

(Please write your Exam Roll No.)

Exam Roll No. 42025603915

# END TERM EXAMINATION

FIFTH SEMESTER [B.TECH] NOVEMBER-DECEMBER- 2017

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

Time: 3 Hours

Maximum Marks: 75

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

- Q1 Attempt **any five** of the following:-
- (a) What is the significance of the informal communication? (5)
  - (b) Explicate the term Chronemics. (5)
  - (c) What is the role of memo in an organization? (5)
  - (d) Describe 'Emotional Intelligence'. (5)
  - (e) 'Listening is an art'. Comment (5)
  - (f) What is self-image? (5)
  - (g) Describe Proxemics. (5)

## UNIT-I

- Q2 What is SWOT analysis? Why is it essential in personal development? Analyze your own personality using SWOT. (12.5)
- Q3 Describe the salient features of professional communication. Illustrate your points. (12.5)

## UNIT-II

- Q4 What is Non-verbal communication? Explain the elements of Non-verbal communication. (12.5)
- Q5 What is Phonetics? Transcribe **any ten** words as per IPA symbols. (2.5+10=12.5)
- i. Sick
  - ii. Bad
  - iii. Perception
  - iv. Chalk
  - v. Examination
  - vi. Please
  - vii. Write
  - viii. Pleasure
  - ix. chair
  - x. Car
  - xi. There
  - xii. Thin

## UNIT-III

- Q6 Attempt both parts:-
- (i) Write a letter to the Manager, SBI on behalf of Fashion Flash Ltd, requesting him to increase credit limit from 40 lacs to 60 lacs. (8)
  - (ii) How does a Report differ from a Project-proposal? (4.5)
- Q7
- (i) Prepare your resume, considering 10 years of experience in your respective field. (8)
  - (ii) Define bibliography and write a bibliography entry in IEEE style.. (4.5)

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**UNIT-IV**

- Q8 What do you mean by a Group Discussion and what are the various aspects of the group dynamics that one should keep in mind before participating in a Group Discussion. (12.5)
- Q9 Describe the Dos and Don'ts for an interviewer during a job interview. (12.5)

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# END TERM EXAMINATION

FIFTH SEMESTER [B.TECH] DECEMBER 2017

Paper Code: ETCE-303 (Batch 2013-17) Subject: Advanced Structural Analysis

Time: 3 Hours

Maximum Marks: 75

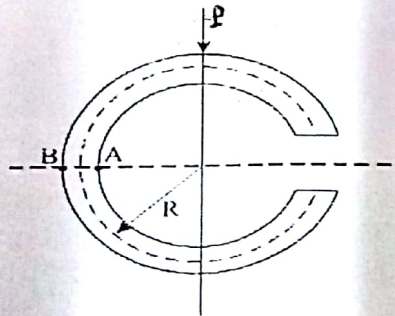
Note: Attempt all questions as directed. Internal choice is indicated.  
Assume suitable missing data if any.

- Q1 Attempt **any five** of the following: - (5x5=25)
- A continuous beam simply supported at A, B and C. The AB and BC are each of length L. Find the value of W at collapse acting on L/2 distance from each end on both the spans.
  - Draw ILD for the following in two hinged arches
    - ILD for bending moment at a given section
    - ILD for normal thrust at a given section
    - ILD for radial shear at a given section
  - Define stiffness coefficient and stiffness matrix. How is the structure stiffness matrix related to the element stiffness coefficient?
  - Describe theory of arches and derive the Eddy's Theorem.
  - The Stiffness method is also known as displacement method or equilibrium method. Why?

- Q2 A two hinged parabolic arch of span 20m and rise 4cm carries a UDL of 50kN/m on left half of span. Find the reactions at supports and position and magnitude of maximum bending moment. (12.5)

OR

The circular link as shown in fig has a circular cross-section 3 cm in diameter. The inside diameter of ring is 4 cm. the load P is 1000 kg. Calculate the stress at A and B. Compare the values with those found by straight beam formula. Assume that the material is not stressed above its elastic strength.



