G 383 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2014

Sixth Semester

Branch : Civil Engineering

CE 010 604 – TRANSPORTATION ENGINEERING – I (CE)

(New Scheme – 2010 Admission onwards)

[Regular/Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*

Missing data, if any, may suitably be assumed.

Each question carries 3 *marks.*

1. State the requirements of a good ballast material.
2. What are the functions of interlocking?
3. What are the factors which govern the suitable shape for tunnels?
4. Classify the different types of breakwaters.
5. Write a note on dipper dredger.

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*

Each question carries 5 *marks.*

6. Explain Pusher and Momentum gradients.
7. What are the factors to be considered in the design of Marshalling yard?
8. Mention the circumstances under which a railway track is laid through a tunnel.
9. Mention the essential features of a Transit shed.
10. Explain the functions of Jetties and Dry dock.

(5 × 5 = 25 marks)

Turn over

Part C

Answer **all** *questions.*

Each question carries 12 *marks.*

11. State the objectives of providing transition curve and essential requirements of an ideal transition curve.

Or

12. What do you understand by (i) Equilibrium cant ; (ii) Cant deficiency ; and (iii) Grade compensation on curves.

13. What are the classification of signals based on operation and special characteristics? Explain the method of centralized traffic control system of control on the movement of train. Mention its advantages.

Or

14. Explain the working principle of Absolute Block System. What way it differ from Automatic Block System?

15. State and describe the various methods adopted in tunnelling in rocky strata.

Or

16. What is the importance of ventilation in tunnelling? Describe the various methods of ventilation with their advantages and disadvantages.

17. (a) Explain the classification of harbours giving suitable sketches. Mention the advantages and disadvantages of each.

    (b) Distinguish between Quay and Wharf.

(7 + 5 = 12 marks)

Or

18. What are navigational aids? Explain any *three* navigational aids.

19. (a) What is a "slipway"? Discuss the design considerations of a slipway.

    (b) Determine the length of a slipway and pull required to lift a tug with the following data :

    (i) Length of tug = 32 m. ; (ii) Draft = 3 m. ; (iii) C = 4.

    (iv) Weight of tug = 60 ton, the height from rail level to top of block = 0.8 m

    (v) Weight of cradle = 6.5 ton, Inclination of slipway to the horizontal = 3° 45'

(7 + 5 = 12 marks)

Or

20. (a) List the forces acting on a gravity dock and explain the scheme of constructing it.

    (b) Distinguish between ladder dredger and hydraulic dredger.

(8 + 4 = 12 marks)

[5 × 12 = 60 marks]

G 354 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2014

Sixth Semester

Branch : Civil Engineering

CE 010 601—DESIGN OF STEEL STRUCTURES (CE)

(New Scheme—2010 Admission onwards)

[Regular/Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

Missing data, if any may, be suitably assumed and stated.
IS 800-2007, IS 875, IS 805, IS 801, IS 811, IS 6533 Part 1, Part 2, and steel tables are allowed.

Part A

Answer **all** *questions.*
Each question carries 3 *marks.*

1. Write three advantages of bolted connections.
2. Draw the moment-rotation curves for different types of connections.
3. Draw a qualitative diagram showing the variation of bending moment, shear force and twisting moment along the length of a ring beam of a circular water tank, between the columns.
4. Mention where light gauge structures are commonly used.
5. Explain how stability is checked in the case of a chimney in the design process.

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*
Each question carries 5 *marks.*

6. Explain the modes of failure of a tension member.
7. Determine the design compressive strength of an ISHB 300 section, 4 m. long pinned at both ends.
8. Explain the design procedure of the supporting structure of a rectangular steel water tank.
9. Explain the behaviour of stiffened and unstiffened compression elements made up of light gauge sections.
10. Explain how the base plate of a chimney is designed.

(5 × 5 = 25 marks)

Turn over

Part C

Answer **all** *questions.*
Each question carries 12 *marks.*

11. Find out the value of plastic modulus for the following sections :

    (i) An isosceles triangles of height '*h*' and base '*b*' bent about an axis parallel to the base.

