

(Please write your Exam Roll No.)

Exam Roll No. 40818003416

# END TERM EXAMINATION

THIRD SEMESTER [B.TECH] DECEMBER 2017

Paper Code: ETCE-209

Subject: Surveying

Time: 3 Hours

Maximum Marks: 75

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

- Q1 Attempt the following questions: (5x5=25)
- (a) What are the principles and methodologies used in tachometric survey?
  - (b) What is the topographic map and its importance in surveying?
  - (c) Describe the various methods of contouring. Also explain with neat sketches, the uses of contour maps.
  - (d) Differentiate between methods of repetition and reiteration used in theodolite survey.
  - (e) What are the major steps involved in planning of a survey?
- Q2 (a) What is the significance of Laplace station in triangulation? Illustrate various method of measuring baselining. (8)
- (b) Explain briefly and write short notes on DGPS. (4.5)
- Q3 The traverse data containing lengths and interior angles of a traverse are given below. The bearing of line PQ was observed and recorded as S 36° 12' 30" E. Check the traverse for angles and closing errors, if any. Find the correct latitudes and departure by transit method. (12.5)

Line	Length	Station	Included Angle
PQ	102.8	P	131° 14' 30"
QR	98.4	Q	84° 19' 25"
RS	110.8	R	116° 35' 25"
ST	82.8	S	119° 58' 05"
TP	113.29	T	87° 54' 0.5"

- Q4 (a) What is the principle of Plane Table surveying? Explain two-point and three-point problems by mechanical and graphical method. (8.5)
- (b) What factors should be considered by the surveyor when setting the specifications for accuracy on a given project? (4)
- Q5 What is 'closing error'? What are the different methods of balancing the closing error in a closed traverse? Explain any one method. (12.5)
- Q6 (a) Write short note on: (i) Transition curve (ii) Vertical curves. (8)
- (b) Convert following bearings from W.CB to R.B. (4.5)
- (i) 210° 0' (ii) 450° 15' (iii) 135° 45'
- Q7 An offset is measured with an accuracy of 1 in 40. If the scale is plotting is 1 cm = 20, 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. (12.5)
- Q8 (a) Explain temporary adjustment of theodolite. (5)
- (b) What are the usual principles of digitizing distance in a Total Station? Why is the reflector a corner cube prism? (7.5)

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## END TERM EXAMINATION

THIRD SEMESTER [B.TECH] DECEMBER- 2017

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** parts from the following:- (5x5=25)
- (a) Differentiate between cavity wall and partition wall?
  - (b) Define the damp proofing and their use in building construction?
  - (c) Briefly define the doors in a technical term and their uses?
  - (d) Write a short note on various types of the glasses and their uses in the building construction?
  - (e) Differentiate between ready mix concrete and pre cast concrete?
  - (f) Differentiate between door and windows with a standard size?
  - (g) What do you understand by plastering and pointing?

- Q2 (a) Define the bricks? Write down the manufacturing and classification of bricks and their uses? How the Conventional brick is different in comparison to modular brick. (12.5)

OR

- Q3 Define the pozzulana cement? Write down the properties and their classification on the basis of uses in building construction? (12.5)

- Q4 Define the green building concept? What are the green features? Also explain any one of the rating systems. (12.5)

OR

- Q5 Explain the workability, mix proportion and grade of concrete? What are types of grade used mainly in construction work? (12.5)

- Q6 Discuss in details about deep and shallow foundation with neat sketches? Write down the basic components of the building? (12.5)

OR

- Q7 Discuss the brick and stone masonry? Give safe permissible loads on brick masonry:

(i) Brick masonry in mud (ii) Brick masonry in c.m. I class (iii) Ordinary brickwork in 1.m. (12.5)

- Q8 What do you understand by smart materials and also discuss about their uses in structures. (12.5)

OR

- Q9 Explain the various types of staircases with a suitable diagrams? Also discuss which type of stairs are most suitable in Multi-storey buildings?(12.5)

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**END TERM EXAMINATION****THIRD SEMESTER [B.TECH] NOVEMBER - DECEMBER 2017****Paper Code: ETCE-203****Subject: Strength of Materials****Time: 3 Hours****Maximum Marks: 75****Note: Attempt any five questions including Q no.1 which is compulsory.****(10x2.5=25)**

Q1 Attempt all parts:-

(a) Define complimentary shear stress.

