(Please write your Exam Roll No.) Exam Roll No. 2011.EC.7416.

END TERM EXAMINATION

THIRD SEMESTER [B.TECH] DECEMBER 2016

Paper Code: ETCE-207 **Subject: Building Materials and Construction**

Time: 3 Hours **Maximum Marks: 75**

Note: Attempts any five questions including Q no.1 which is compulsory. Select one question from each unit.

Q1 Write short notes on the following:- (2.5x10=25)

(a) Portland pozzolancemnet (PPC).
(b) Quarry and mine.
(c) Efflorescence in bricks.
(d) Hydrated or slaked lime.
(e) Hardwood and softwood
(f) Varnishes.
(g) Blown bitumen
(h) Partition wall
(i) Workability
(j) Admixtures

UNIT-I

Q2 (a) Discuss the concept of thermal insulation in brief. Discuss various kinds of materials used for thermal insulation. (6)

(b) What are the constituents and uses of oil paints? Discuss in brief. (6.5)

Q3 (a) Discuss the various constituents of cement in brief. (4)

(b) Explain the various properties and uses of stones. (8.5)

UNIT-II

Q4 (a) What is meant by mix design of concrete? Indicate the mix design procedure recommended by IS:10262. (6.5)

(b) Differentiate between high performance and high strength concrete. (6)

Q5 (a) What do you understand by batching plants? (6.5)

(b) Explain light weight concrete and ready mix concrete. (6)

UNIT-III

Q6 (a) Explain component of building in detail. (6)

(b) Discuss various types of brick bonds in details. (6.5)

Q7 (a) Discuss the various types of finishing and coating materials used in roofs. (6)

(b) Explain the concept of Green building also discuss the LEED classification. (6.5)

UNIT-IV

Q8 (a) What do you understand by staircase. Discuss and classify with neat sketch. (8.5)

(b) Discuss the geo-synthetic materials in brief. (4)

Q9 (a) Differentiate between dome and arch in brief. (6.5)

(b) Explain different types of smart materials used in structures. (6)

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(Please write your Exam Roll No.) Exam Roll No. 321007

END TERM EXAMINATION

THIRD SEMESTER [B.TECH] DECEMBER 2016

Paper Code: ETCE-209 **Subject: Surveying**

Time: 3 Hours **Maximum Marks: 75**

Note: Attempt any five questions including Q no.1 which is compulsory. Select one question from each unit.

Q1 Attempt **any five** questions:- **(5x5=25)**

(a) An offset is measured with an accuracy of 1 in 40. If the scale is plotting is 1cm =20m, find the limiting length of the offset so that the displacement of the point on the paper from both sources of error may not exceed 0.25 mm.

(b) What is triangulation? Describe the different figures used in triangulation.

(c) Explain the characteristic features of some of the electronic theodolites.

(d) What is a field book? Explain the field procedure of chain surveying.

(e) Formulate the correction for curvature and refraction in staff reading and reduced level.

UNIT-I

Q2 (a) The plan of an old survey map plotted to a scale of 10 m to 1 cm carried a note stating that the chain was short by 0.7 links. It was also found that the plan has shrunk so that a line originally 10 cm long was 9.5 cm. The area of a plot was found to be 60 sq. cm. What is the correct area of plan in hectare? **(7.5)**

(b) Differentiate between Prismatic and Surveyor's Compass. What is local attraction and what are its causes? How you detect local attraction? **(5)**

Q3 (a) What are the various methods of leveling? Explain differential leveling and reciprocal leveling in details. **(5)**

(b) The following readings are observed with a level, 1.143 (BM=35), 1.765, 2.566, 3.819 (C.P.), 1.390, 2.262, 0.664, 0.433 (C.P.), 3.722, 2.886. Reduce the levels by the rise and fall method and apply check for the same. (7.5)

UNIT-II

Q4 (a) Describe the various methods of contouring. Also explain with neat sketches, the uses of contour maps. **(7.5)**

(b) For a railway project, a straight tunnel is to be urn between two points P and Q whose co-ordinates are given below:- **(5)**

Point	Co-ordinates	
	N	E
P	0	0
Q	4020	800
R	2110	1900

It is desired to sink a shaft at S, the midpoint of PQ. S is to be fixed from R, the third known point. Calculate (i) co-ordinates of S (ii) Lengths RS (iii) Bearing of RS.

P.T.O.

