

(Please write your Exam Roll No.)

Exam Roll No. 55218003417

END TERM EXAMINATION

THIRD SEMESTER [B.TECH] NOVEMBER-DECEMBER 2018

Paper Code: ETMA-203

Subject: Numerical Analysis and
Statistical Technique

Time: 3 Hours

Maximum Marks: 75

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

- Q1 (a) A can hit a target 3 times in 5 shots, B 2 times in 5 shots and C 3 times in 4 shots. If they fire a volley. What is the probability that at least two shots hit the target. (5)
- (b) A coin is tossed up 400 times and the head turns up 216 times. Test the hypothesis that the coin is unbiased at 5% level of significance. (5)
- (c) Evaluate the value of $\sqrt{5}$ correct to four decimal places by Newton's iteration method. (5)
- (d) Solve the differential equation by Euler's Method (5)
- $\frac{dy}{dx} = x + y$ $y(0) = 1$ taking $h = 0.2$
- (e) Find a real root of equation $x^3 - 2x - 5 = 0$ by using bisection method up to fourth stage. (5)

UNIT-I

- Q2 (a) An insurance company insured 2000 scooter drivers, 4000 car drivers and 6000 truck drivers. The probability of accidents is 0.01, 0.03 and 0.15 respectively. One of the insured person meets with an accident. What is the probability that he is a scooter driver? (6)
- (b) Fit a binomial distribution to the following frequency data (6.5)

X	0	1	3	4
F	28	62	10	4

- Q3 (a) An insurance company observed that only 0.01% of the population is involved in accidents each year. If its 1000 policy holders are randomly selected from the population what is the probability that not more than two of its clients are involved in accidents next year. (6)
- (b) Fit a straight line to the data using method of least square. (6.5)

x	1	2	3	4
y	0	1	1	2

UNIT-II

- Q4 (a) Calculate the Coefficient of correlation from the following data. (6)

x	9	8	7	6	5	4	3	2	1
y	15	16	14	13	11	12	10	8	9

- (b) The theory predicts the proportion of beans in the four groups G1, G2, G3 and G4 should be in ratio 9: 3: 3: 1. In an experiment with 1600 beans the numbers in the groups were 882, 313, 287 and 118. does the experimental result support the theory. Given that the chi-square has a value 7.815 with degree of freedom 3 and level of significance 5%. (6.5)

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- Q5 (a) From the data given below find the equation of line of regression of y on x and also find the value of coefficient of correlation. (6.5)

x	2	4	6	8	10
y	5	7	9	8	11

- (b) Two samples of size 9 and 8 give the sum of squares of deviations from their respective means equal to 160 and 91 respectively. Can these be regarded as taken out from the same population? Given that F has value 3.73 with degree of freedom 8 and 7 at level of significance 5%. (6)

UNIT-III

- Q6 (a) Solve the following system of equations by Gauss-seidel method. (6)
 $10x + y - z = 11.19$ $x + 10y + z = 28.08$ $-x + y + 10z = 35.61$ correct up to two decimal places.
 (b) From the following table estimate the number of students who obtained marks between 40 and 45: (6.5)

Marks	30-40	40-50	50-60	60-70	70-80
No. of Students	31	42	51	35	31

- Q7 (a) Find the real root of the equation $\cos x - xe^x = 0$ by using Newton Raphson method. (6.5)
 (b) Find the value of F(5.5) from the following data: (6)

x	0	1	4	5	6
y	1	14	15	6	3

UNIT-IV

- Q8 (a) The following data gives the velocity of a particle for 20 seconds at an interval of 5 seconds. Find the initial acceleration using the entire data. (6.5)

Time(sec)	0	5	10	15	20
Velocity(m/sec)	0	3	14	68	228

- (b) Evaluate $\int_1^2 \frac{dx}{1+x}$ using Simpson's one third method by taking seven ordinates and compare it with its actual value. (6)

- Q9 (a) Using Runge-Kutta method of fourth order determine y(0.2) correct up to four decimal places given that $\frac{dy}{dx} = y - x$ where $y(0) = 2$ and $h = 0.1$. (6)
 (b) Solve for y, the differential equation $\frac{dy}{dx} = x + y$ $y(0) = 1$, using Euler's method by taking $h = 0.2$. (6.5)

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END TERM EXAMINATION

THIRD SEMESTER [B.TECH] NOVEMBER-DECEMBER 2018

Paper Code: ETCE-203

Subject: Strength of Materials

Time: 3 Hours

Maximum Marks: 75

Note: Attempt five questions in all including Q no.1 which is compulsory.
Select one question from each unit. Assume suitable missing data, if any.

- Q1 Attempt all parts:- (10x2.5=25)
- (a) What do we mean by longitudinal strain, lateral strain and poisson's ratio?
 - (b) What do we mean by principle planes and principle stresses?
 - (c) A prismatic bar of volume V is subjected to a tensile force in longitudinal direction. If poisson's ratio of the material is μ and longitudinal strain is e . Find the final volume of the bar.
 - (d) Define point of contraflexure.
 - (e) Differentiate between a fixed support and simple support with the help of free body diagram.
 - (f) What is pure bending? Give two examples of pure bending.
 - (g) What is middle third rule? For no tension criteria find the expression for core of a solid circular section.
 - (h) State castigliano's theorem.
 - (i) Write the assumptions of theory of pure torsion.
 - (j) What are the limitations of Euler's formula?

UNIT-I

- Q2 Two vertical rods, one of steel and other of copper are each rigidly fastened at the upper end and 600mm apart. Each rod is 3m long and 100mm² in cross-sectional area. A horizontal cross bar connects the lower end of rods and on it is placed a load of 100KN so that the cross bar remains horizontal. Find the position of load on cross bar and estimate the stress in each rod. $E_{\text{steel}}=210 \text{ GPa}$ and $E_{\text{copper}}=120 \text{ GPa}$. (12.5)
- Q3 (a) Explain the concept of Mohr's circle for determining stresses and strain. (6.5)
(b) Explain why do we need a failure theory. Explain in detail the concept of any one failure theory. (6)

UNIT-II

- Q4 A beam 8.5m long rests on supports 5m apart. The right hand end overhanging by 2m and left end by 1.5m, the beam carries a UDL of 50 KN/m run between the supports only. The beam also carries a point load of 60 KN at the extreme right hand end and a point load of 40 KN at the left end. Construct the shear force and bending moment diagrams stating there an all the important values of shear force and bending moment. State the position of point of inflexion on the beam. (12.5)
- Q5 Compare the flexural strength of the following three beams of equal weight:- (12.5)
(a) I-section 30cmx15cm having 2cm thick flange and 1.25 cm thick web.

