(Please write your Exam Roll No.) *Exam Roll No. ...503/802...*

END TERM EXAMINATION

THIRD SEMESTER [B.TECH.] DEC.2014 – JAN.2015

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

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

Note: Attempt five questions including Q.no.1 which is compulsory. Use of scientific calculator is allowed.

Q1 Attempt all the questions:- **(2.5x10=25)**

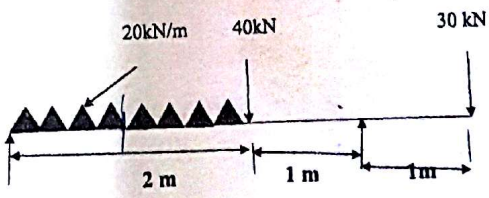
(a) Draw stress-strain curve for ductile material.
(b) An aluminium rod of 20 mm diameter is elongated by 3.5 mm along its longitudinal direction by a load of 25 kN. Determine the original length of the bar. E=70 GPa.
(c) What is strain rosette?
(d) Define the point of contra-flexure.
(e) Derive an expression for volumetric strain on a rectangular bar subjected to tri-axial stress of magnitude σ.
(f) Draw a SF and BM diagram for cantilever with u.d.l.
(g) Explain conjugate beam method for finding deflection of beams.
(h) What are the assumptions for developing Euler's theory for columns?
(i) Maximum shear stress of 50 N/mm² is developed in a hollow circular shaft of outer diameter 20 cm and inner diameter of 8 cm while subjected to a twisting moment. Find the shear stress at the inner radius of the shaft.
(j) What is the concept of equivalent length and where is it used?

Q2 A steel rod of 25 mm diameter passes through a brass tube of 25 mm internal diameter and 35 mm external diameter. The nut on the rod is tightened until a stress of 10 MPa is developed in the rod. The temperature of the tube is then raised by6 60°C. What are the final stresses on the rod and the tube? Assume E_S=200 GPa and α_S=0.0000117/°C, E_b=80 GPa and α_b=0.00019/°C. **(12.5)**

Q3 In a two dimensional problem, two mutually perpendicular stresses at a point are 100 MPa (tensile) and 60 MPa (compressive). If the principle stress is limited to 150 MPa, find the value of shear stress. Also, find the inclination of principle plane and magnitude of he maximum shear. **(12.5)**

Q4 A uniform T-section beam is 100 mm wide by 150 mm deep with a 25 mm thick flange and a 12 mm thick web. If the limiting bending stress for the beam are 80 MN/m² in compression and 160 MN/m² in tension. Find the maximum u.d.l. that the beam can carry over a simply supported span of 4 m and having a point load of 5 kN at center of the beam length. **(12.5)**

Q5 Draw a SF and BM diagram for the overhanging beam shown in figure. Indicate the point of contraflexure. **(12.5)**



Q6 (a) Find the slope and deflection of a cantilever beam with 20 kN at free end and 10 kN at mid point of the cantilever beam. **(7.5)**
(b) Define Castigliano's Theorem with an example. **(5)**

Q7 A solid shaft is required to transmit 96 kW of power at 180 rpm. Find the diameter of the shaft, if permissible stress for the material is 60 N/mm² and permissible twist is 0.33 °/m. Assume C=80 GN/m². **(12.5)**

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END TERM EXAMINATION

THIRD SEMESTER [B.TECH] DEC.2014 –JAN.2015

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. Use of scientific calculator is allowed.

Q1 (a) A speaks truth 4 out of 5 times. A die is tossed. He reports that there is a six. What is the chance that actually there was six?

(b) With the usual notations, find p for a binomial variate X if

$n = 6$ and

$9\,P(X = 4) = P(X = 2)$.

(c) Suppose that X has a Poisson distribution such that

$P(X = 2) = \frac{2}{3} P(X = 1)$, evaluate:

(i) $P(X = 0)$ and (ii) $P(X = 3)$.

(d) Estimate the missing term in the following table:

x	0	1	2	3	4
$f(x)$	1	3	9	-	81

(e) Evaluate:

$\Delta^{10}[(1-x)(1-2x^2)(1-3x^3)(1-4x^4)]$, if the interval of differencing is 2.