Q5 Calculate latitude and departure for the following traverse, if there is any closing error eliminate it using Bowditch's Rule **(12.5)**

Line	Length (m)	W.C.B.
AB	89.31	45°10'
BC	219.76	72° 05'
CD	151.18	161° 52'
DE	159.10	228° 43'
EA	232.26	300° 42'

UNIT-III

Q6 (a) What is Plane Tabling? Explain two-point and three-point problems by mechanical and graphical method. **(7.5)**

(b) What is subtense bar? Differentiate between Movable and fixed-hair method. **(5)**

Q7 To determine the gradient between two points A & B, a tacheometer with anallactic lens is setup at point C and following observations are recorded. **(12.5)**

Staff held Vertical at	Vertical Angle	Stadia Readings
A	+4° 20' 00"	1.300, 1.610, 1.920
B	+0° 10' 40"	1.100, 1.410, 1.720

If horizontal angle between ACB is 45° 10', determine the average gradient between A & B.

UNIT-IV

Q8 (a) What is Laplace Station in triangulation? Explain various method of measuring base line. **(7.5)**

(b) What do you mean by order of triangulation? Explain briefly and write a short note on DGPS. **(5)**

Q9 (a) What are the various kinds of singles used in triangulation? Explain in detail. **(5)**

(b) What are the various methods of setting out simple circular curve? Explain any one with neat sketches. **(7.5)**

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(Please write your Exam Roll No.) Exam Roll No. 00118007916

END TERM EXAMINATION

THIRD SEMESTER [B.TECH] DECEMBER 2016

Paper Code: ETCE-205 **Subject: Fluid Mechanics**

Time: 3 Hours **Maximum Marks: 75**

Note: Attempt any five questions including Q.no.1 which is compulsory.

Q1 Attempt **any five** of the followings: **(5x5=25)**

(a) Even though needle is heavier than water, it can float on it if it is placed lengthwise on the water surface. Why?

(b) Why does the viscosity of a liquid decrease with increase in temperature whereas it increase with increase in temperature in the case of a gas?

(c) Draw the streamline pattern in which, both convective tangential and convective normal accelerations are present.

(d) List all the assumptions made in deriving Bernoulli's equation.

(e) What is Archimedes' principle? A body floats in between two fluids of specific weights γ_1 and γ_2. What will be the expression for buoyancy force?

(f) What assumptions are made in the derivation of energy loss equation for sudden expansion in a pipe? Will the equation be applicable to laminar flow? Why?

(g) What are the usages of dimensional analysis? Discuss with an example.

Q2 (a) Two vertical parallel glass plates distance 't' apart are partially submerged in liquid of specific weight 'γ' and surface tension 'σ'. Show that he capillary rise is given by

$$h = \frac{2\sigma\cos\theta}{t\gamma}$$ **(5.5)**

(b) The space between two parallel horizontal plates kept 5 mm apart is filled with crude oil dynamic viscosity 2.5 kg/ms. If the lower plate is stationary and upper plate is pulled with a velocity of 1.75 m/s, determine the shear stress on the lower plate. **(7)**

Q3 (a) In a flowing fluid system, indicate the condition under which energy between two sections.

(i) will increase (ii) will decrease. **(5)**

(b) Determine the missing components of velocity distribution such that they satisfy continuity equation **(7.5)**

$$u = ?$$
$$v = ax^3 - by^2 + cz^2$$
$$w = bx^3 - cy^2 + az^2x$$

Q4 (a) If a choice is given, which of the two devices, namely orifice meter and venturimeter will be you use for flow measurement in a pipe? Why? **(6)**

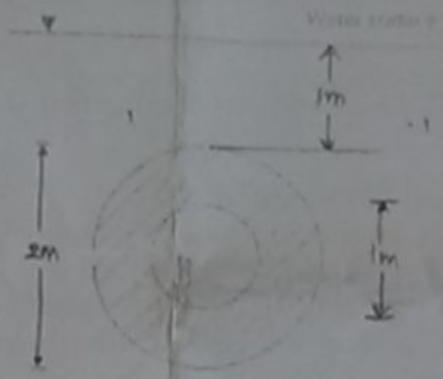
(b) A boiler feed pump is supplied with water at 90°C and 75 kN/m² pressure absolute and delivered at the same temperature and 10000 kN/m² pressure absolute. Under steady state condition, heat of 400 J/N is lost by water while passing through the pump. Assuming inlet and outlet diameters of pump and their elevations to be same, determine the energy added by the pump if pump carries 0.30 m³/s discharge. **(6.5)**

P.T.O.

