system shown in (fig. B) moves from right to left on a girder of span 20 meters. Find the maximum shear force at a section 7.5m from the left end. [10]



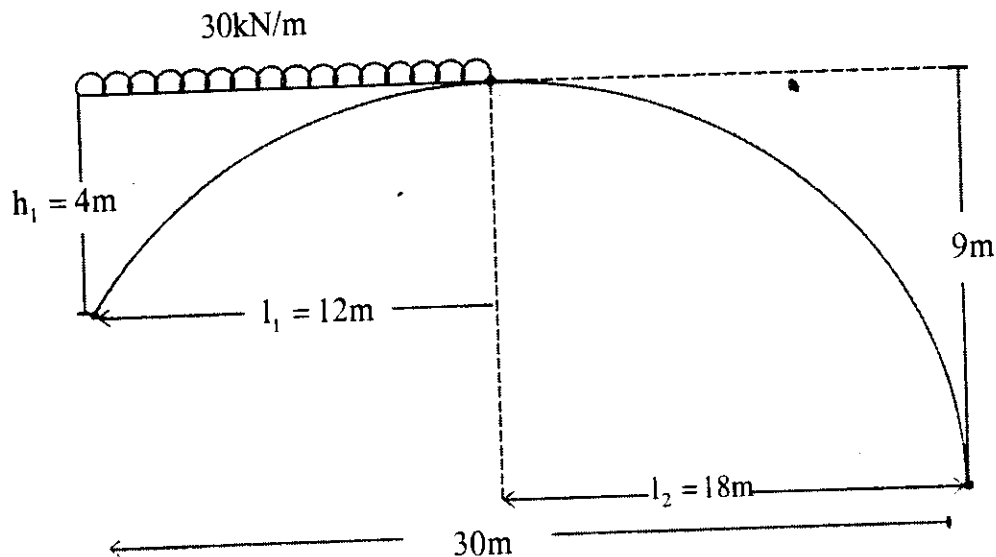
(Fig. B)

- (b) Explain the theory of Muller Breslau Principal and its application. [6]

UNIT-II

- Q.2. A three hinged parabolic arch ABC of span 30m has its Support A and B at different levels. A being at a higher level than B. The Support A is 4m below the crown hinge C and 12m horizontally from A. Find the depth of the support B below the hinge C. If

the arch carries a U.D.L. of 30kN/m from A to C. Determine the horizontal thrust and the vertical reactions at the supports. Find also the maximum bending moments for the Arch. [46]



OR

- Q.2. (a) A three hinged circular arch of span 40m and rise 8m carries a concentrated load of 120kN at a horizontal distance of 10m from the left end. Find the reactions at the supports and the maximum positive and Negative Bending moments. [8]
- (b) A two hing parabolic arch of span ℓ and rise h carries a triangular load whose intensity varies from Zero at the left end to w at a distance a from the left end. Determine the horizontal thrust at each support. [8]

UNIT-III

Q.3. The three hinged stiffening girder of a Suspension bridge of span 120 meters is subjected to two point loads of 240kN and 300kN at distances 25 meters and 80 meters from the left end. Find the shear force and bending moment for the girder at a distance of 40 meters from the left end. The supporting Cable has a central dip of 12 meters. Find also the maximum tension in the Cable, and draw the B.M. diagram for the girder. [16]

OR

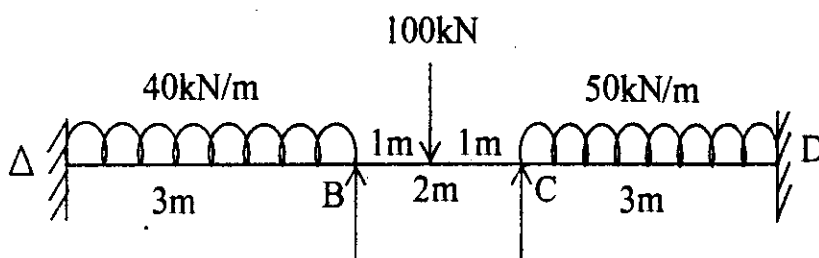
Q.3. A Suspension Cable is supported from two piers 196m apart, one support being 7m above the other. The Cable carries a uniformly distributed load of 15kN/m and has its lowest point 9m below the lower support. The ends of the Cable are attached to rollers at the top of the piers and the back stays which are straight are inclined at 30° to the horizontal. Determine [16]

- (a) The maximum tension in the Cable
- (b) The tension in the back stays and
- (c) The vertical thrust on each pier.

