

Total No. of Questions : 6]

SEAT No. :

P5101

[Total No. of Pages : 3

**BE/Insem.-501**  
**B.E. (Civil)**  
**Environmental Engineering - II**  
**(2012 Pattern) (Semester - I)**

*Time : 1 Hour]*

*[Max. Marks : 30*

*Instructions to the candidates:-*

- 1) *Attempt Q.1 OR Q.2, Q.3 OR Q.4, Q.5 OR Q.6. Figures to the right indicates full marks.*
- 2) *Draw neat figures wherever necessary.*
- 3) *Assume any missing data if necessary.*
- 4) *Use of scientific calculators is allowed.*

- Q1)** a) Explain the variation in sewage flow. How the variation in sewage flow is taken into account while designing the sewer. **[2+2]**
- b) What are the different sources of domestic sewage? Hence explain the method of estimating sewage discharge. **[3+3]**

**OR**

- Q2)** a) Explain the significance of maximum and minimum velocities to be generated in the sewer with suitable examples. **[4]**
- b) State and explain the rational formula for estimating storm water flow. **[2]**
- c) Design a circular sewer for conveyance 5 MLD of sewage flow. The sewer should be designed to carry maximum discharge while running half full. A velocity of 1.0 - 1.5m/s should be generated at maximum flow. Use following data. **[4]**
- i) Max. flow/Ave.flow = 3;
  - ii) Manning's constant = 0.013.

- Q3)** a) Explain the principle and working of grit chamber. Also explain the need of velocity control devices in grit chamber. **[2+2]**
- b) Explain various zones of pollution for a polluted river undergoing self purification. **[4]**

**P.T.O.**

- c) Determine BOD of river water on downstream of point of sewage disposal using following data. [2]
- i) Sewage flow = 5 MLD,
  - ii) BOD of sewage = 240 mg/L ,
  - iii) Discharge in river = 20 MLD and
  - iv) BOD of river water on upstream of point of disposal = 5mg/L.

**OR**

- Q4)** a) What is DO deficit? Hence explain the Oxygen Sag curve. [2+2]
- b) The 5day BOD of a wastewater sample at 20°C was found to be 400 mg/L. Determine the ultimate BOD and 3day BOD at 30°C. Take  $K_D=0.1/d$  at 20°C. [6]

- Q5)** a) Explain the principle and working of Activated Sludge Process with suitable flow chart. [2+2]
- b) Design a high rate single stage trickling filter for treating domestic sewage flow of 8 MLD using N.R.C. formula. Use following data. [6]
- i) BOD<sub>5</sub> of raw sewage = 240 mg/L,
  - ii) BOD removed during primary treatment = 30%,
  - iii) Organic loading rate = 0.8Kg/m<sup>3</sup>/d,
  - iv) Hydraulic loading rate = 15 m<sup>3</sup>/m<sup>3</sup>/d,
  - v) Recirculation ratio = 2.

Determine,

- 1) Volume of filter media
- 2) Dimensions of trickling filter
- 3) Efficiency of trickling filter

**OR**

- Q6)** a) Explain the principle and working of trickling filter with suitable flow chart. [2+2]

b) Design a completely mixed activated sludge process for treating domestic sewage flow of 8 MLD. Use following data. [6]

- i) BOD<sub>5</sub> of raw sewage = 240 mg/L,
- ii) BOD removed during primary treatment = 30%.
- iii) Permissible effluent BOD = 30mg/L.
- iv) MLSS = 3000mg/L,
- v) Return sludge solids concentration = 10000mg/l,
- vi) Ratio of VSS/SS = 0.8,
- vii) Kinetic constants :  $Y = 0.5$ ,  $K_d = 0.05$ .
- viii) Mean Cell Residence Time (MCRT) = 10 days
- ix) Oxygen transfer capacity for aerators under field condition = 1.6 Kg/KWh

Determine,

- 1) Volume of aeration tank
- 2) Rate of sludge wasting and sludge recirculation ratio
- 3) Oxygen and power requirement



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SEAT No. :

P5106

[Total No. of Pages : 4

**BE/Insem.-506**

**B.E. (Civil Engineering)**

**(c) ADVANCED CONCRETE TECHNOLOGY  
(2012 Pattern) (Elective - I) (Semester - I)**

*Time : 1 Hour]*

*[Max. Marks : 30*

*Instructions to the candidates:*

- 1) *Answer Q.1 or 2, 3 or 4 and 5 or 6.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Your answers will be valued as a whole.*
- 5) *Use of electronic pocket calculator is allowed.*
- 6) *Assume suitable data, if necessary.*
- 7) *Use of IS code 10262,456 is not allowed.*