ETCE-205

P1/2

Q5 (a) Determine the total force and position of centre of pressure for annular ring show in Fig. below. **(7.5)**



(b) What is the significance of metacentric height? For rotational stability is it enough that the floating body has a large a metacentric height as possible? Explain. **(5)**

Q6 (a) In a 6.0 m wide rectangular channel with 1.2 m depth of flow a sharp crested weir of 2.5 m length and 0.60 m height is fixed symmetrically across the channel width. If it flows free, determine the discharge. **(7)**

(b) Show that discharge coefficient of a weir is proportional to Froude number. **(5.5)**

Q7 (a) A 2.0 m diameter open cylindrical tank is filled to the depth of 2.0 m with water. The height of the tank is 3.0 m. Determine the speed of rotation about its vertical axis at which water will just spill out of the tank. What will be the depth at the centre? **(7.5)**

(b) A 40 mm diameter jet of water strikes normally against a plate held in position and causes a force of 900 N on the plate. Determine the jet velocity and the discharge. **(5)**

Q8 (a) Lord Rayleigh was interested in the vibration of a spherical drop of diameter '*D*' which is formed when liquid issues from a circular orifice. When the drop is slightly deformed from its spherical shape and left free, on account of surface tension 'σ' it vibrates about its position of equilibrium with frequency '*f*'. If

$$f = \emptyset\,(\sigma, \rho, D, g)$$

Perform dimensional analysis for '*f*'. **(7.5)**

(b) State the conditions that must be satisfied by the repeating variables. If several variables fulfill the conditions for repeating variables, what determines their final choice? **(5)**

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END TERM EXAMINATION

THIRD SEMESTER [B.TECH.] DECEMBER 2016

Paper Code: ETCE203 **Subject: Strength of Materials**

Time : 3 Hours **Maximum Marks :75**

Note: Attempt any five questions including Q.no.1 which is compulsory.

Q1 Attempt **any five** parts of the following:- **(5x5=25)**

(a) What is Hook's Law? What are the assumptions of Hook's Law? Draw the stress-strain curve for mild steel.

(b) A hollow cylinder 2m long has an outside diameter of 50 mm and inside diameter of 40 mm. If the cylinder is carrying a load of 35 kN, find the stress in the cylinder also find the deformation of the cylinder if the value of the modulus of elasticity for cylinder material is 100 GPa.

(c) Define Superposition principle. Also derive the expression for the deformation of a body due to its self weight.

(d) What is the difference between true strain and engineering strain? Also explain the term "creep".

(e) Distinguish between axial stress and bending stress. What do you understand by Elastic Limit?

(f) What are the assumptions made in Euler's column theory? List out the modes of failure in thin cylindrical shell due to internal pressure.

Q2 The state of stress (in N/mm^2) acting at a certain point of the strained material is shown in Fig.1. Compute-

(a) The magnitude and nature of principal stresses and

(b) The orientation of principal planes. **(12.5)**

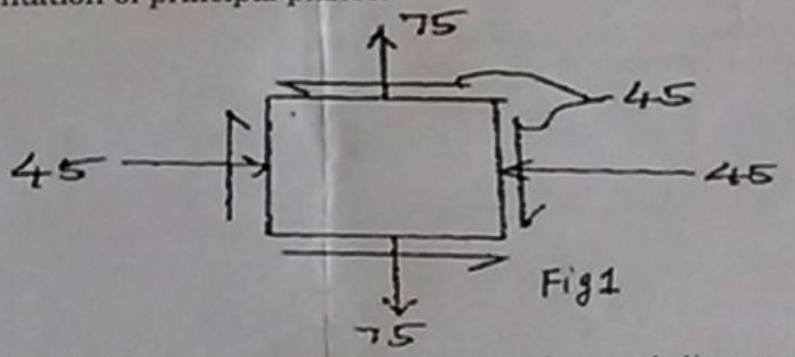

Fig1

Q3 A Cylinderical shell 3 meters long has 1 metre internal diameter and 15 mm metal thickness. Calculate the circumferential and longitudinal stresses induced and also changes in the dimensions of the shell, if it is subjected to an internal pressure of $5kg/cm^2$. Take $E=2.0\times10^6$ kg/cm^2 and Poisson's ratio = 0.3. **(12.5)**

Q4 A Mild steel rod of 20 mm diameter and 300 mm long is enclosed centrally inside a hollow copper tube of external diameter 30 mm and internal diameter 25 mm. The ends of the rod and tube are brazed together, and the composite bar is subjected to an axial pull of 40 kN. If E for steel and copper is 200 GN/m^2 and 100 GN/m^2 respectively, find the streses developed in the rod and the tube. Also find the extension of the rod. **(12.5)**

P.T.O.