(b) What do we mean by neutral axis?

(c) Define point of contraflexure.

(d) What do we mean by longitudinal strain, lateral strain and Poisson's ratio?

(e) Differentiate between a fixed support and simple support with the help of free body diagram.

(f) Define slenderness ratio in case of columns.

(g) What do we mean by principle planes and principle stresses?

(h) Write the assumptions of theory of pure torsion.

(i) Differentiate between long and short columns.

(j) State Castigliano's Theorem.

Q2

At a point within a body subjected to two mutually perpendicular direction the stresses are 80MPa tensile and 40 MPa tensile. Each of the above stress is accompanied by a shear stress of 60 MPa. Determine the normal stress, shear stress and resultant stress on an oblique plane inclined at an angle of  $45^\circ$  with the axis of minor tensile stress with the help of Mohr circle. Also find the principle stresses and location of principle planes.

**(12.5)**

Q3

A beam 8.5 m long rests on supports 5 m apart. The right hand end overhanging by 2m and left end by 1.5m. the beam carries a uniformly distributed load 50kN per meter 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 on all the important values of shear force and bending moment. State the position of point of inflexion on the beam.

**(12.5)**

Q4

The cross-section of the cast iron beam is shown in the Fig.1. This beam is simply supported at the ends and carries a uniformly distributed load of 20 kN/m. If the span of the beam is 3 m, determine the maximum tensile and compressive stresses in the beam.

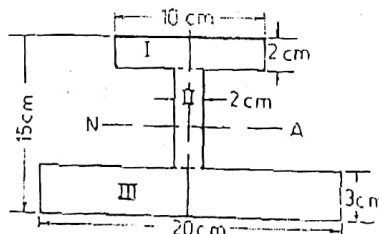
**(12.5)**

Figure 1

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- Q5 A beam of length 4m is simply supported at its ends. It carries a uniformly distributed load of 20 kN/m as shown in Figure 2. Determine the deflection of the beam at its mid-point and also the position of maximum deflection. Take  $E=200$  GPa and  $I=9600$  cm<sup>4</sup>. (12.5)

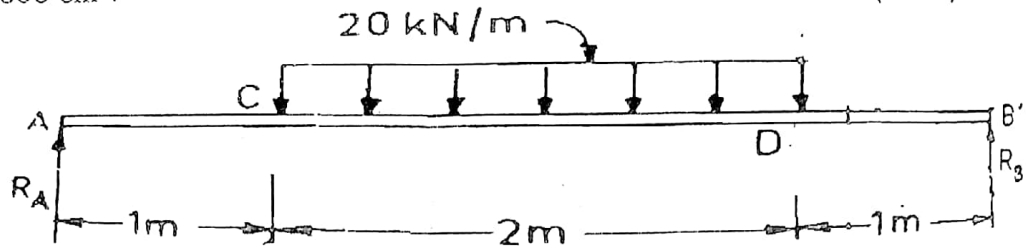


Figure 2

- Q6 A masonry dam, 8m high, 1.5 m 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<sup>3</sup> and that of the masonry is 2240 kg/m<sup>3</sup>. (12.5)
- Q7 A solid shaft is to transmit 300 kW at 100 r.p.m. If the shear stress is not to exceed 80 MPa, find the diameter of the shaft. What percent saving in weight would be obtained if this shaft is to be replaced by a hollow one whose internal diameter equals 0.6 of the external diameter? The length, material and maximum shear stress being the same. (12.5)
- Q8 (a) Derive the expression for Euler's for a column fixed at its both ends. (6)  
 (b) Compare the crippling loads given by Rankine's and Euler's formulae for tubular strut 225 mm long having outer and inner diameters 37.5 mm and 32.5 mm respectively loaded through pin joints at both ends. Take yield stress as 315 MPa;  $\alpha = \frac{1}{7500}$ ; and  $E=200$  GPa. If the elastic limit for the material is taken as 200 MPa, below what length of the strut does the Euler formula ceases to apply. (6.5)

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Q5  
 Q6  
 Q7  
 Q8

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# END TERM EXAMINATION

THIRD SEMESTER [B.TECH] DECEMBER 2017

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. Assume suitable missing data, if any.