    (ii) An I-section of overall depth 300 mm. and flanges 200 × 20 mm, web 10 mm. thick, bent about its strong axis.

Or

12. A beam of span 9 m. carries a uniformly by distributed load of 12 kN/m. The depth of the beam is limited to 450 mm. from clear head room requirements. Design the cross-section of the beam. Use Fe 415 grade steel.

13. Design a built up column with four angles laced together. The effective length of the column is 7.20 m. and it supports a factored load of 1800 kN. Design the lacings also.

Or

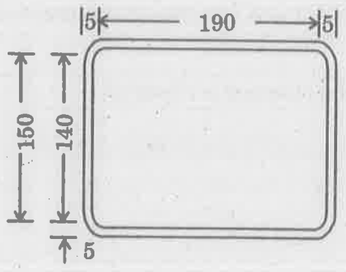
14. Design the section of the steel column and suitable base for an axial compressive load of 2400 kN. The effective length of the column is 5.5 m. The concrete used for making the pedestal is of M_{30} grade.

15. Design the overhead portion of a circular water tank with hemispherical bottom of capacity 150 m^3. The tank has conical roof. Take $f_y = 250\ N/mm^2$.

Or

16. Design the tank portion of a rectangular water tank of capacity 120 m^3.

17. Find the allowable axial load for a column section shown in Fig. 1. The effect length of the column is 3.50 m. Take $f_y = 235\ N/mm^2$.



Or

18. Determine the allowable load per meter on a beam with cross section as shown in Fig. 2. The beam has an effective span of 2 m. $f_y = 235\ N/mm^2$.

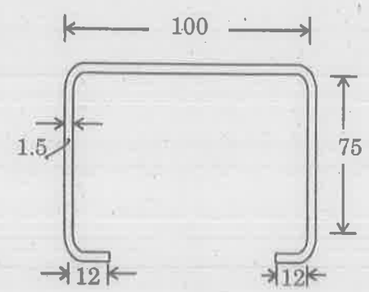


Fig. 2.

19. Design only the chimney of a self supporting stack of effective height 35 m. having its diameter at top equal to 2.10 m. Take wind pressure intensity as 1.5 kN/m^2.

Or

20. Design the chimney of a self supporting stack of effective height 72 m. above foundation. The diameter of the cylindrical part is 4.50 m. Foundation is raft on medium soil. The chimney is in Chennai.

(5 × 12 = 60 marks)

G 363

(Pages : 3)

Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2014

Sixth Semester

Branch : Civil Engineering

CE 010 602 – GEOTECHNICAL ENGINEERING – II (CE)

(New Scheme – 2010 Admission onwards)

[Regular/Improvement/Supplementary]

Time : Three Hours

Maximum : 100 Marks

Part A

Answer **all** *questions.*

Each question carries 3 *marks.*

1. Discuss briefly about the types of sub-surface soundings in soil exploration.
2. Define active earth pressure. Explain its significance in computation of lateral earth pressure.
3. Enumerate the steps involved in conducting the plate load test.
4. What is meant by proportioning footings for equal settlement?
5. Comment on the effects of negative skin friction in pile driving.

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*

Each question carries 5 *marks.*

6. With neat sketches, explain the various sampling tools used in sub-surface investigation.
7. Differentiate between the Rankine's and Coulomb's theory for cohesionless soils.
8. Explain the Skempton's analysis for the computation of bearing capacity.
9. Enumerate the steps involved in the design of a combined footing which is trapezoidal in plan.
10. Briefly explain the problems encountered during the well sinking operation.

(5 × 5 = 25 marks)

Part C

Answer **all** *questions.*

Each question carries 12 *marks.*

11. A column of a building transfers a concentrated load of 225 kN to the soil in contact with the footing. Estimate the vertical pressure at the following points by making use of the Boussinesq and Westergaard equations. (i) Vertically below the column load at depths of 5, 10 and 15 m ; (ii) At radial distances of 5, 10 and 20 m and at a depth of 10 m.