ETCE-203

P1/2

Q5 Find the Euler's crippling load for a hollow cylindrical steel column of 38 mm external diameter and 2.5 mm thickness. Take length of the column as 2.3 m and hinged at its both ends. Take E = 205 kN/mm². Also determine the crippling load by Rankine's formula using fc=335N/mm² and a = 1/7500. (12.5)

Q6 A bar of magnesium alloy 28 mm in diameter was tested on a gauge length of 25 cm in tension and in torsion. A tensile load of 5 tonnes produced an extension of 0.4 mm and a torque of 1250 kg-cm produced a twist of 1.51 degrees. Determine the (i) Young's modulus (ii) Modulus of rigidity (iii) Bulk modulus (iv) Poisson's ratio for the material under test. (12.5)

Q7 A beam of length 6 m is simply supported at the ends and carries two point loads of 48 kN and 40 kN at a distance of 1 m and 3m respectively from the left support. Compute the slope and deflection under each load. Assume EI=17000kN-m². (12.5)

Q8 A horizontal beam 10 m long is carrying a uniformly distributed load of 1 kN/m. The beam is supported on two supports 6 m apart. Find the position of the supports, so that bending moment on the beam is as small as possible. Also draw the shear force and bending moment diagrams. (12.5)

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END TERM EXAMINATION

THIRD SEMESTER [B.TECH] DECEMBER 2016

Paper Code: ETMA-203 **Subject: Numerical Analysis & Statistical Techniques**

Time: 3 Hours **Maximum Marks: 75**

Note: Attempt any five questions including Q.no.1 which is compulsory.

Q1 (a) A problem in statistical is given to three students Ashok, Binod, and Charu, whose chances of solving it independently are $\frac{1}{2}, \frac{1}{3}$ and $\frac{1}{4}$ respectively. Find the probability that (8)

(i) The problem is solved.
(ii) At least two of them are able to solve the problem
(iii) Exactly two of them are able to solve the problem
(iv) Exactly one of them are able to solve the problem

(b) Mathematically define probability and axioms of probability. (7)

Q2 (a) Derive probability mass function of Poison Distribution. (7)

(b) Explain the meaning of skewness. Write short note on the following: (8)

(i) Kelly's coefficient of skewness.
(ii) Bowley's coefficient of skewnes.

Q3 A population consists of the number 1,3,5,7,9. (5x3=15)

(a) Enumerate all possible samples of size of two which can be drawn from the population without replacement.
(b) Show that the mean of the sampling distribution of sample mean is equal to population mean.
(c) Compute the variance of the sampling distribution of sample mean and show that it is less than the population variance.

Q4 (a) A random sample of 10 observations is to be taken from a normal population with variance equal to 16. What is the probability of obtaining a sample with variance greater than 20? (use χ^2 – distribution). (10)

(b) List five features of Student's T-distribution. (5)

Q5 (a) Evaluate $\sqrt{12}$ to four decimal place by Newton's iterative method. (8)

(b) Construct the divided difference table, given that (7)

x:	4	5	7	10	11
y:	48	100	194	900	1210

Q6 Find a polynomial through points (0,1), (1,1), (2,7), (3,25), (4,61), (5,121) using Newton's forward difference interpolation formula. Prepare the difference table & find y and slope at x = 0.5. (15)

Q7 Use Gauss Jacobi iterative (seven iterations) method to solve the following system of simultaneous equations. (15)

$$10x + 2y + z = 9$$
$$x + 10 - 1 = -22$$
$$-2x + 3y + 10z = 22$$

Q8 (a) Given the initial value problem $y' = 1 + y^2$, $y(0) = 0$. Find $y(0.6)$ by Runge-Kutta fourth order method taking h = 0.2. (8)

(b) What is meant by quadrature in Numerical integration? What is Cotes numbers? How are they related to the Newton Cote's quadrature formula? (7)

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END TERM EXAMINATION

THIRD SEMESTER [B.TECH] DECEMBER 2016

Paper Code: ETCE-211 **Subject: Engineering Geology**

Time: 3 Hours **Maximum Marks: 75**

Note: Attempt any five questions including Q no.1 which is compulsory. Select one question from each unit.