**Q1) a)** Write a short note on manufactured sand as a fine aggregate. **[4]**

b) What do you mean by quality assurance and quality control? Give the IS recommendations of quality assurance. **[6]**

OR

**Q2) a)** What is heat of hydration? Explain the factors affecting heat of hydration. **[4]**

b) Explain workability as a quality measure of green concrete . On which factors workability of concrete depends? **[6]**

**Q3) a)** What is light weight concrete? How it can be achieved in practice? **[4]**

b) Write a short notes on : **[6]**

- i) High strength concrete
- ii) High performance concrete

OR

**Q4) a)** What are the different types of industrial waste materials useful for construction industry? Explain any one waste material based concrete in detail. **[4]**

**P.T.O.**

- b) Write a short notes on : [6]
- i) Jet cement concrete (Ultra rapid hardening concrete)
  - ii) Vacuum concrete.

**Q5)** Using Indian Standard recommended guidelines, design a concrete mix for a reinforced concrete structure to be subjected to the very severe exposure conditions for the following requirements : [10]

- A) Stipulations for proportioning
- a) Grade designation : M35,
  - b) Standard deviation,  $s = 5$
  - c) Type of cement : OPC 53 grade conforming to IS 8112
  - d) Maximum water-cement ratio : 0.45
  - e) Workability : 75 mm (slump)
  - f) Degree of supervision : Good
  - g) Type of aggregate : Crushed Angular aggregate,
  - h) Maximum cement content :  $450 \text{ kg/m}^3$
  - i) Minimum Cement content :  $340 \text{ kg/m}^3$
  - j) Method of concrete placing Pumping
  - k) Chemical admixture type : Super plasticizer
- B) Test data for materials
- a) Specific gravity of cement : 3.15
  - b) Specific gravity of admixture : 1.145
  - c) Specific gravity of
    - i) Coarse aggregate - 2.74
    - ii) Fine aggregate - 2.74
  - d) Water absorption
    - i) Coarse aggregates - 0.5%
    - ii) Fine aggregates - 1.00%
  - e) Free surface moisture
    - i) Coarse aggregates - Nil (absorbed moisture also nil)
    - ii) Fine aggregates - Nil

f) Sieve analysis

i) Coarse aggregate :

IS Sieve sizes (mm)	Analysis of Coarse Aggregate Fraction		Percentage of different Fractions			Remark
	I	II	I (60%)	II (40%)	Combined (100%)	
20	100	100	60	40	100	Confirming of Table 2 of IS 383
10	0	71.2	0	28.5	28.5	
4.75		9.40		3.7	3.7	
2.36		0				

ii) Fine aggregate : Conforming to grading zone I

C) Design considerations :

Table 1 : From IS 10262; Maximum water content per cubic meter of concrete

Sr. No.	Nominal Maximum Size of Aggregate (mm)	Maximum Water Content (kg)
i)	10	208
ii)	20	186
iii)	40	165

Table 2 : From IS 10262; Volume of Coarse Aggregate per Unit Volume of Total Aggregate

SI. No. (1)	Nominal Maximum Size of Aggregate (mm) (2)	Volume of Coarse Aggregate Per Unit Volume of Total Aggregate for Different Zones of Fine Aggregate			
		Zone IV	Zone III	Zone II	Zone I
i)	10	0.50	0.48	0.46	0.44
ii)	20	0.66	0.64	0.62	0.60
iii)	40	0.75	0.73	0.71	0.69

OR

- Q6)** a) Write a short note on ground penetration radar technique. [4]
- b) Write a short notes on non destructive testing methods. [6]
- i) Stress wave propagation method
  - ii) Nuclear method.