Or

12. Three footings are placed at locations forming an equilateral triangle of 10 m sides. Each of the footings carries a vertical load of 110 kN. Estimate the vertical pressures by means of the Boussinesq equation at a depth of 9 m at the following locations : (i) Vertically below the centers of the footings ; (ii) Below the center of the triangle.

13. A retaining wall with a vertical back of height 7.32 m supports a cohesive soil of unit weight 17.3 kN/m^3, an angle of shearing resistance = 20° and cohesion = 10 kPa. The surface of the soil is horizontal. Determine the magnitude and direction of the active thrust per meter of wall using Rankine theory.

Or

14. A counterfort wall of 10 m height retains a non-cohesive backfill. The void ratio and angle of internal friction of the backfill respectively are 0.70 and 30° in the loose state and they are 0.40 and 40° in the dense state. Calculate and compare active and passive earth pressures for both the cases. Take the specific gravity of solids as 2.7. Use Rankine's or Coulomb's theory.

15. A strip footing 1 m wide at its base is located at a depth of 0.8 m below the ground surface. The properties of the foundation soil are γ = 17.65 kN/m^3, φ = 20°, c' = 30 kN/m^2. Determine the safe bearing capacity, using a factor of safety 3. Use Terzaghi's analysis. Assume soil is subjected to local shear failure.

Or

16. A circular tank of diameter 3 m is founded at a depth of 1 m below ground surface on 6 m thick normally consolidated clay. The water table is at the base of the foundation. The saturated unit weight of soil is 19.5 kN/m^3, and the in-situ void ratio e_0 is 1.08. Laboratory tests on representative undisturbed samples of the clay gave a value of 0.6 for the pore pressure coefficient A and a value of 0.2 for the compression index Cc. Compute the consolidation settlement of the foundation for a total contact pressure of 95 kPa. Use 2:1 method for computing Δp.

17. A square footing is to be constructed on a deep deposit of sand at a depth of 0.9 m to carry a design load of 300 kN with a factor of safety of 2.5. The ground water table may rise to the ground level during rainy season. Design the plan dimensions of the footing. Assume saturated unit weight is 20.8 kN/m^3, N_c = 25, N_q = 34 and N_γ = 32.

Or

18. Proportion a rectangular combined footing for a uniform pressure under DL+ reduced LL with the following data: Allowable pressures: 180 kPa for Dead load + reduced live Load and 270 kPa for dead load + live load, Column loads: Column A carries a DL of 500 kN and LL of 400 kN while Column B carries a DL of 660 kN and LL of 840 kN, c/c distance of columns = 5 m and the projection beyond column A is not to exceed 0.5 m. Dead load + Reduced Live Load for column A is 700 kN and that for column B is 1080 kN.

19. An *n* pile group has to be proportioned in a uniform pattern in soft clay with equal spacing in all directions. Assuming any value of *c*, determine the optimum value of spacing of piles in the group. Take *n* = 25, and *m* = 0.7. Neglect the end bearing effect and assume that each pile is circular in section.

Or

20. A reinforced concrete pile of size 30 × 30 cm and 10 m long is driven into coarse sand extending to a great depth. The average total unit weight of the soil is 18 kN/m^3 and the average N_{cor} value is 15. Determine the allowable load on the pile by the static formula. Use FS = 2.5. The water table is close to the ground surface.

(5 × 12 = 60 marks)

16. Draw ILD for SF and reaction at B in a continuous beam ABC, pinned at A, with roller support at B and C. Span AB is 7m, and span BC is 6 m.

(12 marks)

17. Explain :

(i) Plane stress and plane strain problems.

(ii) Stresses on arbitrary plane.

(12 marks)

Or

18. State of stress at a point is given by : (12 marks)

$H\sigma_x = 250 \quad \sigma_y = -150 \quad \sigma_2 = 60$

$\tau_{xy} = 40 \quad \tau_{yz} = 50 \quad \tau_{xz} = 60$ MPa

If $E = 2 \times 10^5$ N/mm^2. and $G = 0.75 \times 10^5$ N/mm^2, determine strain components.