Q1 (a) Explain the applications of engineering geology in civil engineering? (5)
(b) Explain the term 'Dip and strike' and their importance. (4)
(c) Mechanical weathering includes _____. (2)
(d) Hydrolysis is the process of _____. (2)
(e) Residual soil is formed _____. (2)
(f) Folds are formed mainly due to _____. (2)
(g) The top rocks of an anticline are found to have joints inclined to axial plane formed by _____. (2)
(h) The mineral with hardness of 9 in mohr's scale is _____. (1)
(i) Precambrian rocks include _____. (1)
(j) Olivine and serpentine are the minerals belonging to _____. (1)
(k) Wind borne soils are known as _____. (1)
(l) The underground water that originates from molten magma is called _____. (1)
(m) The depth of interface between the rock types can be carried out by survey know as _____. (1)

UNIT-I

Q2 (a) Write in detail about the structure of the earth and its composition with a neat diagram. (6)
(b) Briefly explain the various parameters which help in classification of rocks. (6.5)

Q3 Write short notes on various Agents of weathering with the products of weathering. (12.5)

UNIT-II

Q4 What is fold? Describe various type of fold structure with neat sketches and also write their engineering significance. (12.5)

Q5 Explain followings with diagrams:- (4+2+4+2.5=12.5)
(a) Anticline and syncline
(b) Fold axis
(c) Axial plain of fold
(d) Plugs of an anticline

UNIT-III

Q6 What are the objectives of ground water investigation. Describe the method of systematic groundwater survey in alluvial as well as hard rock terrains. (12.5)

Q7 Write a short note on the seismotectonic framework of India. Name some major earthquakes of Himalayan belt with their corresponding magnitudes. Also explain the significance of various Siesmic Zones. (12.5)

UNIT-IV

Q8 (a) What are the types of geological investigation in tunnel alignment? (4)
(b) Describe the effect of siltation on the reservoir life. Sketch the method of measurement of annual siltation rate. (4)
(c) Define and explain Photogeology and its importance. (4.5)

Q9 (a) Describe the various stages of geotechnical works for tunnel. (6.5)
(b) What are the types of land slide? Briefly explain its preventive measures. (6)

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END TERM EXAMINATION

FIFTH SEMESTER [B.TECH.] DECEMBER 2016

Paper Code: ETCE-311 **Subject: Wastewater Engineering and Reuse**

Time: 3 Hours **Maximum Marks: 75**

Note: Attempts any five questions including Q no.1 which is compulsory. Make necessary assumptions wherever required and clearly state them.

Q1 (a) What are the different methods of collection of sewage samples? What are the methods for prevention of sewage sickness? (5)

(b) Using a diagram, explain the sulphur cycle under aerobic oxidation. (5)

(c) What are the advantages and disadvantages of using oxidation ditches? (5)

(d) Define the term SVI. How is the test for determination of SVI carried out? (5)

(e) What are traps? What are the different categories based on their shapes? (5)

Q2 (a) Differentiate between- (6)

(i) Domestic sewage, industrial sewage and sanitary sewage;

(ii) Combined and separate systems of sewage; and

(iii) Sewage and drainage

(b) State the principle of operation and design features of Trickling filters. (6.5)

Q3 (a) Why do we need to compute the Peak Drainage discharge? Explain any one method with suitable data. (6)

(b) Calculate the diameter and discharge of a circular sewer laid at a slope of 1 in 400 when it is running half full, and with a velocity of 1.9 m/sec. (n in Manning's formula = 0.012) (6.5)

Q4 (a) Calculate 1 day 37°C BOD of sewage sample whose 5 day 20°C BOD is 100 mg/l. Assume K_D at 20°C as 0.1. (7.5)

(b) Mention the common types of organisms found in domestic sewages, and explain why routine biological examination of sewage is usually not carried out, as is done for water supplies. (5)

Q5 0.04 cumecs of settled sewage having a 5 day B.O.D. of 120 ppm and containing 4.6 ppm of DO are discharged into a large normal stream carrying an average flow of 1.02 cumecs with a 5 day B.O.D. at 20°C of 9 ppm, and containing 6 ppm of D.O. What is the value of maximum DO deficit that is likey to occur downstream, assuming the temp. at 20°C throughout, $k_D = 0.1$ $k_R = 0.24$, and saturation D.O. at 20°C = 9.2 ppm. If the minimum D.O. is to be kept at 5 ppm, what percentage of removal is necessary in a treatment plant? (12.5)

Q6 (a) Differentiate between aerobic and anaerobic treatment of sewage, giving major end products. Name one treatment method in each category. (4)

(b) What do you understand by digestion of sewage sludge? Give a neat sketch of separate digestion tank and explain its working. (4)

(c) Compare and contrast septic tank with Imhoff tank in scope, function and performance. (4.5)

P.T.O.