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- (b) Rectangular section having depth equal to twice the depth.
 (c) Solid circular section

UNIT-III

- Q6 A masonry dam, 8m high, 1.5m wide at top and 4m wide at the base has its water face vertical and retains water to a depth of 6m. Find the maximum and minimum stress intensities at the base. The density of water is 1000 Kg/m^3 and that of the masonry is 2240 Kg/m^3 . (12.5)
- Q7 A simply supported beam of span L is loaded with UDL of intensity w over the whole span. Using conjugate beam method. Calculate slopes at the end and central deflection. (12.5)

UNIT-IV

- Q8 A composite shaft consists of a steel shaft of 100mm diameter encased in a closely fitting brass sleeve. Determine (i) the outside diameter of the sleeve if the torque applied to the composite shaft is to be shared equally by the two components and (ii) the maximum shearing stress in each material and angle of twist over a length of 3m, when the composite shaft transmits a torque of 25 KNm. Modulus of rigidity for brass and steel are 40 and 80 MPa respectively. (12.5)
- Q9 A 8 metre long column is of circular section 50 mm internal and 60 mm external diameter and is fixed at one end while its upper end is free. Calculate the maximum load the column would be able to carry if its length is reduced to 1m. $E=200\text{GPa}$, crushing strength of material is 300MPa, Rankine constant = $\frac{1}{7500}$. (12.5)

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THIRD SEMESTER [B.TECH] NOVEMBER-DECEMBER- 2018

Paper Code: ETCE-205

Subject: Fluid Mechanics

Time: 3 Hours

Maximum Marks: 75

Note: Attempt all questions as directed. Internal Choice is indicated. Assume missing data if any.

1. Attempt any five parts: 5x5=25
- a) Define poise and develop a relation between the force units and poise for dynamic viscosity? 5
 - b) Prove that the metacentric height of a floating body experimentally is given by a equation: $GM = wx/W \cdot \tan \theta$? 5
 - c) Differentiate between tangential and normal acceleration and find out the expression for both? 5
 - d) Define linear momentum and angular momentum and list out a few applications of each? 5
 - (e) What do you understand by Reynolds number? Mention its significance in fluid mechanics? 5
 - (f) What are the boundary conditions that must be satisfied by a given velocity profile in laminar boundary layer flow? 5
 - (g) What do you understand by fundamental units and derived units? Illustrate with examples? 5
 - (h) What do you understand by non dimensional factors and their use model testing? 5
- Q2. a) Define surface tension and prove that $\Delta p = 4\sigma/D$? A plate of 0.02 mm distant from the fixed plate, move with a velocity of 0.5 m/sec when a force applied is 1.5 N/m^2 . And the gap is filled with oil. Find the viscosity of the oil in poise? 8
- b) What do you understand by the term anchoring of the floating body? Explain the necessity for the same? 4.5
- OR
- Q3. a) Deduce the Chezy's formula for the velocity of flow through pipes? Explain their significance in flow problems? Derive a formula developed by Darcy for loss of head due to friction for the flow through a pipe? 8
- b) The velocity components in two dimensional steady state, incompressible flow are given as:
 $u = x + 2y$ and $v = x^2 - 2y$, check the validity of the flow. If u expression is correct then find the expression for v so that the flow exists? 4.5
- Q4. (a) A ventury meter 30 cm x 10 cm is used for measuring the discharge of oil (Sp. Gr. = 0.85) passing through vertical pipe in upward direction. The difference between entrance and throat section of the venture is 40 cm. The head recorder by mercury manometer is 20 cm. Find the discharge and the pressure difference between the entrance and throat section? Take $C_d = 0.97$. 8
- (b) Two velocity components in a given flow field is given by 4.5
 $u = 4x^2 + 3xy$
 $w = z^2 - 4xy - 2yz$ and find the third component so that the flow field exists?

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OR

- Q5. (a) Define linear momentum and angular momentum and list out a few applications of each? 8.5
- (b) In a foot step (thrust) bearing, a shaft of 8 cm in diameter is rotating at 1000 rpm. An oil film is used is 1.5 mm and μ for oil = 1.5 poise. Find out the power loss in viscous resistance of the bearing? 4
- Q6. a) The velocity profile in a laminar boundary layer is given by 8
- $\frac{u}{U} = 2 \left(\frac{y}{\delta} \right) - \left(\frac{y}{\delta} \right)^2$, if the water is flowing over the plate with a velocity of 10m/min. Find the thickness of the boundary, drag force on the plate and average drag coefficient. The plate is 1 m long and 1.5 m wide and flow is parallel to 1 m side. Take $\rho = 1000 \text{ kg/m}^3$ and $\mu = 0.01$ poise for water.
- (b) The velocity distribution in a boundary layer is given by $\frac{u}{U} = \left(\frac{y}{\delta} \right)$, find out the displacement, momentum and energy thickness? 4.5
- Q7. a) Using dimensional analysis technique proves that the power developed by the hydraulic turbine given by $P = \rho N^3 d^5 f \left(\frac{N^2 d^2}{gH} \right)$, where d is rotor diameter, N rotor speed and H is available head and ρ density of the fluid? Define distorted models with examples? 8
- b) State and explain the Buckingham's π theorem, how is choice of repeating variable made? 4.5

OR

- Q8. a) Explain the characteristics of laminar and turbulent boundary layers? Which factors effect the thickness of boundary layers? Discuss the phenomenon of separation of flow over curved surface? 8
- b) Derive an expression for the drag force on smooth sphere diameter D moving with a velocity V in a fluid density ρ and dynamic viscosity μ ? 4.5

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THIRD SEMESTER [B.TECH] NOVEMBER-DECEMBER 2018

Paper Code: ETCE-207

Subject: Building Material and Construction

Time : 3 Hours

Maximum Marks : 75

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

- Q1 Attempt any five from the following: (5x5=25)
- (a) Explain quarrying of stones ✓
 - (b) Differentiate between light weight concrete and high-density concrete ✓
 - (c) Write a short note on the 'workability of concrete'. How is it measured? ✓
 - (d) What are the characteristics of good timber? Why is seasoning of timber done?
 - (e) What are the major ingredients of 'paint'? List the major role of each ingredient.
 - (f) Briefly explain classification of bricks. ✓
 - (g) Discuss about the use of 'geo-synthetics' and 'nano-materials' in buildings.
- Q2 What is concrete? Differentiate between ready-mix concrete and pre-cast concrete. Explain batching of concrete by weight and volume. (12.5)
- OR
- Q3 Enlist the effects of dampness in a building. What are the various methods that can be adopted to provide damp-proofing in buildings. Explain with diagrams. (12.5)
- Q4 What are the different bonds in brick masonry? Explain in detail with the help of diagrams. Also, discuss about load bearing walls, cavity walls and partition walls. (12.5)
- OR
- Q5 What do you understand by the concept of 'Green Building'? State and explain the different ratings of Green Buildings under LEED. (12.5)
- Q6 Define and explain the term 'acoustics' with respect to buildings. What are the factors that need to be considered in the acoustic design of an auditorium? (12.5)
- OR
- Q7 What are the different mix-proportions of concrete as suggested by Indian Standards? What are the different admixtures added to concrete? State their uses. (12.5)
- Q8 What are the requirements of a good staircase? Enumerate the different types of stairs on the basis of their shape and the material used, with suitable diagrams. (12.5)
- OR
- Q9 Explain the component parts of a door and a window with the help of neat sketches. Discuss the provisions of doors and windows in a structure with respect to location, purpose and size. (12.5)

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THIRD SEMESTER [B.TECH] NOVEMBER-DECEMBER- 2018

Paper Code: ETCE-209

Subject: Surveying

Time: 3 Hours

Maximum Marks: 75

Note: Attempt any five questions including Q.No1 which is compulsory.
Select one question from each unit.

Q.1. Attempt any five from the following.