- Q1 (a) Give a general view of the internal structure of earth as revealed by seismological evidence.  
(b) What is the importance of geological investigation for the design of Tehri dam, a tunnel in Rohtang pass and a rail road bridge covering a deep gorge in Kashmir?  
(c) What are secondary minerals? How are they formed? Give their significance in rocks.  
(d) What are hot water springs? Give the geological conditions for the formation of hot water springs in otherwise cold climatic conditions.  
(e) Write notes on:  
(i) Glacial erosion  
(ii) application of Photo-geology
- (5x5=25)

## Unit-I

- Q2 (a) Describe in detail, the process of weathering of rocks. How does weathering effect the strength and engineering importance of rocks?(6)  
(b) How are rocks classified? Describe the major distinguish properties of the major rocks types. (6.5)
- Q3 (a) Give an account of erosional and depositional landforms created by the action of rivers. (6)  
(b) Describe the following rocks, giving their mineralogical composition, texture and engineering importance. (6.5)  
(i) Granite  
(ii) White marble  
(iii) Sandstone

## Unit-II

- Q4 (a) How would you distinguish between (illustrate with sketches). (4)  
(i) Normal fault and reverse, fault.  
(ii) Longitudinal and reverse, fault.  
(b) What are folds? How are they caused? Give the importance of folds in civil engineering projects. (8.5)
- (2+3+3+4.5=12.5)
- Q5 Write short notes:  
(a) Unconformities  
(b) Geometric and Genetic joint  
(c) Primary and secondary structure in rocks  
(d) Dip and strike, with appropriate sketches.

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**Unit-III**

**(3+3+3+3.5=12.5)**

- Q6 Write short notes on:
- (a) Salt water intrusion
  - (b) Safe yield
  - (c) Types of aquifers
  - (d) Tectonic earthquakes

**(2.5+2.5+2.5+5=12.5)**

- Q7 Explain the following terms:
- (a) Epicentre
  - (b) Seismogram
  - (c) Ground water hazard
  - (d) Earthquakes leading to tsunamis

**Unit-IV**

- Q8 (a) Discuss the objectives and general methods of geological investigation for major engineering projects. **(6.5)**
- (b) Discuss those geological situations, which if ignored at time of planning and design, could be cause of a dam disaster. **(6)**

- Q9 (a) Compare and contrast relative geological merits and demerits of tunnel and open cuts for projects such as Road/rail traffic, Water transfer and pedestrian path. **(6.5)**
- (b) What are the common types of Landslides? Give scientific reasons for the occurrence of Landslides? **(6)**

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# END TERM EXAMINATION

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

Paper Code: ETCE-205

Subject: Fluid Mechanics

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 all the questions:-

(2.5x10=25)

- (a) Define Newtonian and non Newtonian fluids.
- (b) Explain the phenomenon of capillarity and give the expression for capillary rise of a liquid.
- (c) Explain the significance of dimensional analysis as applied through fluid flow problems.
- (d) Explain the following terms:- (i) centre of buoyancy (ii) meta centric height
- (e) How can unsteady flow be transformed into a steady flow?
- (f) Differentiate between (i) stream function and velocity potential function (ii) rotational and irrotational flows.
- (g) If specific gravity of a liquid is 0.8, calculate its mass density, specific volume and specific weight.
- (h) What are hydraulic coefficients? Name them.
- (i) Define vena contracta.
- (j) State the momentum equations.