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UNIT-IV

- Q.4. Determine the support moments for the continuous girder shown in fig. below. If the support B sinks by 2.50 mm. for all member take $I = 3.50 \times 10^7 \text{ mm}^4$ and $E = 200 \text{ kN/mm}^2$. [16]



OR

- Q.4. Determine the end moments at the various joints of the frame shown in fig. C. [16]

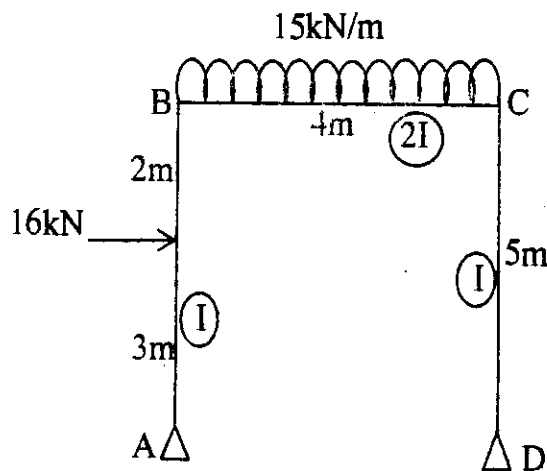


Fig.C

UNIT-V

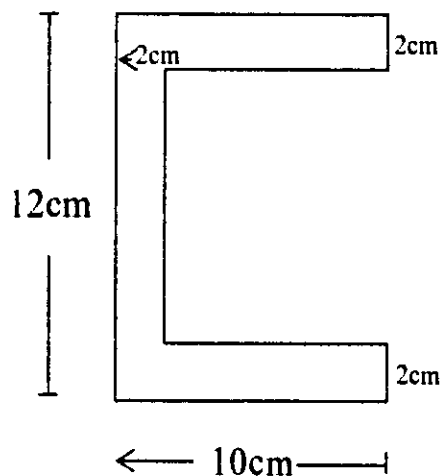
Q.5. Two rectangular bars, one of steel and other of copper each of $(70 \times 30) \text{ mm}^2$ are placed together, to form a beam of 70 mm wide and 40mm deep, on two supports 4m apart, the copper being on the top of steel. Determine the maximum central load which can be applied to the beam if the bars are firmly secured to each other through out their length. [16]

$$E_s = 2 \times 10^5 \text{ N/mm}^2, f_s \text{ max} = 120 \text{ N/mm}^2$$

$$E_B = 0.8 \times 10^5 \text{ N/mm}^2; f_b \text{ max} = 75 \text{ N/mm}^2$$

OR

Q.5. (a) Determine the shear center of cross-see. With its Location. [8]



(b) Short Note on: -

[8]

- (i) Location of NA
 - (ii) Shear Center
 - (iii) Moment of inertia
 - (iv) Principle axis
-

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Total No of Pages: 4**6E3033****B. Tech. VI Sem. (Main & Back) Exam. May/June-2014****Civil Engineering****6CE2 Concrete Structures-II****Time: 3 Hours****Maximum Marks: 80****Min. Passing Marks: 24****Instructions to Candidates:-**

Attempt any five questions, selecting one question from each unit. All Questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly.

Units of quantities used/ calculated must be stated clearly.

Use of following supporting material is permitted during examination.