- Q3 Analyse the continuous beam as shown in fig. if the support B of the continuous beam has a downward settlement of 30 mm. Take  $EI = 45600 \text{ kN-m}^2$ . By flexibility method (12.5)

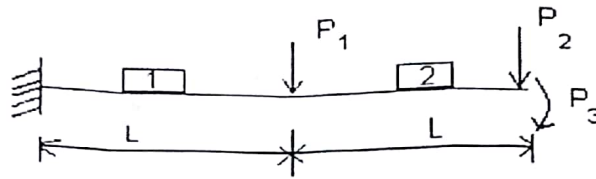
OR

By stiffness method

Assume any type continuous beam with vertical load (P)  
B downward settlement of 30 mm  
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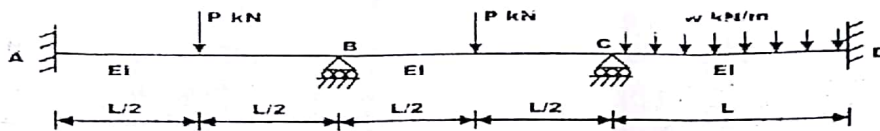
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- Q4 What do you mean by flexibility matrix? Explain in brief. Generate the flexibility matrix with the coordinate shown in fig. (12.5)

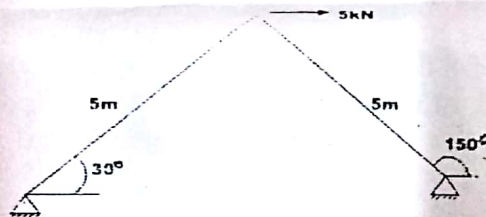


OR

Briefly explain stiffness matrix, Generate the stiffness matrix of the structure as shown in fig.

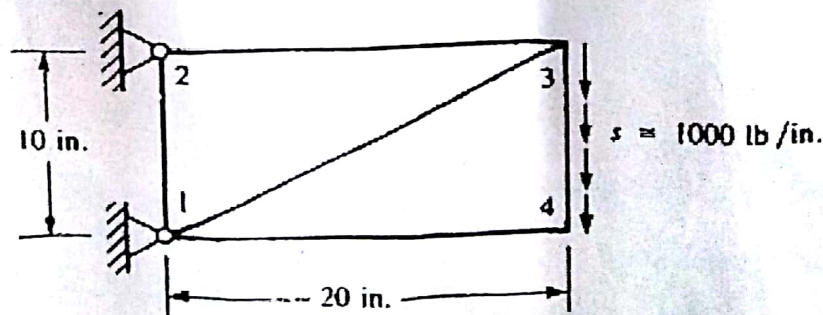


- Q5 Analyse the two member truss shown in fig. Assume EI to be constant for all members. The length of each member is 5 m. (12.5)



OR

Determine the nodal displacements and element stresses, including principal stresses, for the thin plate of section 6.5 with a uniform shear load (instead of a tensile load) acting on the right edge as shown in fig. Use  $E = 30 \times 10^6$  psi,  $\nu = 0.30$  and  $t = 1$  in.



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FIFTH SEMESTER [B.TECH] DECEMBER 2017

Paper Code: ETCE-305

Subject: Design of Steel Structures

Time: 3 Hours

Maximum Marks: 75

Note: Attempt any five questions including Q.no.1 which is compulsory.  
Assume any missing data suitably, if not given. Use of relevant  
Indian Codes/Guidelines is permitted.

- Q1 Attempt any five parts: (5x5=25)
- (a) What are the different types of loads to be considered for design of steel structures?
  - (b) What is the difference between the stringer and crossed girder?
  - (c) Compare welded joints with bolted joints with respect to strength, efficiency and workmanship.
  - (d) State purpose of providing Lug angle.
  - (e) Define Slenderness Ratio of compression member. State its limiting value in case of member carrying axial compression due to dead load and live load.
  - (f) State the situation where Gusseted base is used. Draw neat labelled sectional elevation.
  - (g) Differentiate between Laterally supported and laterally unsupported beams.
- Q2 An industrial building has trusses for 16 m span. Trusses are spaced at 4 m c/c and rise of truss is 4 m. Calculate panel point load in case of Live Load and Wind Load using following data: (12.5)
- (a) Coefficient of external wind action = - 0.7
  - (b) Coefficient of internal wind action =  $\pm 0.2$
  - (c) Design wind pressure = 1.2
  - (d) No. of panels = 12
- Q3 A tie 0.95 m long carries factored load of 150 kN. State whether the ISA 50 x 50 x 6 ( $A_g = 568 \text{ mm}^2$ ) is suitable as tie or not? Also 16 mm dia bolts are provided in one line. Take  $f_u = 410 \text{ MPa}$ ,  $f_y = 250 \text{ MPa}$  and  $\gamma_{m0} = 1.1$  and  $\gamma_{m1} = 1.25$ . (12.5)
- Q4 A hall has trusses spaced at 3 m c/c having span 12 m. Rise of truss is 4 m and no. of panels in truss are 10. Determine panel point load due to Dead Load and Wind Load for following data: (12.5)
- (a) Intensity of load due to purlin, bracing and sheeting together excluding self-weight = 600 MPa
  - (b) Coefficient of external and internal wind action are (-0.6) and ( $\pm 0.2$ ) respectively.
  - (c) Design wind pressure is 1.1 kPa.
- Q5 An ISMB 400 @ 604.3 N/m is used as a simply supported beam for 3.5 m span. The compression flange of beam is laterally supported throughout the span. Determine design flexural strength of member. Also calculate working uniformly distributed load the beam can carry per m span? Check the member for deflection? Take  $Z_p = 1176.18 \times 10^3 \text{ mm}^3$ ,  $\gamma_{m0} = 1.1$ ,  $\beta_b = 1$  and  $f_y = 250 \text{ MPa}$ . (12.5)