(5x5=25)

- Explain the Base Extension Method?
- Explain Horizontal and Vertical Control.
- The plan of an old survey plotted to a scale of 10m to 1cm carried a note stating that the chain was 0.8 links (16cm) too short. It was also found that the plan has shrunk so that a line originally 10cm long was 9.77 cm. The area of plot on the available plan was found to be 58.2 sq. cm. What is the correct area of the plan in hectares?
- The magnetic bearing of Sun at noon is 160° . Find the variation and true bearing of line AB whose current bearing is 130° .
- Explain the principle of Tacheometry.
- What do you understand by Detailing? What are the various instruments used for setting offsets?
- Enumerate characteristic features of electronic theodolites.

UNIT I

Q.2. In running fly levels from a bench mark of RL 384.705 the following readings were observed

Back Sight: 3.215, 1.030, 1.295, 1.855

Fore Sight: 1.225, 3.290, 2.085

From the last position of the instrument, six pegs at 25m interval are to be set out on a uniformly falling gradient of 1 in 100, the first peg is to have a RL of 384.500m. Work out the staff readings required for setting the top of the pegs on the given gradient.

(12.5)

Q.3. a. The following bearings were observed in running a closed traverse ABCDEA.

(8)

Line	FB		BB	
	Degree	Minute	Degree	Minute
AB	71	5	250	20
BC	110	20	292	35
CD	161	35	341	45
DE	220	50	40	5
EA	300	50	121	10

Determine the correct magnetic bearings of the line.

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b. Differentiate between prismatic and surveyor's compass with diagrams.

(4.5)

UNIT II

Q.4. Calculate the latitudes, departure and closing error for the following traverse and adjust using Bowditch's Method. (12.5)

Line	Length(m)	WCB
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'

Q.5. a. What are the characteristics of contours?

(4.5)

b. In a proposed reservoir, the area contouring within the contours are

(8)

Contours (in m)	100	95	90	85	80	75	70	65
Area (in ha)	32	26	24	18	15	13	7	2

Using trapezoidal method, calculate:

- Capacity of reservoir when it is full at 100m level
- Elevation of water level when it is 60% full. Ignore the volume below 65m level.
- Calculate volume of water when reduced level of water surface is 82.2m.

UNIT III

Q.6. Following readings were obtained from an instrument station B using an anallactic lens having the following constants, focal length of glass object 203mm, focal length of anallactic lens 114mm, distance between object glass and anallactic lens 178mm, spacing of outer cross hair 1.664mm. (12.5)

Instrument at	H.I.	To	Bearing	Vertical Angle	Stadia Readings
B	1.503m	A	69°30'00"	+5°	0.658, 1.055, 1.451
		C	159°30'00"	0°	2.231, 2.847, 3.463

The staff was held vertical for both observations. Both bore holes were sunk at A, B and C to expose a plane bed of rock, the ground surface being respectively, 11.918m, 10.266m and 5.624m above the rock plane. Given that the reduced level of B was 36.582m, determine the line of steepest rock slope relative to the direction AB.

Q.7. What is plane table method of surveying? Explain two point problem and three point problem by any of the methods. (12.5)

UNIT IV

Q.8. a. What is meant by order of triangulation? Enumerate triangulation figures with neat sketches? Explain the significance of each figure. (8)

b. Write a short note on DGPS and Total Station. (4.5)

Q.9. What are the various types of curves? Explain Long Chord (chord produced method) and Two Theodolite Method for setting out simple circular curves. (12.5)

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THIRD SEMESTER [B.TECH] NOVEMBER-DECEMBER 2018

Paper Code: ETCE 211

Subject: Engineering Geology

Time : 3 Hours

Maximum Marks : 75

Note: Attempt five questions in all including Q. No. 1 which is compulsory. Select one question from each unit.

Q1. Answer **any five** from the following: (5x5=25)

- Give a general view of the internal structure of earth as revealed by seismological evidence.
- Define the following:
 - Spheroidal weathering
 - Glacial erosion
- Define dip and strike.
- What are hot water springs? Give the geological conditions for the formation of hot water springs in otherwise cold climate conditions.
- Write notes on:
 - Application of photo-geology
 - Use of stereoscope
- What are the types of landslide? Briefly explain its preventive measures.

Unit-I

- Q2.
 - Explain briefly the importance of geological investigation in construction projects. (7)
 - Explain weathering of rocks. (5.5)
- Q3.
 - What are igneous rocks? How are they formed in nature? (8)
 - Explain the difference between colour and lustre. (4.5)

Unit-II

- Q4.
 - Write short notes: (2+3+3+4.5=12.5)
 - Unconformities
 - Primary and secondary structure in rocks
 - Geometric and Genetic Point
 - Stratification
- Q5. Describe with the help of neat sketches, various parts of faults and their causes as understood in structural geology? (12.5)

Unit-III

- Q6. Write short notes on: (3+3+3+3.5=12.5)
 - Types of aquifers
 - Safe yield
 - Salt water intrusion
 - Tectonic Earthquakes
- Q7. Write short notes on the following: (4+4+4.5=12.5)
 - Richter Magnitude
 - Epicentre
 - Seismogram

Unit-IV

- Q8. Give a broad account of geological conditions necessary for the proper location of a Dam. (12.5)
- Q9.
 - What are the common types of landslides? Give scientific reasons for the occurrence of landslides? (6)
 - Give a brief account of measures commonly adopted to combat the landslides. (6.5)

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FIFTH SEMESTER [B.TECH] NOVEMBER-DECEMBER- 2018

Paper Code: ETHS-301 Subject: Communication Skills for Professionals

Time: 3 Hours

Maximum Marks: 75

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

- Q1 Write short notes on **any five** of the following:- (5x5=25)
- (a) Interpersonal skills
 - (b) Interview Preparation
 - (c) Resume
 - (d) Presentation skills
 - (e) Formal reports
 - (f) Memoranda

UNIT-I

- Q2 What are the factors and their functions in the process of communication? (12.5)

OR

Discuss how soft skills can make or break an employee's career.

UNIT-II

- Q3 Give phonemic transcriptions of the following: conclude, precise; shape; mark; earth; cheer; piquant; speech; tour. (12.5)

OR

How is body language important in a multicultural context?

UNIT-III

- Q4 What are the principles of effective business correspondence? (12.5)

OR

Prepare an agenda and write minutes of the meeting of the Sports Committee held on the eve of the Annual Sports Meet of your college/ University.

UNIT-IV

- Q5 Discuss barriers to effective listening. (12.5)

OR

'GD is an essential tool of assessment'. Elaborate.

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FIFTH SEMESTER [B.TECH.] NOV.-DEC. 2018

Paper Code: ETCE-303

Subject: Advanced Structural Analysis

Time : 3 Hours

Maximum Marks :75

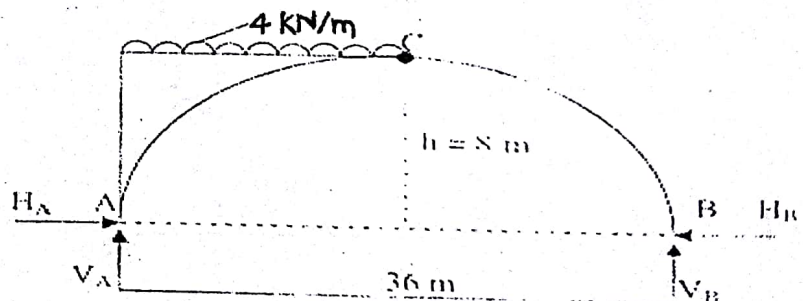
Note: Attempt all questions as directed. Assume suitable missing data if any.

Q1. Attempt all.