- | | |
|---------------------|--|
| 1. <u>IS : 456</u> | 2. <u>IS : 3370 (Part II & IV)</u> |
| 3. <u>IS : 1343</u> | 4. <u>IS : 875</u> |
| 5. <u>IRC : 6</u> | 6. <u>IRC : 21</u> |

UNIT-I

- Q.1 (a) What is the difference between pre tensioning and post tensioning? Describe any six advantages of pre-stressed concrete members over reinforced concrete members. [2+6=8]

- (b) Calculate the extreme fiber stresses at the mid span of the beam of Fig.-1. The beam is having parabolic profile with a pre stressing force of 1000 kN. It is carrying a uniformly distributed load of 40 kN/m including its self weight over a span of 5.0 m. The cross-section of rectangular beam is 300 mm X 600 mm. [8]

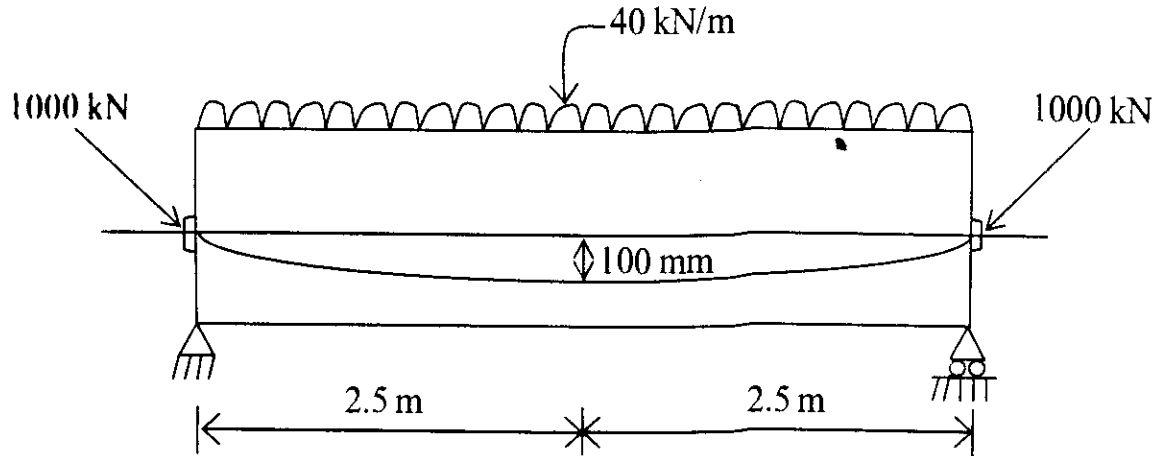


Fig. - 1

OR

- Q.1 (a) Describe the freyssinet system of post tensioning. [4]
- (b) A pre-stressed concrete pile is 300 x 300 mm in section and is provided with 28 wires of 5 mm diameter distributed uniformly over the section. The wires are tensioned with a pre stressing force of 500 kN. Determine the percentage loss of stress in wires. Take modulus of elasticity of steel = 2.1×10^5 N/mm²; modulus of elasticity in concrete = 3.2×10^4 N/mm²; creep shortening = 3.1×10^{-5} mm per mm per N/mm²; shrinkage strain = 0.00025; relaxation loss of stress in steel wires = 4% of initial stress. [12]

UNIT-II

- Q.2 (a) Find the reinforcement of a ring beam of rectangular section 450 mm wide and 800 mm deep with an effective cover of 50 mm. It is subjected to a bending moment of 70 kN-m, torsional moment of 60 kN-m and shear force of 65 kN at working load. Assume grade of concrete M-25 and steel Fe-415. [10]

- (b) Explain the concept of redistribution of moment. Also describe any two advantages of redistribution of moment in the design of statically indeterminate structures.

[4+2=6]

OR

- Q.2 Design a continuous beam of a multi story building of three spans, each of 8m centre to centre. The characteristic superimposed dead load including self wt. is 15 kN/m and characteristic live load is 13 kN/m. Design the critical section of rectangular beam by Limit State method of design by assuming M-20 and Fe-415. Adopt width of beam 300mm. Also design shear reinforcement using 8mm diameter, two legged vertical stirrups. Also apply check for deflection.

[10+4+2=16]

UNIT-III

- Q.3 Design a circular dome over a circular room of diameter 9m to carry a uniformly distributed live load of 1.5 kN/m². The dome has to support a lantern of 18 kN as point load from a circular opening of diameter 1.8 m at its crown. The rise of circular dome is 1.8 m. Assume M-20 grade of concrete & Fe-415 steel. Also design ring beams at opening and bottom of dome.