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- Q6 Design a column of effective length 6.5 m. It is subjected to an axial load of 1200 kN. Provide two channel sections back to back with lacing. Design suitable lacing system also? (12.5)
- Q7 (a) ISLB 200 as a beam carries service uniformly distributed load of 50 kN/m over 3.5 m span and is laterally supported. Check the section for shear capacity if  $f_y = 250$  MPa,  $\gamma_{m0} = 1.1$  and  $t_w = 5.4$  mm. (6)
- (b) Calculate value of least radius of gyration of a compound column consisting of ISHB 250 with one cover plate 300 x 20 mm on each flange. For ISHB 250,  $A = 6971$  mm<sup>2</sup>,  $I_{zz} = 7983.9 \times 10^4$  mm<sup>4</sup>,  $I_{yy} = 2011.7 \times 10^4$  mm<sup>4</sup>. (6.5)
- Q8 Explain the following terms: (4)
- (a) Differentiate modes of failure in columns. (4)
- (b) Design of gantry girder. (4.5)
- (c) Design of frames as per Indian Standard Codal Provisions.

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FIFTH SEMESTER [B.TECH] DECEMBER 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. Select one question from each Unit. Graph sheets may be used, if required.

- Q1 Attempt any five question: (10x2.5=25)
- (a) Explain with neat sketch about Hydrologic cycle? What is potential evapotranspiration?
  - (b) What are the various losses which occur in the precipitation to become runoff? What are the factors affecting the seasonal and annual yield (annual run off) of a catchments.
  - (c) What is watershed simulation?
  - (d) What are the limitations of flood frequency studies?
  - (e) What are the factors affecting the runoff coefficient C in rational formula.
  - (f) What are the geological formations in India which have potential as aquifers?
  - (g) Distinguish between specific capacity of a well and specific yield of an aquifer.

## Unit-I

- Q2 (a) Explain the procedure for plotting the depth-area-duration curves. What are their uses? Also plot the depth-area-duration curves for 12 hour duration for the following data for estimation of average rainfall depth. (8.5)

<b>Isohyets (mm)</b>	300	250	200	150	100	Less than 100
<b>Area enclosed (km<sup>2</sup>)</b>	450	780	1250	1630	1800	1850

- (b) Explain with neat sketches different methods for the estimation of average rainfall depth over an area. (4)

- Q3 (a) Differentiate between consumptive used and evapotranspiration. Briefly explain the methods of estimation of evapotranspiration? (5)
- (b) What are the factors affecting infiltration rate? For the storm of 3-hr duration, the rainfall rates are as follows:

<b>Time period (minutes)</b>	30	30	30	30	30	30
<b>Rainfall rate (cm/hr)</b>	1.4	3.4	4.8	3.2	2.0	1.2

If the surface runoff is 3.4 cm. Draw the graph and determine the  $\Phi$ -index and W-index. (7.5)

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## Unit-II

- Q4 (a) Explain the salient features of a current meter. Describe briefly the procedure of using a current meter for measuring velocity in a stream. (5)  
 (b) The following data were collected at a gauging station on a stream. Compute the discharge by the mid section method. (7.5)

Distance from one bank (m)	0	3	6	9	12	15	18	21	24	27
Water depth(m)	0	1.5	3.2	5.0	9.0	5.5	4.0	1.6	1.4	0
Mean velocity (m/s)	0	0.12	0.24	0.25	0.26	0.24	0.23	0.16	0.14	0

- Q5 (a) With the aid of neat sketches, describe a flow mass curve, its limitations and explain how it could be used for determination of (12.5)  
 (i) The minimum storage needed to meet a constant demand.  
 (ii) The maximum constant maintainable demand from a given storage.