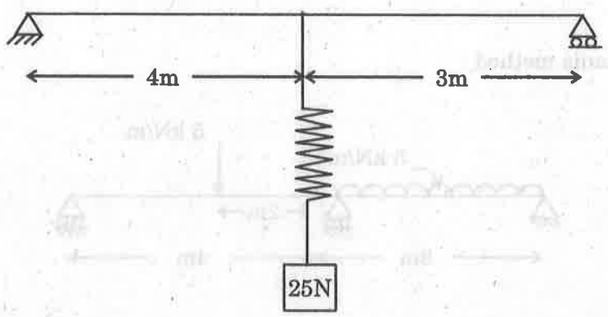
(12 marks)

19. Briefly explain D'Alembert's principle and derive spring stiffnes for a parallel connection.

(12 marks)

Or

20. Find the natural frequency of the system shown the mass of beam is negligible in comparison to the suspended mass. Take $E = 2 \times 10^5$ N/mm^2. The cross-section of beam has following dimensions $b = 120$ mm., $d = 160$ mm.



(12 marks)

[5 × 12 = 60 marks]

G 372

(Pages : 4) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2014

Sixth Semester

Branch : Civil Engineering

CE 010 603—STRUCTURAL ANALYSIS—II (CE)

(New Scheme—2010 Admission onwards)

[Regular/Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*
Each question carries 3 *marks.*

1. What is load factor ?
2. Explain substitute Frame Method.
3. Explain Kanis method for frames.
4. What is stress tensor ?
5. What is Natural frequency ?

(5 × 3 = 15 marks)

Part B

Answer **all** *questions..*
Each question carries 5 *marks.*

6. Explain lower bound and upper bound theorem in plastic Analysis.
7. Explain briefly tension coefficient method applied to space frames.
8. Briefly explain Muller Breslau's principle.
9. Find the principle stresses for the stress matrix shown below. All values are in MPa.

$$\begin{bmatrix} 8 & 5 & 2 \\ 5 & 4 & 1 \\ 2 & 1 & 3 \end{bmatrix}.$$

10. Explain free or natural vibrations.

(5 × 5 = 25 marks)

Part C

Answer **all** *questions.*
Each question carries ~~12~~ *marks.*

11. Determine Collapse load in fixed beam shown in Fig. 1.

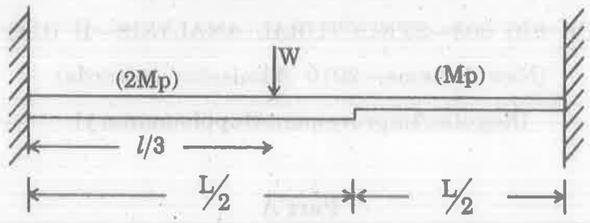


Fig. 1

(12 marks)

Or

12. Determine plastic moment capacity of frame for loading as given in Fig. 2.

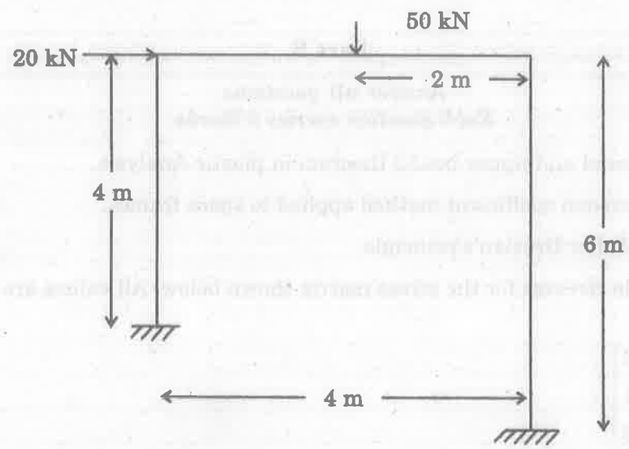
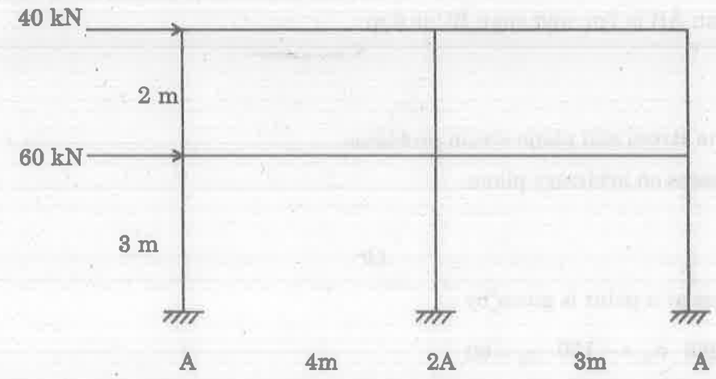