(5×5=25)

- Define the types of framed structures and deformations available in these structures. Also explain static and kinematic indeterminacy for the plane truss and plane frame with examples.
- Define Eddy's theorem. Explain the effect of yielding of supports in arches?
- Define flexibility matrix and stiffness matrix. Also define flexibility & stiffness influence coefficients and derive the relationship between stiffness matrix and flexibility matrix.
- Differentiate between structure approach and element approach used in stiffness matrix method. What is the relationship between structure stiffness matrix and element stiffness matrix?
- A three hinged parabolic arch has a span l and rise h . Draw influence line diagram for the following;
 - Horizontal thrust
 - Bending moment at a section 'a' distance from left support
 - Normal thrust at the above section
 - Radial shear at the above section

- Q2. A UDL of 4 kN/m covers left half of a 3-hinged parabolic arch of span 36m and central rise of 8m. Determine the horizontal thrust. Also find bending moment, normal thrust and radial shear at quarter section from left support. Sketch BMD. (12.5)



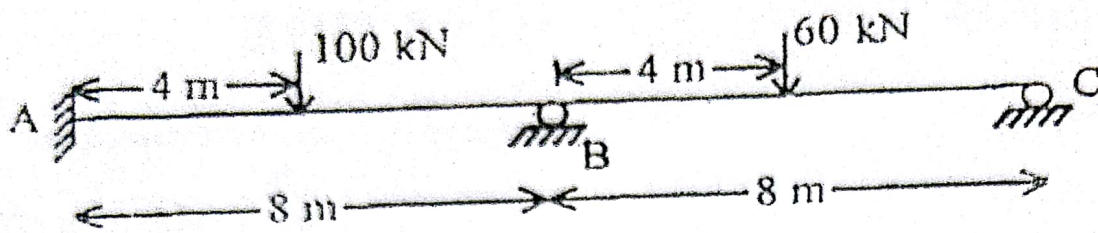
OR

- A quarter circle beam of radius R curved in plan is fixed at end A and free at end B. It carries a vertical load P at its free end. Determine the deflection at the free end and sketch shear force, bending moment and torsional moment diagrams. Assume flexural rigidity (EI) = torsional rigidity (GJ). (12.5)

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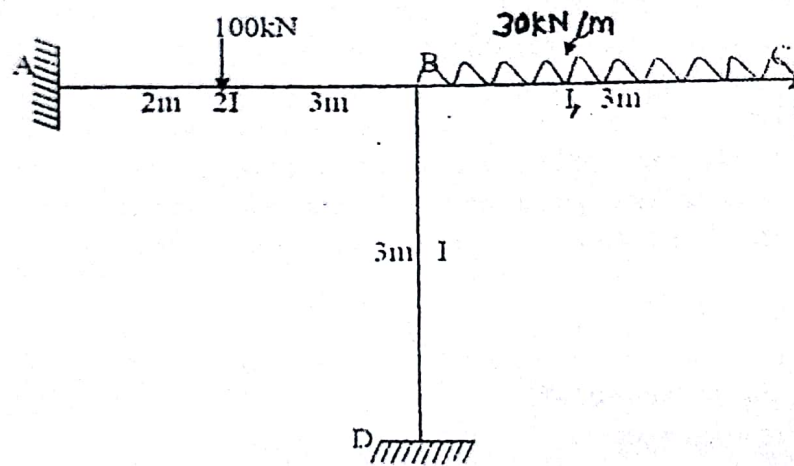
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Q3. Analyse the continuous beam shown in figure by flexibility matrix method and sketch BMD. Take EI constant throughout. (12.5)

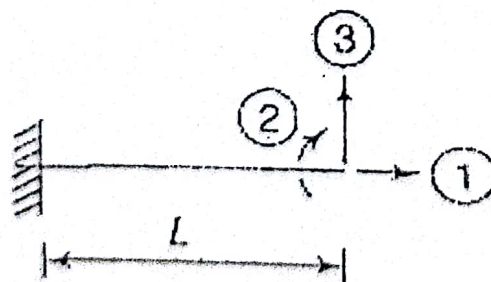


OR

Analyse the portal frame ABCD shown in figure by stiffness matrix method. (12.5)



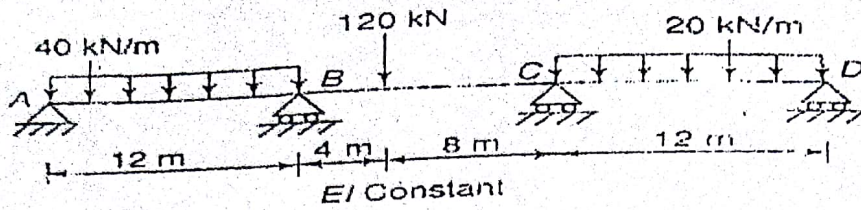
Q4. For a cantilever beam of uniform cross section shown in figure, develop the flexibility and stiffness matrices with reference to the coordinates. Verify that the two matrices are the reciprocal of each other. (12.5)



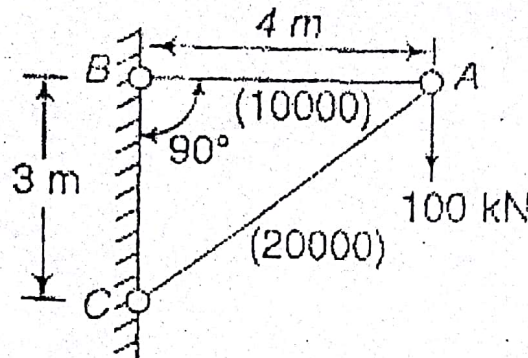
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Write down the design steps of stiffness matrix method for analysis of structure. Generate the stiffness matrix for the structure shown in figure. (12.5)

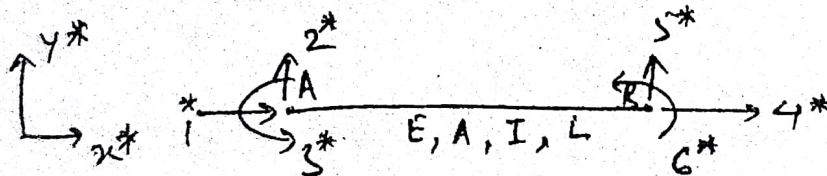


Q5. Develop the stiffness matrix for the plane truss shown in figure. Also determine the displacement of joint A, and calculate the forces in member AB and AC. The numbers in parentheses are the cross section areas of the members in mm^2 . Take $E = 200 \text{ kN/mm}^2$. (12.5)



OR

Write down the steps for analysis of plane frame by direct stiffness method. Develop element stiffness matrix for a plane frame member having span l . EA is axial stiffness and EI is flexural stiffness. (12.5)