## Unit-III

- Q6 (a) What are the factors affecting a flood hydrograph? (4.5)  
 (b) The flood hydrograph of a small stream is given below. Analyse the recession limb of the hydrograph and determine the recession coefficients and estimate the groundwater storage at the end of 7<sup>th</sup> day from the occurrence of peak. (8)

Time (days)	0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	5.0	6.0	7.0
Discharge (m <sup>3</sup> /s)	155	70.0	38.0	19.0	9.0	5.5	3.5	2.5	1.9	1.4	1.2	1.1

- Q7 (a) What is meant by synthetic Unit Hydrograph? Explain the procedure of Snyder's Synthetic-Unit Hydrograph. (5)  
 (b) Two catchment A and B are considered meteorologically similar. Their catchment characteristics are given: Catchment A:  $L = 30\text{km}$ ,  $L_{ca} = 15\text{km}$ ,  $A = 250\text{ km}^2$  & For catchment B:  $L = 45\text{km}$ ,  $L_{ca} = 25\text{km}$ ,  $A = 400\text{km}^2$ . For catchment A, a 2-hour unit hydrograph was developed and was found to have a peak discharge of  $50\text{ m}^3/\text{s}$ . The time to peak from the beginning of the rainfall excess in this unit hydrograph was 9.0h. Using Snyder's method, develop a unit hydrograph for catchment B. (7.5)

## Unit-IV

- Q8 (a) What do you understand by time of concentration of a catchment? Describe briefly methods of estimation of the time of concentration. (6)  
 (b) The mean annual flood of a river is  $600\text{ m}^3/\text{s}$  and the standard deviation of the annual flood series is  $150\text{m}^3/\text{s}$ . What is the probability of a flood of magnitude  $1000\text{m}^3/\text{s}$  occurring in the river within next 5 years? Use Gumbel's method and assume the sample size to be very large. (6.5)
- Q9 (a) Develop the equation relating the steady-state discharge from a well in an unconfined aquifer and depth of water table at two known position from the well. State clearly all the assumptions involved in you deviation. (6.5)  
 (b) What are the commonly used methods to assess the recharge of ground water in an area? Explain briefly any one method. (6)

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FIFTH SEMESTER [B.TECH] NOVEMBER-DECEMBER 2017

Paper Code: ETCE-309

Subject: Geotechnical & Foundation Engg..

Time: 3 Hours

Maximum Marks: 75

Note: Attempt any five questions including Q.No1 which is compulsory.

- Q1 Write a brief note on following:- (10x2.5=25)
- Long term & short term failure of the slopes
  - Braced Excavation
  - Stability requirements of the retaining wall
  - Permissible total and differential settlement
  - Purpose of geotechnical exploration
  - Types of piles
  - Geosynthetics
  - Mat foundation
  - Environmental cycle
  - Landslides
- Q2 (a) Write a note on depth, location and spacing of bore hole (6.5)  
(b) Explain how static cone penetration test (SCPT) is performed at the site. Write the equation for finding bearing capacity by SCPT. (6)
- Q3 (a) How the plate load test is performed as per IS 1888:1982. Discuss the limitations of this test. (6.5)  
(b) A square footing is to be constructed at a depth of 2.5 m below the ground surface on a silty clay for which cohesion is  $39 \text{ kN/m}^2$  and bulk density is  $18.5 \text{ kN/m}^3$ . the total load applied to the soil is 360 kN uniformly distributed. Find out the size of footing using Terzaghi's analysis. The factor of safety is 2.5 and water table correction factors is 0.5. Take  $N_c=10$ ,  $N_q=2$  and  $N_\gamma=2$  (6)
- Q4 (a) How the load carrying capacity of pile foundation is determined by dynamic formulae. (6)  
(b) Determine the outside diameter of an open caisson to be sunk through 35m of sand water to bed rock. The caisson is subjected to a load of 45 MN. Assume the allowable bearing capacity is  $2 \text{ MN/m}^2$  and mantle friction is  $30 \text{ kN/m}^2$ . Find the thickness of the seal also. (6.5)
- Q5 What is the difference between active and passive earth pressure. A vertical retaining wall 12 m high supports a sandy soil with bulk density  $18.5 \text{ kN/m}^3$ . The upper surface of the backfill rises from the crest of wall at an angle of  $14^\circ$  with the horizontal. Determine the total active earth pressure by Culmann's method. Assume  $\phi=35^\circ$  and  $\delta=12^\circ$ . (12.5)
- Q6 (a) Discuss Swedish slip circle method for the stability of finite slopes. Explain how centre of critical slip circle is located by Fellenius method. (6)  
(b) A 10 m deep silty clay cut has an inclination of  $45^\circ$ . The soil properties are:-  
 $C_u=35 \text{ kPa}$ ,  $\phi_u=10^\circ$  and  $\gamma=18.5 \text{ kN/m}^3$ . Find the critical height of the slope in this soil. (6.5)