(5x5=25)

Unit-I

Q2 (a) Let X be a continuous random variable with p.d.f given by **(6)**

$$f(x) = \begin{cases} Kx, & 0 \le x < 1 \\ K, & 1 \le x < 2 \\ -Kx + 3K, & 2 \le x < 3 \\ 0, & x \ge 3 \end{cases}$$

(i) Determine the constant K.

(ii) Determine $F(x)$, the c.d.f.

(b) Find the moment generating function of the random variable whose moments are $\mu'_r = (r+1)!\,2^r$. **(6.5)**

Q3 (a) Let the probability function of the normal distribution be:

$$p(x) = K\,e^{\left(-\frac{1}{8}x^2+2x\right)}$$

Find k, μ and σ^2. **(6.5)**

(b) Fit atleast square geometric curve $y = ax^b$ to the following data: **(6)**

x	1	2	3	4	5
y	0.5	2	4.5	8	12.5

Unit-II

Q4 (a) Suppose the observations on X and Y are given as:

X	59	65	45	52	60	62	70	55	45	49
Y	75	70	55	65	60	69	80	65	59	61

Where N = 10 students, and Y = Marks in Maths, X = Marks in Economics. Compute the least square regression equations of Y on X and of X on Y. **(6)**

(b) A manufacturer claimed that at least 98% of the steel pipes which he supplied to a factory conformed to specification. An examination of a sample of 500 pieces of pipes revealed that 30 were defective. Test this claim at a significance level of (i) 0.05 (ii) 0.01. **(6.5)**

P.T.O.

Q5 (a) If X and Y are standardized random variable and

$$r\,(aX + bY,\ bX + aY) = \frac{1+2ab}{a^2+b^2}.$$

Find $r(x,y,)$, the coefficient of correlation between X and Y. **(6)**

(b) The following table gives the number of air craft accidents that occurred during the seven days of the week. Find whether the accidents are uniformly distributed over the week. **(6.5)**

Days	Mon	Tue	Wed	Thu	Fri	Sat	Total
No. of accidents	14	18	12	11	15	14	84

Unit-III

Q6 (a) Use Newton-Raphson method to obtain a root, correct to three decimal places, of the following equation:

$\sin x = 1 - x$. **(6)**

(b) Estimate the values of $f(22)$ and $f(42)$ from the following available data: **(6.5)**

x	20	25	30	35	40	45
$f(x)$	354	332	291	260	231	204

Q7 (a) Using Regula-Falsi method, compute the real root of the equation, correct to three decimal places.

$x\ e^x - \sin x = 0$. **(6)**

(b) Given:

$f(0) = -18,\ f(1) = 0,\ f(3) = 0,\ f(5) = -248,\ f(6) = 0,\ f(9) = 13104.$

Find $f(x)$. **(6.5)**

Unit-IV

Q8 (a) The function $y = 3xe^{-x}$ is tabulated below:

x	3	3.2	5
y	0.4481	0.3913	0.1010

Develop a subprogram to find the first derivative values of y, test is with the above data and compare your result with the actual values. **(6)**

(b) Evaluate: $\int_0^{\pi/2} \sqrt{\sin\theta}\ d\theta$,

Using Simpson's rule with $h = \frac{\pi}{2}$. **(6.5)**

Q9 (a) The following table gives the angular displacement θ (radians) at different intervals of t (seconds).

θ	0.052	0.105	0.168	0.242	0.327	0.408	0.489
t	0	0.2	0.04	0.06	0.08	0.10	0.12

Calculate the angular velocity at the instant t = 0.06. **(6)**

(b) A solid of revolution is formed by rotating about the X-axis the area between the X-axis, the lines x = 0 and x = 1, and the curve through the points with the following co-ordinates:

x	0.0	0.25	0.50	0.75	1.0
y	1	0.9896	0.9589	0.9089	0.8415

Estimate the volume of the solid formed, giving the answer to three decimal places. **(6.5)**

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ETMA-203
P2/2

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END TERM EXAMINATION

THIRD SEMESTER [B.TECH] DEC.2014 – JAN.2015

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

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

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

Q1 Write short notes on **any five** of the following:- **(5x5=25)**

(a) Rock cycle
(b) Glacial Land forms
(c) Strike and dip
(d) Seismograph
(e) Magnitude and intensity of earthquake
(f) Photogrammetry
(g) Site selection for tunneling
(h) Aerial photo interpretation technique