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END TERM EXAMINATION

FIFTH SEMESTER [B.TECH] NOVEMBER-DECEMBER-2018

Paper Code: ETCE-305

Subject: Design of Steel Structures

Maximum Marks :75

Time : 3 Hours

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

- Q1 Attempt **any five** parts (5x5=25)
- (a) Compare welded joints with bolted joints with respect to strength, efficiency and workmanship.
 - (b) Define slenderness ratio of compression member. State its Limiting value in case of member carrying axial compression due to dead load and live load.
 - (c) Differentiate between laterally supported and laterally unsupported beams.
 - (d) Differentiate between web buckling and web crippling. With diagram.
 - (e) What is lacing, battens and splices? Differentiate it with diagram.
 - (f) Draw the diagram of a lap joint and double cover Butt joint.
 - (g) Explain Tacking rivets and gusset plate with diagram.
 - (h) Explain block shear failure with example.
- Q2 Calculate the design bending strength of ISLB 300 @0.369 kN/m considering the beam to be laterally unsupported. Assume the design force is less than the design shear strength and is of low shear. The effective length of beam is 4m. Assume Fe 410 grade of steel. (12.5)
- Q3 A column ISMB 300@ 576.8 is to support a factored axial load of 500 KN. Shear force of 120KN and bending moment of 40 kN-m. Design the splice plate. Assuming bolt of dia 20 mm. (12.5)
- Q4 Design a laced column 10.5m long to carry factored axial load of 1000KN the column is restrained in position but not in direction at both the ends. Provide single system. Use 2 channel sections placed back to back. Assume steel of grade Fe 410. Design the lacing system with site weld connections. (12.5)
- Q5 Explain the following terms.
- (a) Differentiate modes of failure in columns. (4)
 - (b) Design of gantry girder. (4)
 - (c) Design of frames as per Indian Standard Codal Provisions. (4.5)
- Q6 Derive an expression for calculating shape factor for.
- (a) Triangular section (6)
 - (b) Symmetric I section (6.5)
- Q7 Design a lap joint between two plates each of width 120 mm, if the thickness of one plate is 16 mm and other is 12 mm. The joint has to transfer a design load of 160 kN. The plates are of Fe -410 grade. Use bearing types of bolt. (12.5)
- Q8 Design a double angle tension member connected on each side of a 10 mm thick gusset plate, to carry an axial factored load of 375 kN. Use 20 mm black bolts. Assume shop connection. (12.5)

END TERM EXAMINATION

FIFTH SEMESTER [B. TECH.] NOVEMBER-DECEMBER 2018

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.
Select one question from each unit.

- Q1 Answer **any five** questions providing sketches wherever applicable: (5x5=25)
- (a) Explain applications of hydrology in engineering
 - (b) Explain hydrograph along with its components
 - (c) Draw and explain Horton's representation of hydrological cycle
 - (d) Why is separation of base flow required from a flood hydrograph. Describe three methods of base flow separation.
 - (e) What is ϕ Index, W Index, Effective rainfall and Annual average rainfall?
 - (f) What are the IS recommendations about density of rain gauges in a catchment area
 - (g) Mention flood damage causes and remedial measures.
 - (h) Define an aquifer, an aquifer, an aquitard, an aquiclude along with examples.

UNIT-I

- Q2 (a) Explain various abstractions from precipitations, along with the various methods to reduce these abstractions. (5)
- (b) A lake had a water surface elevation of 103.200 m above datum at the beginning of a certain month. In that month the lake received an average inflow of $6.0 \text{ m}^3/\text{s}$. Further, in that month, the lake received a rainfall of 145mm and the evaporation from the lake surface was estimated as 6.10 cm. Write the water-budget equation for the lake and calculate the water surface elevation of the lake at the end of the month. The average lake surface area can be taken as 5000 ha. Assume that there is no contribution to or from ground water storage. (7.5)

OR

- Q3 (a) Explain various methods to determine areal mean rainfall over an area. (5)
- (b) The following are the rates of the rainfall of the successive 20 min period of a 140 min storm; 2.5, 2.5, 10.0, 7.5, 1.25, 1.25, 5.0 cm/hr. Taking the value of ϕ index as 3.2 cm Find out the net runoff in cm, the total rainfall and the value of W-Index? (7.5)

UNIT-II

- Q4 (a) What is current meter? Explain its types. (4)
- (b) What is stage of a river and explain various stage measurement techniques. (4)
- (c) A 25 gm/l solution of a fluorescent tracer was discharged into a stream at a constant rate of $10 \text{ cm}^3/\text{sec}$. The background concentration of the diet in the stream water was found to be zero. At a downstream section sufficiently far away, the die was found to reach an equilibrium concentration of 5 parts per billion. Estimate the stream discharge. (4.5)
- Q5 (a) Explain electromagnetic and ultrasonic methods for measurement of discharge. (5)

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(b) Compute the stream flow for the measurement data given below: (7.5)

Distance (m)	0	0.6	1.2	1.8	2.4	3.0	3.6	4.2	4.8	5.4	6.0	6.6
Depth (m)	0	0.3	1.29	2.16	2.55	2.22	1.68	1.05	1.05	0.63	0.42	0
Velocity (m/sec) at 0.2 d	0	0.42	0.57	0.78	0.87	0.81	0.75	0.63	0.63	0.54	0.45	0
Velocity (m/sec) at 0.8 d	0	0.2	0.36	0.54	0.60	0.30	0.51	0.39	0.39	0.33	0.30	0
Avg Velocity	0	0.315	0.465	0.66	0.735	0.555	0.645	0.51	0.51	0.435	0.375	0

Solve by area velocity method.

UNIT-III

- Q6 (a) Explain all the factors affecting the hydrograph. (5)
 (b) Given the ordinates of a 4h unit hydrograph as given below. Derive the ordinates of a 12h unit hydrograph for the same catchment. (7.5)

Time (hr)	0	4	8	12	16	20	24	28	32	36	40	44
Ordinates 4h UH	0	20	80	130	150	130	90	52	27	15	5	0

- Q7 (a) Explain synthetic unit hydrograph along with Instantaneous unit hydrograph. (5)
 (b) A 6h unit hydrograph of a basin is triangular in shape and has a peak of $60\text{m}^3/\text{sec}$. The peak Occurs at 18 hours from the start and the base length of the unit hydrograph is 54 hours. (7.5)
 i) What is the area of the catchment represented by the Unit hydrograph?
 ii) Calculate the equilibrium discharge of the S_6 - curve of the basin.
 iii) Calculate the flood hydrograph due to a rainfall excess of 2.5cm in the first 6hr period and 3.5cm in the next 6h interval. The base flow can be assumed to be $15\text{ m}^3/\text{sec}$ constant throughout.

UNIT-IV

- Q8 (a) What is flood routing? Explain different types of routing and enlist the uses of flood routing. (5)
 (b) Flood frequency computations for the river Chambal at Gandhisagar dam by using Gumbel's Method, yielding the following results. (7.5)

Return Period T (years)	Peak Flood (m^3/sce)
50	40,309
100	46,300

Estimate the flood magnitude in this river with a return period of 500 years.

- Q9 (a) Explain the following terms: (6)
 i) Design flood.
 ii) Standard design flood.
 iii) Maximum probable flood.
 iv) Design storm.
 (b) A 10cm diameter well penetrates a 10 m thick confined aquifer. The steady state Drawdowns were found to be 2.5 m and 0.05m at distances of 10m and 40m respectively from the centre of the wall when the well was pumped at a constant rate of 125 l/min. Calculate the transmissibility and hydraulic conductivity of the aquifer. (6.5)

END TERM EXAMINATION

FIFTH SEMESTER [B. TECH] NOVEMBER-DECEMBER 2018

Paper Code: ETCE-309

Subject: Geotechnical & Foundation Engg.