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SEAT No. :

P5108

[Total No. of Pages : 2

**B.E./Insem.-508**

**B.E. (Civil)**

**ADVANCED ENGINEERING GEOLOGY WITH ROCK  
MECHANICS**

**(Elective - I) (Semester - I)**

*Time : 1 Hour]*

*[Max. Marks : 30*

*Instructions to the candidates:*

- 1) *All Questions are compulsory.*
- 2) *Figures to the right indicate full marks.*
- 3) *Neat diagrams should be drawn wherever necessary.*

**Q1) a)** Describe field characteristics of Deccan Trap Basalt. **[6]**

b) Describe the seismic zones of India on the basis of recent work. **[4]**

OR

**Q2) a)** Describe the Regional distribution of Deccan trap Basalt. **[6]**

b) Differentiate between joint, fractures and fault. **[4]**

**Q3) a)** What treatment is to be given to a dyke crossing dam alignment. **[6]**

b) Write a note on Engineering significance of fracture from dam foundation point of view. **[4]**

OR

**Q4) a)** How location of spillway is decided on geological grounds. **[6]**

b) Write a note on Engineering significance of Tachylytic Basalt. **[4]**

**P.T.O.**



**Q5) a)** What do you mean by watershed development? How the soil erosion is prevented. [6]

b) Write a note on Percolation Tank on Amygdaloidal Basalt. [4]

OR

**Q6) a)** Enlist only different parameters of morphometric analysis of river basin. [6]

b) Scarcity of sand in Maharashtra. [4]



Total No. of Questions : 6]

SEAT No. :

P5110

[Total No. of Pages : 2

**B.E./Insem.-510**

**B.E. (Civil)**

**INTEGRATED WATER RESOURCES PLANNING AND  
MANAGEMENT**

**(2012 Pattern) (Elective - II) (Semester - I)**

*Time : 1 Hour]*

*[Max. Marks : 30*

*Instructions to the candidates:*

- 1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Assume Suitable data if necessary.*

**Q1) a)** Write any two water infrastructures in supply of Water. **[5]**

b) What is meant by prior appropriation & riparian rights? **[5]**

OR

**Q2) a)** Write Short note on water resources in India. **[5]**

b) What is meant by ground water ownership & permit systems. **[5]**

**Q3) a)** What are the principles of water pricing & water allocation? **[5]**

b) Explain the Concepts of 'virtual water' & 'blue water'. **[5]**

OR

**Q4) a)** Define capital cost & opportunity cost. **[5]**

b) Write role of blue water, Green water, and virtual water in water management. **[5]**

**P.T.O.**

- Q5) a)** How the recycling and reuse of water can be done? [5]
- b) Write different methods of assessment of flood damage? Explain any one. [5]

OR

- Q6) a)** What is meant by inter basin water transfer? Explain. [5]
- b) State different methods of drought forecasting and write its mitigation plan. [5]



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SEAT No. :

P5103

[Total No. of Pages : 3

**BE/Insem.-503**  
**B.E. (Civil)**  
**STRUCTURAL DESIGN AND DRAWING - III**  
**(2012 Pattern) (Semester - I)**

*Time : 1½ Hours]*

*[Max. Marks : 30*

*Instructions to the candidates:*

- 1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Use of non programmable electronic calculator is allowed.*
- 5) *Assume suitable data, if necessary.*
- 6) *Assessment will be based on complete solution and not on final answer.*
- 7) *IS 1343: 2012, IS 1893: 2002 and IS 456: 2000 are allowed in the examination.*

- Q1)** a) What are the various phenomena that contributes the loss of prestress?[3]
- b) A beam spanning 3m supports a concentrated load of 68 kN at the center of the beam. Cross section of the beam is 250 mm wide by 300 mm deep. It is prestressed by a force of 540 kN at constant eccentricity of 60 mm. Neglecting the self-weight of beam, determine the location of the pressure line at the center, quarter span and support section of the beam. Draw sketch representing the locus of P-line and C-line. [7]

OR

- Q2)** a) Explain with help of sketches pre-tensioning and post-tensioning systems. [4]
- b) A pretensioned beam has cross section as shown in the Fig.1. The beam has 4 cables each having 5 wires of 5 mm diameter carrying an initial stress of 1100 MPa. All wires are straight and run parallel to centroidal axis of the beam having ultimate strength equal to 1650 MPa. Determine the loss of prestress due to elastic shortening and normal relaxation of steel. Take modular ratio as 7.5. [6]