UNIT-I

Q2 Define various types of weathering with example. **(12.5)**

Q3 Discuss why geological study is important in civil engineering. Write the characteristics of the earth interior. **(12.5)**

UNIT-II

Q4 What are the geological processes involved in creating fold and fault? Discuss the characteristics of different types of fold and fault. **(12.5)**

Q5 How structural geology is important in civil engineering? Discuss with example. **(12.5)**

UNIT-III

Q6 What are the geological formations that store the ground water? Discuss a method for identifying ground water potential zones. **(12.5)**

Q7 What are the causes of earthquake? Describe the landforms created along the plate boundaries. **(12.5)**

UNIT-IV

Q8 What is Landslide? Define different types of landslide. Discuss landslide mitigation measures. **(12.5)**

Q9 Describe the probable impacts of dam construction on a mountainous area in upstream, on site and down stream on various aspects. **(12.5)**

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END TERM EXAMINATION

THIRD SEMESTER [B.TECH.] DEC.2014 – JAN.2015

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

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

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

Q1 (a) Discuss briefly the different types and sources of errors in surveying. **(3)**

(b) What are the basic principles of surveying? Explain briefly the basic method of fixing positions in the horizontal plane. **(3)**

(c) Differentiate between:- **(4)**
(i) Plane Surveying and geodetic surveying
(ii) Check lines and tie lines

(d) What is an offset? What are different types of offsets? **(3)**

(e) Explain the Bowditch rule for adjusting compass traverse. **(3)**

(f) Define the terms 'altitude' and 'departure'. How would you determine them for a line? **(3)**

(g) Derive the distance equation for an anallactic lens. What are its advantages? **(3)**

(h) Define Super-elevation. Obtain expressions for it as applicable on a highway. **(3)**

Q2 (a) Describe in detail the processes of- **(8)**
(i) Differential levelling (ii) Profile levelling
(iii) Cross-sectioning (iv) Fly levelling

(b) A distance was measured using a 30m steel tape in 4 sections: 30m, 30m, 30m and 26.455m. The tape was supported at the two ends during the measurements. The field temperature was 30°C and a tension of 100N was used. The tape was calibrated fully supported at a temperature of 20°C using a tension of 75N and had a length 30.01m. Compute the correct distance. Take weight of the tape as 15N and cross-sectional area as 0.02cm^2. Co-efficient of expansion = 116×10^{-5}/°C. Young's modulus= 2.06×10^5 N/mm^2. **(4.5)**

Q3 (a) The bearings of the lines of a closed traverse are 290°30'; 175°30'; 112°0'; 30°0'. Determine the included angles and the angular error. **(5)**

(b) In running fly levels from a B.M. of R.L. = 2,50,000 the following readings were obtained

Backsights	1.315, 2.035, 1.980, 2.625
Foresights	1.150, 3.450, 2.255

From the last position of the instrument, 5 pegs at 20m intervals are to be set out on a uniform rising gradient of 1 in 40. The first peg is to have a R.L. of 247.245. Workout the staff readings required for setting the tops of the pegs on the given gradient. **(7.5)**

Q4 (a) State what errors are eliminated by repetition method. How will you set out a horizontal angle by method of repetition? **(5)**

(b) The area within the contour lines at the site of a reservoir and the face of a proposed dam are as follows: **(7.5)**

P.T.O.

ETCE-209/ETEN-209

P1/2

Contours (m)	Area (m^2)
300	620
302	6400
304	60240
306	90510
308	100200
310	301500
312	70300
314	450500
316	527280

Taking 300m as the bottom level of the reservoir and 314 m as the water level, find the volume of the water in the reservoir.

Q5 (a) Discuss the characteristics of contours and uses of contours maps with suitable sketches. **(5)**

(b) A traverse is run to set out a line MQ=1900m at right angles to a given line MN. The lengths and bearing of the traverse legs are observed as follows:**(7.5)**

Line	Length	Bearing
MN	____	360°0'
MO	850m	120°0'
OP	1000m	86°30'
PQ	____	____

Compute the length and bearing of PQ.