Time: 3 Hours

Maximum Marks: 75

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

- Q1 Write short note on following: (2.5×10=25)
- Undisturbed samples.
 - Ultimate bearing capacity of soil.
 - Geomembranes.
 - Braced cuts.
 - Base Failure.
 - Permissible limits of total and differential settlement.
 - Weep holes in retaining walls.
 - Grouting and Injection.
 - Area ratio in exploration of soil.
 - Environmental cycle.
- Q2 What are the purposes of geotechnical exploration? Also, explain the significance of terms area ratio, inside clearance and outside clearance with respect to undisturbed samples of soil. (12.5)
- Q3 A strip footing is to be designed to carry a gross load of 900kN/m at a depth of 1m in a gravelly sand. The appropriate shear strength parameter $c=0$ and $\phi=38^\circ$. Determine the width of the footing if a factor of safety of 3 against shear failure is to be assured. Water table is found to be at foundation level. Above the water table, the saturated unit weight is 18kN/m³ and below the water table, the saturated unit weight is 20kN/m³. For $\phi=38^\circ$, the bearing capacity factors are: $N_q=49$ and $N_\gamma=67$. Unit weight of water is 9.8kN/m³. (12.5)
- Q4 (a) What are under reamed piles? Explain their uses. (6)
(b) A singly-reamed, 8m long RCC pile with 350mm shaft diameter and 750 bulb diameter installed at a depth 500mm from the ground surface within stiff, saturated silty clay (undrained shear strength is 50kPa, adhesion factor is 0.3 and the applicable bearing capacity factor is 9) to counteract the impact of soil swelling on a structure constructed above. Neglecting suction and the contribution of the under-ream to the adhesive shaft capacity, what would be the estimated ultimate load carrying capacity of the pile? (6.5)
- Q5 (a) What is active and passive pressure on the retaining wall? Drive an expression for the active pressure on the wall as per Rankine' (6.5)
(b) A 4m high retaining wall supports a saturated cohesive soil ($\phi=0$) with horizontal surface. The top 2.5m of the backfill has the bulk density and apparent cohesion of the bottom 1.5m is 19.5kN/m³ and 20.3kN/m³ respectively. If the tension crack develops, what would be the total active pressure on the wall? (6)
- Q6 (a) Differentiate between finite and infinite slopes? With diagram. (6)
(b) An infinitely long slope is made up of $c-\phi$ soil having cohesion=20kPa and dry unit weight=16kN/m³. The angle of inclination and critical height of slope are 40° and 5m respectively. What will be the angle of internal friction of the soil to maintain the limiting equilibrium? (6.5)
- Q7 What are caissons? Explain the various types of caissons along with their uses? (12.5)
- Q8 The number of blows observed in a standard penetration test for 0-150mm, 150-300mm and 300-450mm penetration of sampler are 6, 8 and 10 respectively. The water table is at the ground surface. Test is performed at a depth of 10m below the ground surface. The unit weight of soil is 16kN/m³. What will be the N-value after all corrections? (12.5)

END TERM EXAMINATION

FIFTH SEMESTER [B.TECH.] NOVEMBER-DECEMBER 2018

Paper Code: ETCE-311

Subject: Waste Water Engineering
and Reuse

Time: 3 Hours

Maximum Marks: 75

Note: Attempt five questions in all including Q.No.1 which is compulsory.
Select one question from each unit. Make necessary assumptions
wherever required and clearly state them.

Q1 Attempt any three:-

- (i) Explain the role of determination of solids in sewage. How do you determine the suspended solids in a given sample? (5)
- (ii) Draw a neat and labelled flow diagram showing the various treatment units involved in the treatment of sewage. (5)
- (iii) State the characteristics of good ventilating system. (5)
- (iv) State the merits and demerits of attached growth and suspended growth of biological treatment of sewage. (5)

UNIT-I

- Q2 (a) Differentiate between (i) Self cleansing velocity and limiting velocity (ii) Separate and combined sewage systems. (4)
- (b) A main combined sewer is to be designed to serve an area of 12 sq. km with a population density of 250 persons/hectare. The average rate of sewage flow is 250 lpcd. The maximum flow is 100% in excess of average together with the rainfall equivalent of 15mm in 24 hours, all of which are runoff. Determine the capacity of sewer. Taking the maximum velocity of flow as 3m/sec, determine the size of circular sewer. (6)
- (c) For a small town, having projected population of 30,000 residing over an area of 20 hectares, find the design discharge for the combined sewer for the following data: (i) Rate of water supply = 150 lpcd (ii) runoff coefficient = 0.4 (iii) Time of concentration = 30 minutes. (5)
- Q3 (a) Explain various methods used for testing of bacteria in sewage. (6)
- (b) Give various treatment standards for sewage effluents discharge. (4)
- (c) Discuss Bangalore and Indore methods of sewage disposal. (5)

UNIT-II

- Q4 (a) Design a continuous flow type oxidation ditch to treat a domestic flow of 3MLD for the following data: (i) BOD₅ of raw sewage = 200 mg/l (ii) Desired BOD₅ of effluent = 25mg/l (iii) SS in raw sewage = 250 mg/l (iv) Desired SS in effluent = 30mg/l (v) Mixed liquor suspended solids = 4600mg/l (vi) Growth yield coefficient = 0.55 (vii) Microorganism decay coefficient = 0.03 (viii) Mean cell residence time = 16 days. (10)
- (b) Explain with the flow diagrams single stage and two stage trickling filters. (5)

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- Q5 (a) Describe with the help of neat sketch, the components of a septic tank, along with the functions of each. Also mention the design criteria involved in design. (7)
- (b) Design an Imhoff tank to treat the sewage from a small town with 30000 population, assume the suspended solids in the influent are 200 ppm. Water content of the sludge is 97%. Design the tank for 3 months sludge storage. Rate of sewage is 135 lpcd. (8)

UNIT-III

- Q6 (a) Explain the biochemical mechanism of the activated sludge process with neat diagram. (5)
- (b) In activated sludge process, what is meant by (i) mixed liquor (ii) MLSS (iii) MLVSS (iv) SVI (v) sludge age? (5)
- (c) The MLSS concentration in an aeration tank is 2000mg/l and the sludge volume after 30 minutes of settling in a 1000 ml graduated cylinder is 180 ml. Calculate SVI, return sludge ratio, SDI. (5)
- Q7 (a) Explain the various stages in the sludge digestion process with diagram. (5)
- (b) Design a digestion tank for the primary sludge for an average flow of 250 MLD, total suspended solids in raw sewage= 200 mg/l, moisture content of digested sludge=85%. (6)
- (c) Discuss Air stripping method for ammonia removal. (4)

UNIT-IV

- Q8 Write notes on the following (i) Intercepting Trap (ii) inverted siphons (iii) drop manhole with diagram. (15)
- Q9 (a) Discuss one and two pipe system of plumbing. (6)
- (b) Explain the methods for the testing of sewers. (6)
- (c) Materials used in construction of sewer. (3)

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END TERM EXAMINATION

SEVENTH SEMESTER [B.TECH.] NOVEMBER- DECEMBER 2018

Paper Code: ETCE-401

Subject: Economics for Engineers

Time : 3 Hours

Maximum Marks :75

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

Q1 Attempt the following:-

(5x5=25)

- (a) Define time value of money?
- (b) What do you mean by marginal utility?
- (c) Define cross Elasticity of Demand?
- (d) Explain Internal Rate of Return?
- (e) Discuss public private partnership?

Q2 (a) Explain Break Even Analysis, with the help of suitable diagram? (6)

- (b) A bonus package pays an employee Rs 1000 at the end of the first year, Rs1500 at the end of the second year and so on, for the first nine years of employment. What is the present worth of the bonus package at 6% interest? (6.5)

Q3 (a) Differentiate between joint stock companies and partnership firms?