**P.T.O.**

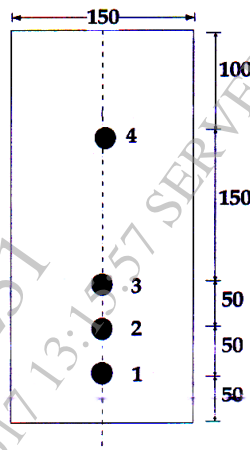


Fig. 1

- Q3) a)** A simply supported post tensioned slab, 500 mm thick has span of 10 m. The slab is prestressed by cables each containing 12 high tensile wires of 8 mm diameter. The cables are spaced at 500 mm centre to centre at an effective depth of 450 mm. Estimate the ultimate flexural strength of the slab. Also determine the maximum permissible uniformly distributed ultimate live load that can be placed on slab assuming. Consider load factors for live load and dead load as 1.5. Take  $f_{ck} = 40$  MPa and  $f_p = 1600$  MPa. [5]
- b)** A simply supported one way post tensioned slab is spanning over 10 m. The slab is required to support a live load of  $10 \text{ kN/m}^2$ . If  $f_{ck} = 30$  MPa and compressive stresses are not likely to increase in service conditions, and structure is Type I, determine the minimum depth of slab required. Take loss ratio as 0.8 and the cube strength of concrete at transfer as 23 MPa. [5]

OR

- Q4) a)** The end block of a post tensioned beam is  $300 \text{ mm} \times 500 \text{ mm}$  and prestressed by Freyssinet cylindrical anchorage of 150 mm diameter as shown in the Fig. 2. The jacking force in anchorage is 900 kN. Design suitable anchorage zone reinforcement and sketch the detailing. [5]

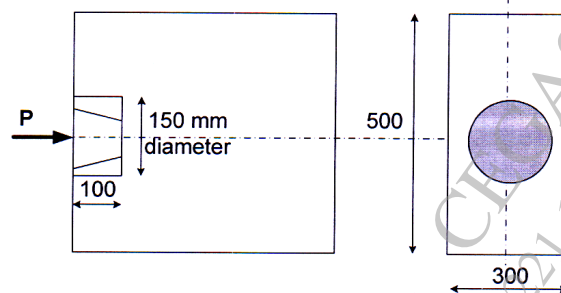


Fig. 2

- b) For the problem of Q.4 (a), determine the ultimate shear resistance at support section and also design for shear as per IS: 1343. The ultimate shear force at the support section may be taken as 300 kN. The effective cover to the reinforcement is 50 mm and  $f_{ck} = 40$  MPa. [5]

Q5) The bending moments developed due to gravity and earthquake loads for a continuous beam ABC are as follows : [10]

Bending Moments due to	Support moments at (kN-m)			Mid-span moments for span (kN-m)	
	A	B	C	AB	BC
Lateral load	$\pm 90$	$\pm 90$	$\pm 90$	0	0
Dead load	-50	-40	-50	+20	+20
Dead load + Imposed load	-75	-65	-75	+37	+37

Calculate the design moments developed due to gravity and earthquake loads using load combinations as per IS: 1893 and design the beam ABC for flexure.

OR

- Q6) Determine the seismic forces in X and Y direction at each floor level for the residential RCC structure shown in the Fig. 3. The building is located in seismic zone V. The soil conditions are medium stiff. The special moment resisting RC frames are in-filled with brick-masonry. The lumped weight due to dead loads may be taken as 12 kN/m<sup>2</sup>. The floors are to cater a live load of 4 kN/m<sup>2</sup> on floors and 1.5 kN/m<sup>2</sup> on the roof. [10]

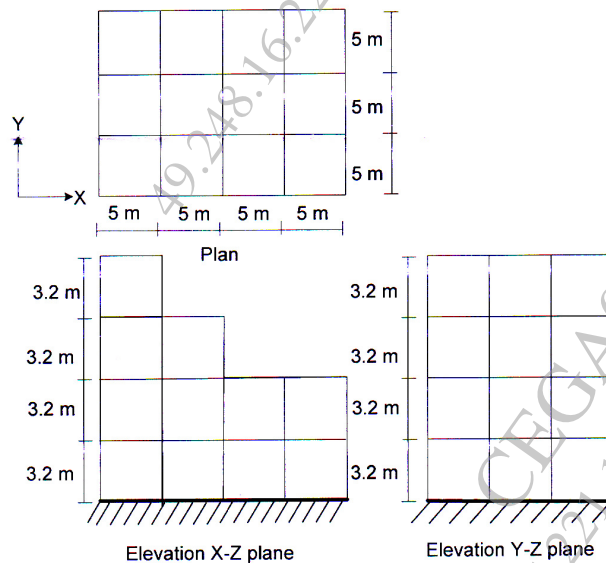


Fig. 3

Total No. of Questions : 6]