Q6. (a) A tacheometer is setup at an intermediate point on a traverse course PQ and the following observations were made on vertically held staff: **(6.5)**

Staff Station	Vertical Angle	Staff Intercept (m)	Axial Hair Reading (m)
P	+9°30'	2.250	2.105
Q	+6°00'	2.055	1.875

The instrument is fitted with an anallactic lens. The multiplying constant is 100. Compute the length PQ and the R.L. of Q if the R.L. of P is 350.50m.

(b) Define the following terms used in the plane table surveying. **(6)**

(i) Orientation (ii) Radiation

(iii) Intersection (iv) Resection

Q7 (a) What is three-point problem? Describe the procedure in detail. **(6.5)**

(b) It was required to find the distance between two points A and B and their reduced level. Two arbitrary points C and D were suitably selected and the tachometric observations recorded were as follows:- **(6)**

Instrument Station	H.I.(m)	Total Coordinates		Staff Station	Q.B.	Vertical Angle	Staff Readings
		N	E				
C	1.450	300.000	812.170	A	N39°24'W	+16°24'	1.65,2.75,3.85
D	1.500	586.650	1250.750	B	N37°12'E	+25°12'	2.50,3.20,3.90

Q8 (a) Explain the functions of a transition curve and the methods used for determining the length of a transition curve. **(6)**

(b) Explain with suitable example the procedure for adjustment of angular observations obtained during triangulation. **(6.5)**

Q9 (a) A reverse curve AB is to be set out between two parallel railway tangents, 12m apart. If the two arcs of the curve are to have a same radius and the distance between the tangents points A and B is 96m, calculate the radius of the curve. The curve is to be set out from A and B at 8m intervals along that line. Calculate the offsets. **(6.5)**

(b) Explain in detail the working of the following with neat sketches: **(6)**

(i) Total Station (ii) Differential GPS.

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END TERM EXAMINATION

THIRD SEMESTER [B.TECH.] DEC.2014 – JAN.2015

Paper Code: ETCE205 **Subject: Fluid Mechanics**

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

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

Q1 Attempt all the questions:- **(2.5x10=25)**

(a) Define a fluid and distinguish between compressible and incompressible fluids.

(b) If specific gravity of a liquid is 0.8, calculate its mass density, specific volume and specific weight.

(c) Explain water hammer in pipe flow.

(d) What is metacenter height and what role does it play in floating bodies?

(e) Differentiate between Eulerian and Lagrangian method of representing fluid motion.

(f) Define pathline, streakline and streamline flow. Under what conditions these lines are identical?

(g) Does the velocity distribution V=5xi+5yj-10zk, satisfy the flow of mass conservation for incompressible flow?

(h) What is the difference between laminar and turbulent flow? Classify the following as laminar and turbulent flow:-

(i) Atmospheric winds

(ii) Flow in river

(iii) Flow of lubricating oil from an oil can.

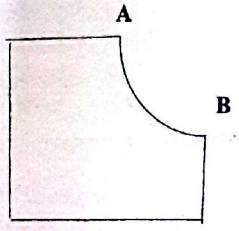
(i) Comment on the validity of the statement that "Bernoulli's Theorem is derived under assumption of no external force except that gravity is acting on the liquid".

(j) Explain the significance of dimensional analysis as applied to fluid flow problems.

Q2 A tank is filled with water under pressure. The pressure guage is fitted at the top of the tank which indicates a pressure of 15kPa. The tank measures 2.5m perpendicular to the plain of the paper and the curve surface AB of the top is the quarter of a circular cylinder of radius 2m. Determine: (12.5)

(a) Horizontal and vertical component of the fluid pressure on the curved surface AB and

(b) Magnitude and direction of the resultant force.



Q3 A hollow cylinder closed at both ends has an outside dia of 1.25m, length 3.2m and specific weight 75kN/m^3. If the cylinder is to float in just in stable equilibrium in sea water, find its maximum permissible thickness. Assume sea water weighs 10kN/m^3. **(12.5)**

P.T.O.