ETCE-311

P1/2

Q7 Design a grit chamber and aeration tank of a Complete Sewage Treatment Plant of 1.5 MLD (Average Annual Flow of activated sludge process to be Constructed in "Dharmshala" in Himachal Pradesh Town.

Basic Data for the Proposed S.T.P:

Average Flow = 1.25 MLD = 1250 m^3/day

Peak Flow = 3.125 MLD = 3125 m^3/day

Sewerage Characteristics	Influent	Effluent
BOD, 20°C	295 mg/l	20 mg/l
Suspended Solids	4653 mg/l	30 mg/l
PH	Around 7.5	Around 7.5

G.L. near plant (av) R.L. 1860 m above MSL formation level

TWL in inlet chamber : 1863.50 m

TWL in outlet channel of FST : 1 861.30 m **(12.5)**

Q8 (a) Why it is necessary to provide 'ventilation' of the house drainage system? Draw a sketch to show the typical ventilation arrangements including inlet, outlet, etc. to a house drainage system, and explain its working. **(5)**

(b) Design an oxidation pond for treating domestic sewage of 10,000 persons supplied with 200 litres per capita per day. The BOD and the suspended solids are each of 300 mg/l.

Permissible organic loading for the pond is not less than 500 kg/ha/day. The detention period is not to exceed 10 days. Assume width of the pond to its length as 1:2 and the operational depth as 1.2 m. Assume any other suitable data. **(4)**

(c) Mention merits and demerits of Bio towers. **(3.5)**

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END TERM EXAMINATION

FIFTH SEMESTER [B.TECH] DECEMBER 2016

Paper Code: ETCE-309 **Subject: Geotechnical and Foundation Engineering**

Time: 3 Hours **Maximum Marks: 75**

Note: Attempt all questions as directed. Internal choice is indicated

Q1 Briefly describe the following:
(a) Various field tests to estimate bearing capacity. **(10)**
(b) Construction procedure for drilled pier. **(5)**
(c) Braced Excavations **(5)**
(d) Slope protection measure **(5)**

Q2 Explain how Terzaghi's theory of bearing capacity is modified for square and circular footings? How is local shear failure accounted for? **(8+4.5=12.5)**

OR

Q3 Explain briefly various causes of settlement? Also explain the various factors that will affect the selection of type of foundation? **(12.5)**

Q4 Outline the procedure to determine the bearing capacity of a single driven pile and that of a group of piles in a thick layer of soft-clay. Draw a neat sketch and label its various parts. **(12.5)**

OR

Q5 Write short note on the following:-
(a) Probable difficulties during caisson foundations. **(6.25)**
(b) Tilt and shift of Caisson foundations. **(6.25)**

Q6 Distinguish between 'active' and 'passive' earth pressure. Derive a general expression for active earth pressure behind a vertical wall due to a cohesionless soil backfill with a level surface by coulomb's wedge theory. **(4+8.5=12.5)**

OR

Q7 What are the different models of failure of retaining wall? Explain with the help of sketches. Differentiate between cantilever and Anchored sheet pile walls. **(8+4.5=12.5)**

Q8 Explain the friction-circle method for analyzing the stability of the slopes. Explain under what conditions: **(8.5+4=12.5)**
(a) a base failure and
(b) a toe failure are expected

OR

Q9 Briefly describe the following:- **(4+4+4.5)**
(a) Geomembranes and geotextiles
(b) Drainage and vibration method as a soil improvement technique
(c) Closure of landfills (with a neat sketch) and monitoring requirements.

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END TERM EXAMINATION

FIFTH SEMESTER [B.TECH] DECEMBER 2016 – JANUARY 2017

Paper Code: ETCE-303	Subject: Advanced Structural Analysis
Time: 3 Hours	Maximum Marks: 75

Note: Attempt any six questions including Q.no.1 which is compulsory. Assume any missing data suitably, if not given.

Q1 Attempt **any five** parts: **(5x5=25)**

(a) Define stiffness coefficient and stiffness matrix. How is the structure stiffness matrix related to the element stiffness coefficient?

(b) Describe the terms lack of fit and temperature effects.

(c) Define the type of framed structure. Also write down the equations of equilibrium and compatibility.

(d) Describe Theory of arches and derive the Eddy's theorem.

(e) Differentiate the force method and displacement method of analysis?

(f) Describe the basic steps involved in the Finite Element Method for the solution of a static problem?