SEAT No. :

P5102

[Total No. of Pages : 2

**B.E./Insem.-502**  
**B.E. (Civil)**  
**TRANSPORTATION ENGINEERING**  
**(2012 Pattern) (Semester - I)**

*Time : 1 Hour]*

*[Max. Marks : 30*

*Instructions to the candidates:-*

- 1) *Answer Q.1 or Q.2, Q.3 or Q.4 and Q.5 or Q.6.*
- 2) *Figures to the right side indicate full marks.*
- 3) *Use of electronics pocket calculators is allowed.*
- 4) *Assume suitable data if necessary.*
- 5) *Neat diagrams must be drawn wherever necessary.*

- Q1)** a) What is the concept of Saturation system or Maximum Utility system? How the maximum utility per unit length is worked out by the saturation system. **[1 + 4 = 5]**
- b) State the comparison between First 20 year road development plan and Second 20 year road development plan. **[1 × 5 = 5]**

**OR**

- Q2)** a) Write a short note on : **[5]**
- i) Spot Speed study
  - ii) Traffic control Devices
- b) The area of a certain district in India is 18500 Sq. Km and there are 15. Towns as per 1981 census. Determine the lengths of different categories of roads to be provided in this district by the year 2001. **[5]**
- Q3)** a) Enumerate the steps for practical design of Super elevation. **[5]**
- b) Determine the Safe Stopping Sight Distance of a vehicle travelling at a design speed of 50 Kmph on concrete road surface : **[5]**

Assume following data :

Width of carriageway = 3.75 m

Traffic regulation = Two way Traffic

**P.T.O.**

perception time = 1.5 seconds.

Brake reaction time = 0.5 seconds,

coefficient of friction between tyre and concrete surface = 0.50

**OR**

**Q4) a)** Define alignment. State the various requirements of an ideal alignment. Also state the various objectives of preliminary survey for highway alignment. **[1+1+3=5]**

b) Define gradient. State various types of gradients. Also find the compensated gradient for a hill road with ruling gradient of 1 in 20, and a horizontal curve of radius 80 m. **[1+1+3=5]**

**Q5) a)** Name the usual test employed for evaluating aggregates used in road construction. Explain in brief Shape Test. **[2+3=5]**

b) Calculate the cumulative number of standard axles to be carried in the design of a new road in plain terrain with a single lane carriageway ; given the following data : **[5]**

i) Initial traffic volume in the year of completion of construction in one directions = 250 commercial vehicles per day

ii) Traffic growth rate per annum = 7.5 %

iii) Design life = 12 years

iv) Design CBR of subgrade soil = 4 %

v) Vehicle Damage Factor = 3.5

**OR**

**Q6) a)** Explain in brief the Following : **[5]**

i) Equivalent Single Wheel Load (ESWL)

ii) Temperature Stresses

b) Write a short note on : **[5]**

i) Joints in Concrete Pavement

ii) Softening Point test on Bitumen





Total No. of Questions : 6]

SEAT No. :

P5111

[Total No. of Pages : 2

**B.E./Insem.-511**

**B.E. (Civil)**

**TQM & MIS IN CIVIL ENGINEERING  
(2012 Pattern) (Elective - II) (Semester - I)**

*Time : 1 Hour]*

*[Max. Marks : 30*

*Instructions to the candidates:*

- 1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Assume suitable data if necessary.*

**Q1) a)** Explain the contribution of Edward Deming and Philip Crosby in TQM. [6]

b) Write a detail note on Quality Function Deployment. [4]

OR

**Q2) a)** Write a detailed note on Quality Audit. [5]

b) Give a note on "Cause and effect diagram". [5]

**Q3) a)** Define MIS? Explain benefits and limitations of MIS. [6]

b) What are the sources of information? [4]

OR

**Q4) a)** What is Decision support system? Explain various components of DSS. [6]

b) Give the difference between Data & information. [4]

**P.T.O.**

- Q5) a)** What is TQM? Explain the need of TQM in Construction Industry. [6]
- b) Write the checklist for the activity “Casting an RCC slab”. [4]

OR

- Q6) a)** Differentiate between TQM and TQC. [4]
- b) What are the various barriers in implementation of TQM in construction industry? [6]