Q4 (a) A pipe conveys 0.25kg/s of air at 300K and under an absolute pressure of 2.25 bar. Calculate the minimum diameter of pipe necessary if the flow velocity is limited to 7.5m/s. **(5)**

(b) A stream function is given by $\psi = 3x^2y + (2+t)y^2$. Find the velocity and determine its value at a point defined by the position vector $r = i + 2j - 3k$ when t=2. (7.5)

Q5 A 2m long pipeline tapers uniformly from 10cm diameter to 20cm diameter at its upper end. The pipe centerline slopes upward at an angle of 30^0 to the horizontal and the flow direction is from smaller to bigger cross-section. If the pressure guage is installed at the lower and upper end of the pipeline, read 200kPa and 230kPa respectively. Determine the flow rate at the mid-length of the pipeline. Assume no energy losses. **(12.5)**

Q6 A pipe connects a reservoir to a turbine which discharges water to the tail race through another pipe. The head loss between the reservoir and the turbine is 10 times the kinetic head in the pipe and that from the turbine to the tail race is 0.5 times the kinetics head in the pipe. The rate of flow is $1m^3/s$ and pipe dia in both cases is 1m. Find the pressure at the inlet and at the exit of the turbine. Calculate the power generated by the turbine. Take energy level (EL) of turbine=105m, EL of reservoir =150m, EL of tail water=100m. **(12.5)**

Q7 A 1:20 model of a naval ship having a submerged area of $5m^2$ and length 8m has a total drag of 20N when towed through water at a velocity of 1.5m/s. Calculate the total drag on the prototype when moving at the corresponding speed. Use the relation $F_f = 1/2\ C_f\ \rho\ AV^2$ for calculating the skin resistance. Take kinematic viscosity of water as 0.01 stoke and the mass density of water as $1000kg/m^3$. Assume $C_f = 0.0735/(Re)^{1/5}$. **(12.5)**

Q8 Define **any five** of the following and explain their engineering significance. **(2.5x5=12.5)**

(a) Kinematic similarity
(b) Dynamic similarity
(c) Froude number F_r
(d) Weber number W
(e) Mac number M
(f) Euler number E

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ETCE-205
P2/2

(Please write your Exam Roll No.) Exam Roll No. 802180514

END TERM EXAMINATION

THIRD SEMESTER [B.TECH] DECEMBER 2014-JANUARY 2015

Paper Code: ETCE-207 **Subject: Building Materials and Construction (Batch 2013)**

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

(a) What are the properties of First Class Bricks?
(b) How are Igneous Rocks classified?
(c) How would you classify the stone for Engineering works?
(d) What are the Ingredients of Portland Cement?
(e) Write short notes on Heavy Weight concrete.
(f) Distinguish between Friction Piles and Bearing Piles.
(g) Differentiate between Rolling Door and sliding door with neat sketch.
(h) With the help of neat sketch explain three-hinged arch.
(i) Write short notes on Escalators and lifts.
(j) How does the National Building code classify buildings according to Fire resistance?

Unit-I

Q2 (a) Explain with a neat sketch one method of Burning bricks in a continuous kiln. **(6.5)**
(b) Briefly explain the field tests conducted on stones. **(6)**

Q3 (a) What are the properties of Glass? **(4)**
(b) Explain various methods of Artificial seasoning of Timber. **(8.5)**

Unit-II

Q4 (a) What are the different mineral admixtures used with concrete? Briefly explain their effect on concrete. **(6.5)**
(b) What are the various precautions to be taken in concrete works? **(6)**

Q5 (a) Explain briefly the principle of Pre-stressed concrete? What are the advantages of Pre-stressed concrete? **(6)**
(b) Briefly explain the (i) Roller compacted concrete (ii) Poly concrete. Also mention its uses and applications. **(6.5)**

Unit-III

Q6 (a) What are the rules to be followed in Bonding Bricks? **(6)**
(b) Differentiate with neat sketches between English and Flemish Bond. **(6.5)**

Q7 (a) Briefly explain various methods of providing foundations in waterlogged areas. **(6.5)**
(b) What is the basic concept behind the Green Buildings? State the different ratings of Green buildings under LEED. **(6)**

Unit-IV

Q8 (a) Draw the Geometric design of an RCC stair for a hospital with a staircase of internal dimensions 6.0x4.5m. Floor-to-Floor height is 4.2m. **(8.5)**
(b) Discuss with appropriate sketches the Location of Doors, Windows and Ventilators in a Building. **(4)**

Q9 (a) Explain the acoustic design principle of an Auditorium with neat sketches. **(6.5)**
(b) Explain the Fire-resistant construction of the following components of a Building: (i) Floors and Roofs (ii) Wall opening (iii) Fire escapes. **(6)**

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