[10+6=16]

OR

- Q.3 (a) Derive the expression for collapse load of a square slab fixed on all edges under yield line theory. [8]
- (b) A R.C. Slab 5m X 5m is simply supported along the four edges and is reinforced with 10mm diameter of Fe-415 grade bars at 150mm c/c both ways. The average effective depth of the slab is 100mm with overall depth of 130mm. The slab carries a flooring of 50mm thick with unit weight 22 kN/m². Determine the maximum permissible service load for the slab if M-20 grade concrete is used.

[8]

UNIT-IV

- Q.4 Design a rectangular water tank resting on ground having base area of 4m x 6m. The height of water tank is 3.75m and keep a free board of 0.15m. Assume M-25 grade of concrete and Fe-415 steel. Assume appropriate data and clearly state the assumptions.

[16]

OR

- Q.4 Design an Intze water tank for a capacity of 900m^3 by using M-25 and Fe-415. Assume density of water 9.8 kN/m^3 and keep diameter of cylindrical portion 14m. Take rise of top circular dome and bottom circular dome as 1.8m & 1.6m respectively. Design top circular dome, top ring beam and cylindrical wall of the tank. Take height of conical dome as 2m with angle 45° with vertical.

[16]

UNIT-V

- Q.5 Design a reinforced concrete deck slab culvert or two lane carriageway with the following data:

Effective span = 5.4 m; Clear span = 5.0 m; Width of culvert = 12 m; Width of bearing = 400 mm; Width of foot path = 1.5 m on both side; Thickness of wearing course = 75 mm; Asphaltic concrete with unit weight 22 kN/m^3 ; Materials : M-25 and Fe-415; Overall depth of deck slab = 470 mm; Effective cover = 50 mm; Carriageway width = 7.5 m. Consider IRC Class AA Tracked loading.

[16]

OR

- Q.5 Design the stem and heel slab of an R.C. cantilever retaining wall supporting an earth embankment of 3.5 m high. The top surface of embankment is horizontal. Also show the reinforcement with a neat sketch. Assume the following data:

Unit wt. of soil = 18 kN/m^3

Angle of internal friction = 30°

Safe bearing capacity of soil = 150 kN/m^2

Grade of concrete = M – 20

Grade of steel = Fe – 415

Assume all other data and clearly state your assumptions.

[16]

6E3034

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6E3034

B. Tech. VI Sem. (Main & Back) Exam. May/June-2014
Civil Engg.
6CE3 Steel Structures-II

Time: 3 Hours

Maximum Marks: 80

Min. Passing Marks: 24

Instructions to Candidates:-

Attempt any four questions, selecting one question from each unit. All Questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly.

Units of quantities used/ calculated must be stated clearly.

Use LSM for units 1 and 2 and WSM for units 3 and 4.

*Use of following supporting material is permitted during examination.
(Mentioned in form No. 205)*

- | | |
|--|---------------------|
| 1. I.S. 800 – 2007 | 2. I.S. 800 – 1984 |
| 3. ISI Hand Book for structural Engineers vol 3 (Steel Tables) | 4. I.S. 875 Part 3. |
| 5. Railway Bridge Rules | |

UNIT-I

- Q.1 (a) Determine the design wind pressure for a sloping roof of a shed to be used in Kota. The span of the roof is 12m and its pitch is $\frac{1}{4}$. The height of the eaves above the ground level is 10m. Assume normal permeability. [8]

- 123
- (b) Design an I section purlin for dead load plus live load condition from following data-

- | | | | | |
|-------|--------------------|-----|---|-------|
| (i) | Spacing of trusses | c/c | = | 4.0 m |
| (ii) | Spacing of purlins | c/c | = | 1.7 m |
| (iii) | Angle of pitch | | = | 30° |

The trusses carry G.I. sheets.

[12]

OR

- Q.1 Design a gantry girder for an industrial building, to carry an E.O.T. crane, from following data-

[20]

- | | | | |
|-------|-----------------------------------|---|--------|
| (i) | Crane capacity | = | 150 kN |
| (ii) | Weight of crane excluding trolley | = | 100 kN |
| (iii) | Weight of trolley | = | 40 kN |
| (iv) | Span of crane | = | 12 m |
| (v) | Span of gantry girders | = | 7 m |
| (vi) | Minimum approach of hook | = | 1.0 m |
| (vii) | Wheel base | = | 3.0 m |

UNIT-II

- Q.2 A plate girder, simply supported at the ends has effective span 16 m. It carries a superimposed load of 25 kN /m over the whole span. Assuming compression flange of the girder to be laterally supported, design the section at mid-span. Also design the welds connecting flange plates and web. Do not design stiffeners.