Q2 Analyse two span continuous beam shown in figure 1.0 by flexibility and stiffness method. Also draw the bending moment diagram. Assume $EI = 27000\ kNm^2$. **(10)**

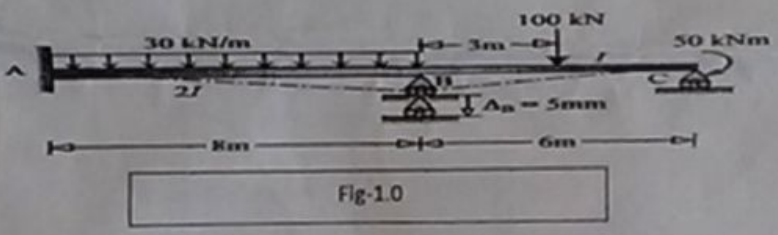

Fig-1.0

Q3 Derive the stiffness matrix for the frame with reference to the co-ordinates shown in (figure 2.0). Assume $EI = 1$ *and* $I = 1$. **(10)**

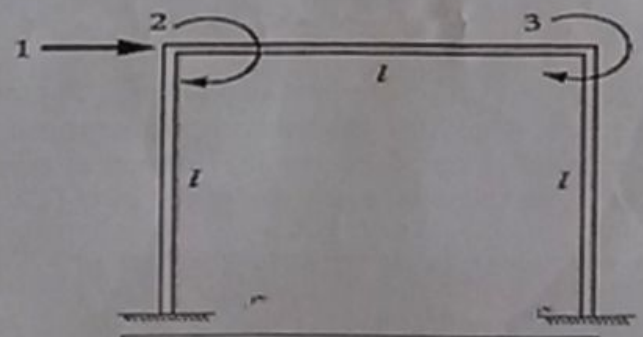

Fig-2.0

Q4 A continuous beam ABC is carrying a uniformly distributed load of 1 kN/m in addition to concentrated load of 10 kN as shown in Fig. 3.0. Draw bending moment and shear force diagram. Assume EI to be constant for all members. **(10)**

P.T.O.

ETCE-303

Pth

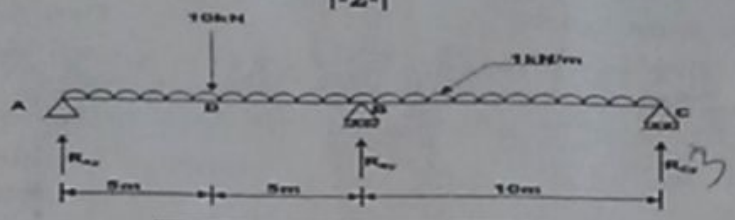

Fig-3.0

Q5 Derive flexibility matrix and stiffness matrix for the figure shown in figure 4.0. **(10)**

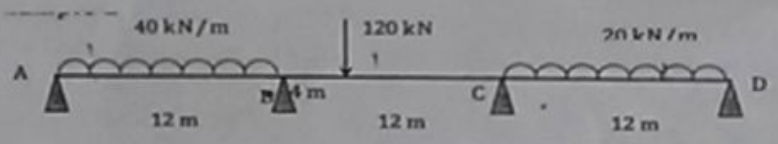

Fig-4.0

Q6 Briefly explain the direct stiffness method. Also differentiate space truss and space frame with example. **(10)**

Q7 Determine the moments at each joint of the frame and draw the quantitative bending moment diagrams and qualitative deflective curve. The joints at A and D are fixed and joint C is assumed pin-connected. EI is constant for each member (Fig. 5.0). **(10)**

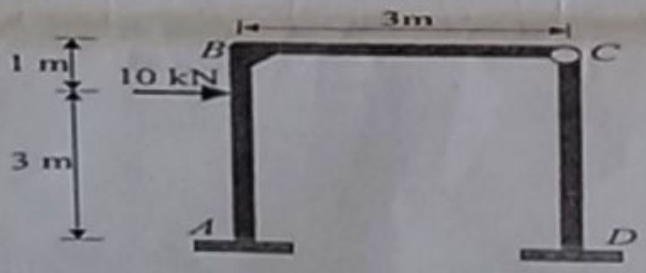

Fig-5.0

Q8 A 3 hinged arch is circular in shape as shown in Figure 6, 25 m in span with a circular rise of 5m. It is loaded with a concentrated of 10 kN at 7.5 m from the left hand hinge. Find the (a) Horizontal thrust (b) reaction at each end hinge (c) bending moment under the load.**(10**

Fig-6.0

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(Please write your Exam Roll No.) Exam Roll No. 007

END TERM EXAMINATION

FIFTH SEMESTER [B.TECH] DECEMBER 2016 – JANUARY 2017

Paper Code: ETCE-307 **Subject: Engineering Hydrology**

Time: 3 Hours **Maximum Marks: 75**

Note: Attempt any five questions including Q.no.1 which is compulsory. Make necessary assumptions wherever required and clearly state them.