Fig. 2

(12 marks)

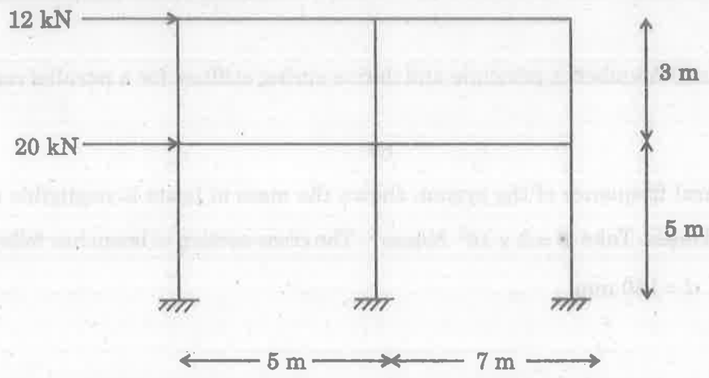
13. Analyse the frame using cantilever method :



(12 marks)

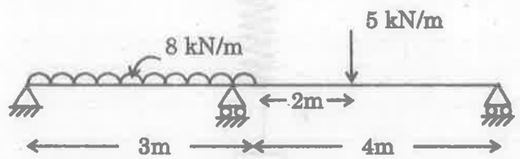
Or

14. Analyse frame using Portal method :



(12 marks)

15. Analyse using Kanis method :



(12 marks)

Or

G 411 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2014

Sixth Semester

Branch : Civil Engineering

CE 010 606 L05 – CONCRETE TECHNOLOGY (Elective – I) (CE)

(New Scheme – 2010 Admission onwards)

[Regular/Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*

Each question carries 3 *marks.*

1. Name the Bogue's compounds specifying the formula and abbreviated formula.
2. List any *six* factors affecting workability of concrete.
3. Write short note on Get space ratio.
4. Define characteristic compressive strength of Concrete.
5. What are the different ways of making concrete light in weight in actual practice?

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*

Each question carries 5 *marks.*

Write short notes on the following :

6. Quality of water for concrete making.
7. Air entraining agents.
8. Various Elastic modulii of concrete.
9. Methods of controlling sulphate attack in concrete.
10. No-fine concrete.

(5 × 5 = 25 marks)

Turn over

Part C

Answer **all** *questions.*

Each full question carries 12 *marks.*

11. (a) Explain in detail, how compressive strength of cement is determined highlighting the specimen preparation and testing procedure. How Ordinary Portland Cement is classified according to its compressive strength as per BIS?

Or

(b) Explain alkali aggregate reaction mentioning the mechanism, factors promoting the reaction and methods of control.

12. (a) Explain the following fresh state characteristics of concrete : (i) Seggregation ; and (ii) Bleeding.

(2 × 6 = 12 marks)

Or

(b) (i) What are admixtures? How are admixtures classified?

(ii) Explain the action of plasticizers in concrete.

(5 + 7 = 12 marks)

13. (a) (i) Explain the term shrinkage in concrete. What are the different forms of shrinkage in concrete?

(ii) What are the factors affecting shrinkage?

(6 + 6 = 12 marks)

Or

(b) Explain the following :

(i) Effect of maximum size of aggregate on strength.

(ii) Maturity concept of concrete.

(2 × 6 = 12 marks)

14. (a) Explain the following :

(i) Indirect tension testing methods for concrete.

(ii) Comparison between cube and cylinder strength of concrete.