[20]

OR

- (a) Briefly discuss splicing of web plate, with neat diagrams.
- [5]
- (b) A welded plate girder of 24m span carries u.d.l. of 40 kN/m including self weight, in addition to two point loads, each 150 kN applied at one-third points. The designed section of the girder consists of a web plate 1400 mm × 10 mm and flange plates of size 400mm X 30mm at top and at bottom. Design the intermediate transverse stiffeners and their connection to the web plate.
- [15]

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UNIT-III

- Q.3 (a) Draw a neat sketch of a through type plate girder Railway Bridge and label the components. [5]
- (b) Determine the increase in stresses in the flanges of leeward girder due to overturning effect of wind when (i) bridge is unloaded and (ii) bridge is loaded, for a deck type plate girder railway bridge, B. G. from following data- [15]
- | | | |
|--|---|--------|
| (i) Effective span of bridge | = | 25 m |
| (ii) Spacing of plate girders c/c | = | 2.0 m |
| (iii) Overall depth of the section of girder | = | 2.1 m |
| (iv) Height of rail section | = | 150 mm |
| (v) Height of sleepers | = | 150 mm |

OR

- Q.3 An 'A' type portal bracing has been used in a through type truss girder bridge. It is subjected to a lateral horizontal force of 100 kN as shown in Fig 1. Analyse the frame completely. Also find the portal effect in the bottom chords of the truss girders, if the end posts are inclined at 50° to the horizontal. [20]

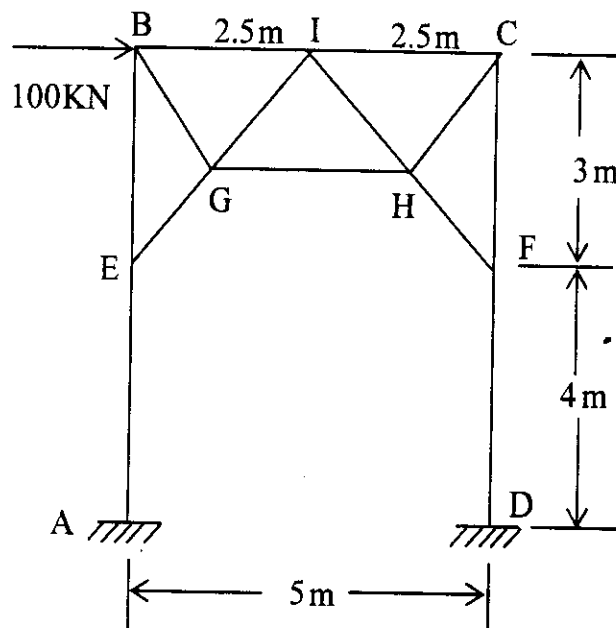


Fig1

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UNIT-IV

Q.4 Design an overhead steel tank, circular in shape, with hemi spherical bottom for 1,60,000 liters capacity. The tank is supported on 6 columns placed uniformly along the periphery, for which $M = .01482 WR$, $T = .00151 WR$ and $F = W/12$. The columns and staging need not be designed. [20]

OR

Q.4 Design an elevated riveted steel rectangular tank with flat bottom for a capacity of 75,000 liters. The tank is resting on two tier of I section beams, which in turn rest on 6 no. of columns. Use 1.2 m wide plates. Do not design the columns and staging. [20]

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B. Tech. VI Sem. (Main & Back) Exam., May/June-2014

Civil Engineering

6CE4 Environmental Engineering-I

Time: 3 Hours

Maximum Marks: 80

Min. Passing Marks: 24

Instructions to Candidates:-

*Attempt any **five** questions, selecting **one** question from **each** unit. All Questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly.*

Units of quantities used/ calculated must be stated clearly.