(6.5)

- (b) What do you understand by commercial banks? (6)

Q4 (a) Find out annual rate of depreciation based on (i) 'straight line method' and also (ii) 'declining balance method' for an asset purchased for Rs 8,00,000 having life of 4 years with zero value at the end of 4 years. (6)

- (b) What do you mean by equilibrium price under perfect competition. (6.5)

Q5 (a) Discuss inflation and its impact on economy. (6.5)

- (b) What do you mean by Principle of Economic Equivalence? (6)

Q6 Explain functions of Reserve Bank of India. (12.5)

Q7 Why study of Economics is important for engineers? What is its applicability? (12.5)

Q8 (a) What do you mean by store keeping? Give elements of material management. (6)

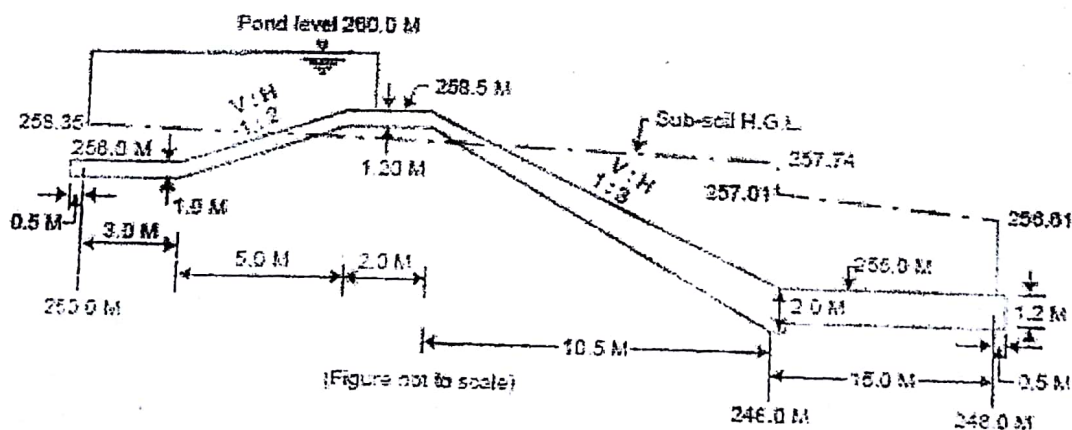
- (b) Explain Taxes and Subsidy and its relevance for engineering economic decision making. (6.5)

END TERM EXAMINATION

SEVENTH SEMESTER [B.TECH] NOVEMBER – DECEMBER 2018

Paper Code: ETCE-403**Subject: Irrigation Engineering****Time : 3 Hours****Maximum Marks : 75****Note: Attempt all questions as directed. Internal choice is indicated.**

- Q1 Attempt **any five** of the following (5×5=25)
- Define duty and delta, and derive their relationship. What are the factors on which duty depends?
 - Explain briefly Khosla's exit gradient concept.
 - What are outlets? What is meant by the term 'Setting of the outlet'?
 - Derive the equation of the term "flexibility" and "proportionality" as applied to modules. Derive equations for them.
 - Briefly explain Chaturvedi's Method for design of transitions.
 - What are the objectives of River Training and what are types of river training?
- Q2 (a) After how many days water shall be supplied to a field in order to ensure sufficient irrigation of the given crop if: field capacity of the soil is 30% permanent wilting point=14%, dry density of soil is 1.3gm/cc, effective depth of root zone is 75cm and daily consumptive use of water for the given crop is 15 mm. (5)
- (b) What are the different types of canal outlets? Explain the performance criteria for canal outlets. (7.5)
- OR**
- (a) The culturable commanded area of a watercourse is 1400 hectares. Intensities of rice and wheat are 10% and 35%, respectively. The duties for the crops at the head of the discharge required at the head of the watercourse. (5)
- (b) What are the causes and effects of water logging? Briefly list the remedial measures for water logging. (7.5)
- Q3 (a) Using Khosla's method, obtain the residual seepage pressures at the 'key' points for the weir profile shown in Figure. Also calculate the value of the exit gradient. Consider the case of no flow at pond level. (7.5)



- (b) What are the functions of a distributary head regulator and a cross regulator? (5)

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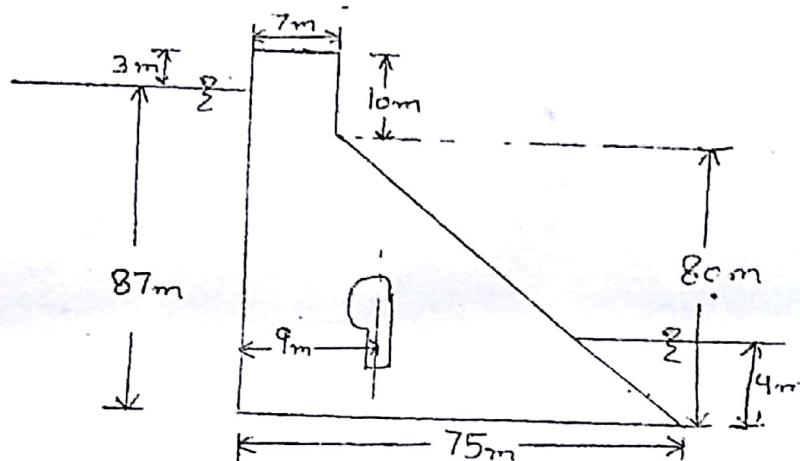
- (a) Discuss the various types of falls with neat sketches. Also discuss the suitability of each type. (7.5)
- (b) What are the roughening measures for energy dissipation? Explain with neat sketches. (5)

Q4 Discuss with neat sketches, the three different types of aqueducts which can possibly be constructed depending upon the size of the drainage to be passed below the canal. Also discuss the factors governing the choice of any of these three types of aqueducts. (12.5)

OR

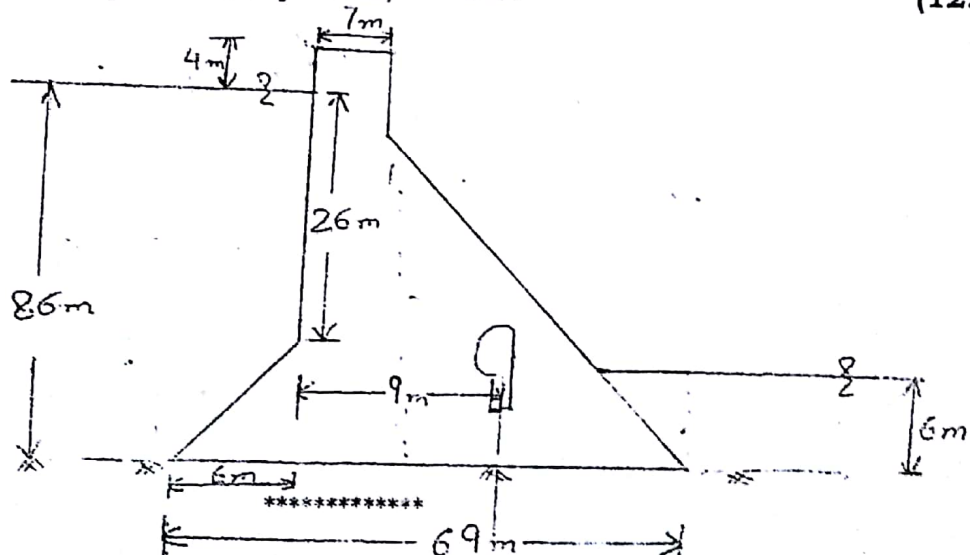
How would you estimate the afflux and the uplift pressure on the roof of the barrel of a siphon aqueduct? Also discuss the general considerations for design of canal head regulator. (12.5)

Q5 Calculate the maximum vertical stress at heel and toe of the dam shown in figure. Neglect the earthquake effect. Also calculate the major principle stress at the toe of the dam and the intensity of shear stress on a horizontal plane near toe. (12.5)



OR

For the following profile investigate the safety against overturning and sliding. Given: Coefficient of friction is 0.75, density of concrete is 2.4 tonnes/m³. Also check the safety against tension and compression, shear strength at the base is 14kg/cm² and Uplift intensity factor, C = 60% (12.5)



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(Please write your Exam Roll No.)