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- Q7 Write short notes on any four of the following:- (3+3+3+3.5=12.5)
- (a) Pre-compression
  - (b) Grouting
  - (c) Soil contamination
  - (d) Joints in retaining wall
  - (e) Negative skin friction
  - (f) Immediate settlement
- Q8 (a) Explain how Terzaghi's theory of bearing capacity is modified for square and circular footings? (7)
- (b) Briefly describe the closure of landfills (with a neat sketch) and monitoring requirements. (5.5)

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# END TERM EXAMINATION

FIFTH SEMESTER [B.TECH] DECEMBER 2017

Paper Code: ETCE-311

Subject: Wastewater Engineering and Reuse

Time: 3 Hours

Maximum Marks: 75

Note: Attempt all questions as directed. Internal choice is indicated. Make necessary assumptions wherever required and clearly state them.

- Q1 (a) Explain the use of rational formula for the design of drains draining Indian catchments. Up to how much hectares of catchments it can be safely used? (5)
- (b) Why circular section is more commonly used in the construction of sewers? What are the advantages of egg - shaped section and under what condition of flow does it become more useful? Will you recommend its use, for sanitary sewer and if not why? (5)
- (c) What is sewage farming? What are its advantages over the method of disposal of sewage by dilution? What precaution should be taken in its operation to prevent health hazard either to farm workers or to the consumer using the produce. (5)
- (d) Give a line diagram of the method of purifying sewage from outfall sewer to the effluent discharge points in the river. (5)
- (e) Explain the problems commonly encountered in the maintenance of sewers. Also describe the method employed to tackle these problems. (5)

- Q2 (a) Differentiate: (6)
- (i) Inlet time and channel flow time
- (ii) Critical rainfall duration and critical rainfall intensity
- (iii) Non-silting and Non-scouring velocity.
- (b) A 30 cm diameter sewer having an invert slope of 1 in 150 was flowing full. What would be the velocity of flow and discharge? Is the velocity self cleansing? Assume  $n = 0.013$ . What would be velocity and the discharge when the same is flowing at 0.20 and 0.80 of the full depth? (6.5)

OR

- Q3 (a) State the routine tests carried out in the laboratories at sewage treatment plants and explain the significance each of them. (6)
- (b) The 7 days  $20^{\circ}\text{C}$  BOD of a sample of sewage is 300 ppm and its 3 days  $37^{\circ}\text{C}$  BOD is 500 ppm. Find out the value of de-oxygenation constant  $k$  and then estimate its 5 days  $30^{\circ}\text{C}$  BOD. (6.5)
- Q4 (a) Differentiate between aerobic and anaerobic treatment of sewage, giving major end products. Name one treatment method with schematic details in each category. (6)
- (b) Design an aerated lagoon to serve for 5000 persons at 100 lpcd, BOD of raw sewage is 200 mg/litre. (6.5)

OR

- Q5 (a) Design a grit chamber for a horizontal velocity of 25 cm/sec and a flow which ranges from a minimum of 25000 cu.m/day to a maximum of 1,00,000 cu.m/day. Average flow is 62500 cu.m/day. (6)
- (b) Explain Type I, II, III and IV settling. (6.5)

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- Q6 (a) Design the complete activated sludge treatment plant for the following data:

Population served	50,000
Average sewage flow	180 l.p.c.d
BOD of raw sewage	200 mg/litre
Raw sewage suspended solids	300 mg/litre
BOD removal in primary treatments	35%
Overall BOD reduction desired	90%

Also calculate the aeration requirements and explain with sketches, how it is to be provided. (12.5)

**OR**

- Q7 (a) What is nitrification & De-nitrification? Explain air stripping process? Why air stripping is employed in waste water treatment? (6)  
 (b) Why digestion of sludge is necessary? Explain with a neat sketch of digestion tank its working. (6.5)

- Q8 (a) Explain the various types of aeration adopted in activated sludge process. (6)  
 (b) Explain in detail about laying, jointing and testing of sewers. (6.5)

**OR**

- Q9 Write short notes on:  
 (a) One and two pipe system of plumbing. (3)  
 (b) Inverted Syphon (3)  
 (c) Factors governing the selection of pump in sewage pumping station (3)  
 (d) Grease and oil traps (3.5)

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