Q1 Attempt **any five** parts: **(5x5=25)**

(a) The normal annual rainfall at station A, B, C and D in a basin are 80.97, 67.59, and 76.28 and 92.01 cm respectively. In the year 1985, the station D was inoperative and the station A, B and C recorded annual precipitation of 91.11, 72.23 and 79.89 cm respectively. Estimate the rainfall at station D in that year.

(b) Explain a procedure for fitting Horton's infiltration equation for experimental data from a given plot.

(c) With the aid neat sketches, describe a flow mass curve and explain how it could be used for the determination of
(i) The maximum storage needed to meet a constant demand.
(ii) The maximum constant maintainable demand from a given storage.

(d) Explain the procedure of using a unit hydrograph to develop the flood hydrograph due to a storm in a catchment.

(e) Annual flood series having N consecutive entries are available for a catchment. Describe a procedure to verify whether the data follow Gumbel's distribution.

(f) At a certain point in an unconfined aquifer of 3 km^2 area, the water table was at an elevation of 102.00 m. Due to natural recharge in a wet season, its level rose to 103.20 m. A volume of 1.5 Mm^3 of water was then pumped out of the aquifer causing the water table to reach a level of 101.20 m. Assuming the water table in the entire aquifer to respond in a similar way, estimate
(i) The specific yield of the aquifer and
(ii) The volume of recharge during the wet season.

Q2 (a) What is meant by Probable Maximum Precipitation (PMP) over a basin? Explain how PMP is estimated. **(4.5)**

(b) Prepare the maximum depth-duration curve for the 90-minute storm given below: **(8)**

Time (minutes)	0	10	20	30	40	50	60	70	80	90
Cumulative rainfall (mm)	0	8	15	25	30	46	55	60	64	67

Q3 (a) Discuss the factors affecting the infiltration capacity of an area. **(4)**

(b) Determine the best values of the parameters of Horton's infiltration capacity equation for the following data pertaining to infiltration tests on a soil using double ring infiltrometer. **(8.5)**

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Time since start in minutes	5	10	15	25	40	60	75	90	110	130
Cumulative infiltration in mm	21.0	36.0	47.6	56.9	63.8	69.8	74.8	79.3	87.0	92.0

Q4 (a) A 500 *g/l* solution of sodium dichromate was used as chemical tracer. It was dosed at a constant rate of 4 *l*/s. At a downstream section, the equilibrium concentrate was measured as 4 parts per million (ppm). Estimate the discharge in the stream. **(4)**

(b) The following table gives the mean monthly flows in a river during 1981. Calculate the minimum storage required to maintain a demand rate of 40 m3/s. **(8.5)**

Month	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Mean Flow (m^3/s)	60	45	35	25	15	22	50	80	105	90	80	70

Q5 Derive a 1 cm 5 h hydrograph from a 1 cm-3 h unit hydrograph. The 1 cm^{-3} h unit hydrograph coordinates are as under: **(12.5)**

Time	0	1	2	3	4	5	6	7	8	9	10	11	12
Discharge (m^3/s)	0	2.0	6.34	13.66	17.0	16.32	11.34	7.34	4.34	2.32	1.0	0.33	0

Q6 (a) What is an S hydrograph? How is it derived from a unit hydrograph? **(4.5)**

(b) What is a synthetic unit hydrograph? Why is it necessary? **(4)**

(c) Explain the assumptions made in the unit hydrograph theory. **(4)**

Q7 (a) For a catchment area of 50 km^2, the 1 h- 1 cm unit hydrograph coordinates are as follows:

Time (h)	0	1	2	3	4	5	6	7	8	9	10
Discharge (m^3/s)	0	6	28	35	27	20	14	9	5	2	0

The worst possible storm covering the entire catchment area is 2 cm/h for 3 h. Find the maximum flood discharge. **(6.5)**

(b) Which are the basic equations used in hydraulic flood routing? Discuss them in brief with suitable assumed data. **(6)**

Q8 (a) Discuss the assumptions made in the analysis of steady radial flow into a well. **(3)**

(b) Explain the pumping test to estimate the safe yield from an open well. **(4)**

(c) Water was pumped out from a well in a confined aquifer 10 m thick, having a hydraulic conductivity of 1.5 m/day. The drawdown observed in the two adjoining wells at 10 m and 60 m from the pumping well was 3 m and 0.05 m, respectively. Find the constant rate of pumping. **(5.5)**

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