## UNIT-I

- Q2 (a) Find out the minimum size of glass tube that can be used to measure water level if the capillary rise in the tube is to be restricted to 2 mm. Consider surface tension of water in contact with air is 0.0736 N/m. (6.5)
- (b) Define total pressure and centre of pressure. Also define and classify manometers. (6)

## OR

- Q3 (a) Obtain an expression for the bulk modulus of elasticity 'K' of a fluid in terms of pressure 'P' and the mass density 'ρ'. (6.5)
- (b) Explain the procedure of finding hydrostatic forces on curved surfaces. (6)

## UNIT-II

- Q4 (a) Water flows through a pipe AB 1.2m diameter at 3 m/s and then passes a pipe BC 1.5 m diameter. At C, the pipe branches. Branch CD is 0.8 m in diameter and carries one-third flow in comparison to flow in AB. The flow velocity in branch CE is 2.5 m/s. Find the volume rate of flow in AB, the velocity in BC, the velocity in CD and the diameter of CE. (9)
- (b) Write and explain the use of continuity equation in Cartesian coordinates. (3.5)

## OR

- Q5 (a) Explain (i) linear translation, (ii) linear deformation (iii) angular deformation, (iv) rotation with neat sketches. (6)
- (b) The velocity components in a two dimensional flow field for an incompressible fluid are as follows:  $u = y^3/3 + 2x - x^2y$  and  $v = xy^2 - 2y - x^3/3$ . Obtain an expression for stream function. (6.5)

## UNIT-III

- Q6 (a) What is a pitot tube? How will you determine the velocity at any point with the help of pitot tube? (6)
- (b) Water is flowing through a pipe having diameters 20 cm and 10 cm at sections 1 and 2 respectively. The rate of flow through pipe is 35 l/s. The section 1 is 6 m above datum and section 2 is 4 m above datum. If the pressure at section 1 is 39.24 N/cm<sup>2</sup>, find the intensity of pressure at section 2. (6.5)

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OR

- Q7 (a) Derive Euler's equation of motion along a streamline for an ideal fluid stating clearly the assumptions. Explain how this is integrated to get Bernoulli's equation along a stream line. (6)
- (b) The inlet and throat diameters of horizontal venturimeter are 30 cm and 10 cm respectively. The liquid flowing through the meter is water. The pressure intensity at inlet is  $13.734 \text{ N/cm}^2$  while the vacuum pressure head at the throat is 37 cm of mercury. Find the rate of flow. Assume that 4% of the differential head is lost between the inlet and throat. Find also the value of  $C_d$  for the venturimeter. (6.5)

UNIT-IV

- Q8 (a) State Buckingham's  $\pi$  theorem. Why this theorem is considered better than Rayleigh's method for dimensional analysis? (6)
- (b) Estimate for a 1:20 model of a spillway (i) the prototype velocity corresponding to a model velocity of  $1.5 \text{ m/s}$  (ii) the prototype discharge per unit width of  $0.2 \text{ m}^3/\text{s}$  per meter (iii) the pressure head in the prototype corresponding to a model of pressure head of 5 cm of mercury at a point. (6.5)

OR

- Q9 (a) What is meant by geometric, kinematic and dynamic similarities? Are these similarities truly attainable? If not, why? (6)
- (b) Using Buckingham's  $\pi$  theorem show that the velocity  $V$  for a fluid of mass density  $\rho$  and dynamic viscosity  $\mu$  through a circular orifice of diameter  $D$  under the head  $H$  is given by  $V = \sqrt{2gH\phi\left[\frac{D}{H}, \frac{\mu}{\rho VH}\right]}$  (6.5)

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**END TERM EXAMINATION**

THIRD SEMESTER [B.TECH] NOVEMBER - DECEMBER 2017

Paper Code: ETMA-203

Subject: Numerical Analysis and Statistical Techniques

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) Define a random variable. Give an example for discrete and continuous random variable each. (4)  
 (b) What do you understand by unbiased estimate of a parameter? Out of sample mean and sample variance, which are unbiased estimate of population parameter? (4)  
 (c) What do you understand by rate of convergence of Newton-Raphson's method, discuss. (4)  
 (d) Explain Picard's method to solve differential equations. (3)