(2 × 6 = 12 marks)

Or

(b) (i) What is non-destructive testing of concrete? Mention the various methods.

(ii) Explain any *one* method in detail with necessary sketches.

(4 + 8 = 12 marks)

15. (a) Explain the following :

(i) Hot weather concreting.

(ii) Fibre Reinforced concrete.

(2 × 6 = 12 marks)

Or

(b) Write a detailed note on the following :

(i) Light weight aggregates used in Concrete.

(ii) Ferro cement.

(2 × 6 = 12 marks)

[5 × 12 = 60 marks]

G 395 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2014

Sixth Semester

Branch : Civil Engineering

CE 010 605—WATER RESOURCES ENGINEERING (CE)

(New Scheme—2010 Admission Onwards)

[Regular/Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*
Each questions carries 3 *marks.*

1. What are the different types of irrigation systems ?
2. Define hydrologic cycle. What are the components of hydrologic cycle ?
3. Define the terms specific yield and specific retention.
4. State the major functions of a canal head regulator.
5. What do you understand by mass inflow curve ?

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*
Each questions carries 5 *marks.*

6. Explain the terms 'duty' and 'delta'. Derive a relationship between the two.
7. Define Runoff. Discuss the factors affecting runoff.
8. Explain the terms : (i) Aquifer ; (ii) Aquiclude ; (iii) Aquitard ; and (iv) Aquifuge.
9. What is a canal outlet ? What are the requirements of a canal outlet ?
10. With a neat sketch, explain the different zones of storage of a reservoir.

(5 × 5 = 25 marks)

Part C

Answer **all** *questions.*
Each question carries 12 *marks.*

11. (a) Define Irrigation. Discuss the necessity of Irrigation. (7 marks)

    (b) Define the terms : (i) GCA ; (ii) CCA ; (iii) kor depth ; (iv) kor period ; and (v) outlet factor. (5 marks)

Or

Turn over

12. (a) Briefly explain various Irrigation efficiencies. (5 marks)

(b) A certain crop is grown in an area of 4000 hectares which is fed by a canal system. The data pertaining to irrigation are as follows.

Field capacity of soil	=	25%
Optimum moisture	=	12%
Permanent wilting point	=	10%
Effective depth of root zone	=	90 cm
Relative density of soil	=	1.4

If the frequency of irrigation is 12 days and overall efficiency is 25%, find :

(i) Daily consumptive use.

(ii) The water discharge in m^3/sec required in the canal feeding the area.

(7 marks)

13. (a) What is meant by Precipitation ? Explain any *one* method of measuring precipitation. (6 marks)

(b) What is meant by a Hydrograph ? With the help of a neat sketch, explain the essential components of a single peaked hydrograph. (6 marks)

Or

14. (a) Describe the various methods for computing average rainfall over a drainage basin. (7 marks)

(b) Define Φ Index. How is it determined from the rainfall hyetograph ? (5 marks)

15. (a) Explain Darcy's law. What are its assumptions ? Discuss its validity. (5 marks)

(b) Derive an expression for discharge from a well in an unconfined aquifer. The well fully penetrates in it. (7 marks)

Or

16. Describe various types of open wells and tube wells. (12 marks)

17. (a) Explain how the canals are classified based on different criteria. (6 marks)

(b) Describe the procedure for designing an irrigation channel using Kennedy's theory. (6 marks)

Or

18. (a) Design an irrigation channel in alluvial soil to carry a discharge of 30 m^3/sec. The side slopes are ½ H to 1 V. Assume Lacey's silt factor as 1 and use Lacey's theory for design. (6 marks)

(b) What are the causes of silting in canals? Explain how to prevent the same. (6 marks)

19. (a) Discuss in brief the various investigations required for reservoir planning. (6 marks)

(b) Explain briefly how you will determine the reservoir capacity using mass inflow curve. Assume rate of demand as constant. (6 marks)

Or

20. (a) What is meant by river training ? List the various objectives of river training. (6 marks)

(b) Write a note on reservoir sedimentation. (6 marks)

[5 × 12 = 60 marks]