*Use of following supporting material is permitted during examination.
(Mentioned in form No. 205)*

1. _____

2. _____

UNIT-I

Q.1 (a) Describe environment and its various components, what is the dynamic relationship of biotic and abiotic components? [8]

(b) What is design period? Write down design periods for pipeline, pumps, pump house and treatment plant. [8]

OR

Q.1 (a) For given data, calculate the population in 2021 by incremental increase method.

[8] _____

Year	1961	1971	1981	1991	2001
Population in thousands	92	135	179	225	280

(b) What are the design Capacities of intake, rising main, Sump, filter plant, C.W.R, Pumps, Service Reservoir, Distribution mains and ground level reservoirs. [8]

UNIT-II

Q.2 (a) Compare the ground water and surface water sources in terms of yield, potential, quality and cost. [8]

(b) Explain the hydrological cycle and the ill effects of environmental pollution on the hydrological cycle. [8]

OR

Q.2 (a) Describe the physical, chemical and biological water quality parameters as per Indian Standards. [8]

(b) What are the ill effects of excess of fluoride, Nitrate, T.D.S, Heavy metals, and presence of pathogenic bacteria? [8]

UNIT-III

Q.3 (a) Describe the process of design of a pipeline joining two villages, knowing the distance, discharge and the difference of reduced levels. Also design the pumping set. Assume any data suitably. [8]

- (b) Design a continuous flow rectangular sedimentation tank for a population of 20,000 persons with a daily per capita demand of 250 liters, assuming a detention period of 6 hours. [8]

OR

- Q.3 (a) Describe various types of settlings. [8]
- (b) What are the criteria of selection of pipes and pumps in a water supply project? Sketch and describe various types of pipe joints. [8]

UNIT-IV

- Q.4 Sketch and explain the working and design criteria of all components of a water treatment plant. [16]

OR

- Q.4 (a) Describe the disinfection of water by chlorination. How do you decide the dose of chlorine? [8]
- (b) What are the main differences in slow sand and rapid gravity sand filters? [8]

UNIT-V

- Q.5 (a) Describe the method of determination of capacity of a service reservoir by mass curve method. [8]
- (b) Sketch and describe the house connection and the pressure requirement at ferrule for different heights of buildings. [8]

OR

- Q.5 (a) Describe the Hardy cross method of distribution pipe network analysis with a suitable example. [8]
- (b) Describe the various water distribution systems and compare them. [8]
-

6E3036

Roll No. _____

Total No of Pages: 4**6E3036****B. Tech. VI Sem. (Main & Back) Exam. May/June-2014****Civil Engineering****6CE5 Transportation Engineering-I****Time: 3 Hours****Maximum Marks: 80****Min. Passing Marks: 24****Instructions to Candidates:-**

Attempt any five questions, selecting one question from each unit. All Questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly.

Units of quantities used/ calculated must be stated clearly.

Use of following supporting material is permitted during examination.

1. _____

2. _____

UNIT-I

Q.1 (a) Describe any four characteristics of road transport. [8]

(b) Write salient features (any six) of second twenty year road development plan. [8]

OR

Q.1 (a) Enumerate various factors controlling highway alignment. Also explain any one factor in brief. [2+2=4]

(b) Calculate the total lengths of NH, SH and MDR needed in a district as per second 20-year road development plan (i.e. Bombay Road Plan). The data collected from district are as follows:

Total area = 18400 km²; Undeveloped area = 4800km²; Developed & agricultural area = 8000 km² [3 x 4=12]

Population Range	No. of towns
< 500	200
500 – 1,000	350
1,000 – 2,000	750
2,000 – 5,000	360
5,000 – 10,000	150
10,000 – 20,000	80
20,000 – 50,000	25
50,000 – 1,00,000	10
>1,00,000	5

UNIT-II

- Q.2 (a) List out any four desirable properties of road aggregates. Describe procedure for Los Angeles Abrasion Test for road aggregates. [2+6=]
- (b) Describe the method for construction of WBM road. [8]

OR

- Q.2 (a) Write any six major differences in bitumen and tar in tabular form. [6]
- (b) Describe the construction steps for premixed Bituminous carpet. Also give the quantity of bitumen required for tack coat, prime coat and pre mix. [8+2=10]

UNIT-III

- Q.3 (a) Explain total reaction time of driver by 'PIEV' theory. [6]
- (b) The speed of overtaking and overtaken vehicles are 70 and 40 Kmph respectively on a two way traffic road. If the acceleration of overtaking vehicle is 0.99 m/sec²,
- (i) Calculate safe overtaking sight distance.