**UNIT-I**

- Q2 (a) At a nuclear plant test are performed to check the corrosion inside the pipes. The test has probability 0.7 of detecting corrosion when it is present, but it has a probability 0.2 of falsely indicating internal corrosion. Suppose the probability that any section of pipe has interval corrosion is 0.1. Find the probability that section of pipe has interval corrosion, given that the test is negative. (8)  
 (b) Define moment generating function and find the moment generating function for Binomial Distribution. (7)
- Q3 (a) Suppose that, on average, 1 person in 1000 makes a numerical error in preparing his or her income tax return. If 10,000 returns are selected at random and examined, find the probability that 6 of them contain an error. (8)  
 (b) Fit a straight line to the data using method of least square (7)

x:	1	2	3	4	6	8
y:	2.4	3.1	3.5	4.2	5.0	6.0

**UNIT-II**

- Q4 (a) Obtain the equation of the line of regression of y on x for the following data; (8)
- |    |    |    |    |    |    |    |    |    |    |    |
|----|----|----|----|----|----|----|----|----|----|----|
| x: | 23 | 27 | 28 | 28 | 29 | 30 | 31 | 33 | 35 | 36 |
| y: | 18 | 20 | 22 | 27 | 21 | 29 | 27 | 29 | 28 | 29 |
- (b) A sleep inducing tablet when administered to 50 patient was found to be effective on 37 patient. Test the hypothesis at 5% level of significance that the tablet was effective in at least 80% cases. (7)
- Q5 (a) A manufacturer claims that his measuring instrument as a variability measured by S.D.  $\sigma=2$ . During a test the measurement recorded are 4.1, 5.2 and 10.2. Construct a 90% confidence interval to estimate the true population variance. (8)

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- (b) A process of producing synthetic diamonds is viable only if the average weight of the diamond is greater than 0.5 karat. The weight of the six diamond generated are 0.46, 0.61, 0.52, 0.48, 0.57, and 0.54 karat. Test the viability of the process at 5% level of significance. (7)

UNIT-III

- Q6 (a) Solve the following system of equations by **Gauss-Seidel** method. (8)  
 $20x + y - 2z = 17$ ,  $3x + 20y - z = -18$ ,  $2x - 3y + 20z = 25$   
 (b) The area A of a circle of diameter d is given for the following values; (7)

d:	80	85	90	95	100
A:	5026	5674	6362	7088	7854

Find approximate values for the areas of the circle diameter 82.

- Q7 (a) Find the real root of the equation  $\cos x + 1 = 3x$  correct to three decimal places by **Newton-Raphson** method. (8)  
 (b) The following values of the function  $f(x)$  for the values of  $x$  are given: (7)  
 $f(1)=4$ ,  $f(2)=5$ ,  $f(7)=5$ ,  $f(8)=4$ , find the value of  $f(6)$ .

UNIT-IV

- Q8 (a) Find the value of  $\pi$  by evaluating  $\int_0^1 \frac{1}{1+x^2} dx$  using **Simpson's one-third rule** in 10 intervals. (8)  
 (b) The function  $y = \sin x$  is tabulated in the scheme below. Find the value of  $\cos x$  at  $x = 1$ . (7)

x:	0.7	0.8	0.9	1.0	1.1	1.2	1.3
y:	0.644	0.717	0.783	0.841	0.891	0.932	0.964

- Q9 (a) Apply **Euler's modified method** to find  $y(0.3)$  taking step size 0.1 by solving the d.e. (8)  
 $\frac{dy}{dx} = x + 2y$ , given  $y(0) = 1$ .  
 (b) Solving the d.e.  $\frac{dy}{dx} = x + y$ , given that  $y(1) = 1$ , find  $y(0.2)$  taking  $h = 0.1$ , using **Runge - Kutta fourth order** method. (7)

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