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END TERM EXAMINATION

SEVENTH SEMESTER [B. TECH] NOVEMBER-DECEMBER 2018

Paper Code: ETCE-405

Subject: Transportation Engineering-II

Time: 3 Hours

Maximum Marks: 75

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

(5x5=25)

- Q1 Attempt **any five** parts:-
- (a) Why railway track is called permanent way? What are the ideal requirement of a permanent way?
 - (b) What are the consideration of choice of gauge in india?
 - (c) Explain the grade compensation on horizontal curves and the norms for it on Indian railway?
 - (d) Differentiate between compound curve and reverse curve. What are the condition which warrant their use in Indian railway?
 - (e) Explain the needs of points and crossing in railway?
 - (f) Explain the working of interlocking of signals in railway?
 - (g) What are functions of terminal building at an airport?
 - (h) What are visual aids at airport?

- Q2 What is wind rose? Sketch and explain the marking on shoulder of runway and taxiway? (12.5)

OR

Explain the importance of proper grading of an airport site, bringing out the difference between highway grading and airport grading?

- Q3 Design an exit taxiway for total angle of 36° and a maximum turn off speed of 75 km/h. Radius of entrance curve =720 m, width of runway=45 m, width of taxiway=22.5 m. Suggest the necessary separation clearance. (12.5)

OR

Determine the radius of a taxiway for subsonic aircraft for design turning speed of 45km/h. Assume the coefficient of friction between the tyres and pavement is 0.13.

- Q4 A flat catchments of 150 sq.km area is at an average distance 15 km from the coast. Determine the maximum floods discharge using Ryve's formula. (12.5)

OR

Enumerate the structure used to effect drainage in tunnels during construction?

- Q5 Calculate the crossing angles for 1 in 12 crossing using (i) the centre line method (ii) the isosceles triangle method (iii) the right angle method. (12.5)

OR

Calculate the superelevation, maximum permissible speed and the length of transition for 3° curve on a BG section with maximum sanctioned speed of 90km/h. Assume the equilibrium speed to be 75 km/h and the booked speed of the goods train to be 50km/h.

(Please write your Exam Roll No.)

END TERM EXAMINATION

SEVENTH SEMESTER [B.TECH] NOVEMBER-DECEMBER 2018

Paper Code: ETCE-413

Subject: Earthquake Technology

Maximum Marks: 75

Time: 3 Hours

Note: Attempt all questions as directed. Internal choice is indicated.
Assume missing data suitably if not given.

Q1 Short answer type questions:-

- Classify types of earthquake and various causes of earthquake? Explain in detail what are seismic waves and its types. (3+2)
- Differentiate between soft storey and weak storey in a building. (5)
- Derive dynamic equation of motion to discuss free vibration of viscous damped SDOF system. (5)
- Discuss different methods of seismic analysis of a structure. (5)
- What is the effect of an earthquake on non-structural components in a building? What measures should be considered for earthquake protection of horizontal and vertical projections of a building. (2+3)

Q2 Discuss different methods to quantify the size of an earthquake? Explain various methods for characterization of a strong motion. (12.5)

OR

Write short notes on:-

(2.5x5=12.5)

- Iso-seismal map
- Damping
- Ground failures due to earthquake
- D'Alembert's principle
- Seismic zones

Q3 Write short notes on:-

(2.5x5=12.5)

- Natural frequencies and Mode shapes
- Stodola's method
- Logarithmic decrement
- Transmissibility ratio
- Lumped mass model

OR

- What is the effect of mass, stiffness and damping on structural vibration and their significance in dynamic equation of motion? (5)
- A heavy table is supported by flat steel legs. Its natural period in lateral vibration is 0.5 sec. when a 25 kg plate is clamped to its surface; the natural period in lateral vibration lengthens to 0.75 sec. What are the mass and the effective lateral stiffness of the table? (2.5)
- For a system with damping ratio ξ , determine the number of free vibration cycles required to reduce the displacement amplitude to 10% of the initial amplitude; for the initial velocity being zero. (5)

Q4 Discuss un-damped free vibration analysis of a MDOF system and explain the modal expansion theorem using orthogonality property of the mode shapes. For forced vibration analysis of a damped MDOF system, discuss "Mode-superposition Method" explaining different modal combination rules. (12.5)

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OR

What is the philosophy of earthquake resistant design and what are different code based methods of seismic design of structures? What are different types of lateral load resistant system? What are the IS code provisions for drift limitations in a building? (6.5+3+3)

- Q5 What do you understand by response control of a building? Categorically identify different methods of response control. Explain the importance of ductility in ERD of buildings (both steel and RCC buildings) as well as the IS code provisions for ductility requirements in the building. (2.5+5+5)

OR

Explain different levels of seismic evaluation of existing buildings. What are different types of irregularities in a building and their effect on seismic performance of the building? Explain various retrofitting techniques for seismic strengthening of existing buildings? (5+4+3.5)

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(Please write your Exam Roll No.)

Exam Roll No. 01725602415

END TERM EXAMINATION

SEVENTH SEMESTER [B.TECH] NOVEMBER-DECEMBER 2018

Paper Code: ETEN 419
ETEN 421

Subject: Planning & Design of Green Buildings

Time : 3 Hours

Maximum Marks :75

Note: Attempt five questions in all including Q. No. 1 which is compulsory.

- Q1. Write the short notes on the following: (5x5=25)
- CO₂ emission trade
 - Barriers of green building
 - Passive cooling
 - Pest control in green building
 - Blower Door test
- Q2. a) Give the brief note on the historical development of green building. (6)
b) Elaborate the concept of green building. Give any one example of green building. (6.5)
- Q3. What is GRIHA, LEED & IGBC? Explain LEED rating system in detail. (12.5)
- Q4. Discuss the concept and principle of Earth Air Tunnel System in detail. Also indicate the importance parameters that impact the performance of the Earth Air Tunnel System. (12.5)
- Q5. What are the problems associated with selection of inappropriate building materials? Also explain about the materials and furnishings used in the construction of green buildings. (12.5)
- Q6. What are the different type of waste generated during the entire life cycle of conventional building and how it can be managed in green building? (12.5)
- Q7. How following features helpful in designing energy efficient building? (12.5)
- Orientation of building
 - Site selection and development
 - Building envelopes
- Q8. What are the source of air and noise pollution during construction and demolition activities and also discuss the guidelines to reduce the air and noise pollution during the same. (12.5)
- Q9. How the water can be conserved and water efficiency of green building can be increased during the construction and operation phase of green building. (12.5)