(ii) Find minimum length of overtaking zone.

(iii) Draw a neat sketch of the overtaking zone and show position of sign posts.

[4+4+2=10]

OR

Q.3 (a) Derive an expression for finding the stopping sight distance at level and at grade on a highway. [8]

(b) A state highway with design speed 80 Kmph and having pavement width 7.0 m is passing through rolling terrain in heavy rain fall area. It has a horizontal curve of radius 500 m. Design the length of transition curve assuming suitable data. [8]

UNIT-IV

Q.4 (a) Describe traffic volume study. Explain any three objects of traffic volume studies. [1+3=4]

(b) Explain the procedure to measure spot speed by enoscope with diagram. [4+2=6]

(c) Write any six advantages of traffic signals. [6]

OR

Q.4 (a) Write any six causes of accidents. [6]

(b) Explain any five of the followings: [5 x 2 =10]

(i) Informatory sign.

(ii) Off street parking.

(iii) Application (any 2) of O & D studies.

- (iv) Grade separated intersection.
- (v) "3 Es" method for reduction accidents.
- (vi) Traffic signals.
- (vii) Road markings.

UNIT-V

- Q.5 (a) Describe in brief any four factors considered for design of pavements. [6]
- (b) Describe C.B.R. method adopted for design of flexible pavements as per IRC:37 guidelines. [10]

OR

- Q.5 (a) Describe followings for the alignment of hill roads:
- (i) Resisting length of hill road. [2]
 - (ii) Trace cut for hair pin bends. [2]
- (b) Describe any four major points to be considered for road side development and arboriculture. [6]
- (c) Write short notes on any 4 of the followings:
- (i) Road side drains in hill roads.
 - (ii) Sub-Surface drainage in hill roads.
 - (iii) Cross-drainage in hill roads.
 - (iv) Problems in maintenance of hill roads.
 - (v) Terrain classification on the basis of cross-slope. [6]

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Total No of Pages: 3

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B. Tech. VI Sem. (Main & Back) Exam., May/June-2014

Civil Engineering

6CE6.2 Elective Remote Sensing and GIS

Time: 3 Hours

Maximum Marks: 80

Min. Passing Marks: 24

Instructions to Candidates:-

Attempt any five questions, selecting one question from each unit. All Questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly.

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Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. _____

2. _____

UNIT-I

Q.1. (a) Define Photogrammetry? Define classification of Photographs. [8]

(b) Compare between Aerial and Terrestrial Photographs. [8]

OR

Q.1. (a) Write about different types of Stereo of stereoscopes. [8]

(b) Define various methods used for measurements on aerial photographs? [8]

UNIT-II

- Q.2. (a) Define Remote Sensing and various stages of Remote Sensing system. [8]
(b) Differentiate between Electromagnetic Radiation and Spectrum. [8]

OR

Q.2. Write short notes on any **Two**: -

- (a) Atmospheric window [8]
(b) Signatures [8]
(c) Scattering [8]

UNIT-III

- Q.3. (a) Discuss about various types of Platforms. [8]
(b) Write short note on Multi concept of Remote sensing Applications. [8]

OR

- Q.3. (a) Define sensors and write about the characteristic of sensors. [8]
(b) Write about Orbital parameters of satellite. [8]

UNIT-IV

- Q.4. (a) Write about various Components used for interpretation of Satellite images. [8]
(b) Differentiate between Digital and Visual Techniques. [8]

OR

- Q.4. (a) Write about Principals of Digital Image Processing. [8]
- (b) Discuss various Techniques used in digital Image Processing. [8]

UNIT-V

- Q.5. (a) What is Geographical Information System. [8]
- (b) Write about use of vector and Raster data Structures. [8]

OR

- Q.5. (a) Discuss about applications of GIS in urban planning. [8]
- (b) Write about application of GIS in Agriculture or Irrigation. [8]
