Code : 1GC31 **R-13**

II B.Tech. I Semester Regular Examinations Nov/Dec 2014

Mathematics -II

(Common to CE & ME)

Max. Marks: 70 **Time: 03 Hours**

Answer *any five* questions

All Questions carry equal marks (14 Marks each)

****

1 a) Prove that the sum of the eigen values of a square matrix A is equal to the trace of the matrix A 4M

b) Find the eigen values & eigen vectors of the matrix $\begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$ 10M

2. a) Find the Fourier series of the periodic function defined as

$$f(x) = \begin{cases} -\text{®}, & -\text{®} < x < 0 \\ x, & 0 < x < \text{®} \end{cases}$$ 8M

b) Find the half – range Fourier cosine series for $f(x) = x$ in $0 < x < 2$ 6M

3. a) Form the partial differential equation by eliminating h, k from $(x-h)^2 + (y-k)^2 + z^2 = a^2$ 7M

b) Solve $\frac{\partial u}{\partial x} = 2\frac{\partial u}{\partial t} + u$ where $u(x,0) = 6e^{-3x}$ 7M

4. a) Find a real root of $xe^x - \cos x = 0$ using Newton – Raphson method 7M

b) Find $y(1.6)$ using Newton's forward difference interpolation formula from the table.

x	1.0	1.4	1.8	2.2
y	3.49	4.82	5.96	6.5

7M

5. Given that $y' = y - x$, $y(0) = 2$, find $y(0.1)$ and $y(0.2)$ using Runge – Kutta method taking $h = 0.1$ 14M

6. a) Evaluate $\int_0^2 e^{-x^2} dx$ using Simpson's rule taking $h = 0.25$ 7M

b) Given that

x	4.0	4.2	4.4	4.6	4.8	5.0	5.2
$\log x$	1.3863	1.4351	1.4816	1.5261	1.5686	1.6094	1.6487

Evaluate $\int_4^{5.2} \log x dx$ by Simpson's $\frac{3}{8}$ rule. 7M

7. a) S.T. the function $f(z) = \sqrt{|xy|}$ is not analytic at the origin, although Cauchy-Riemann equations are satisfied at that point. 7M

b) Find K such that $f(x,y) = x^3 + 3Kxy^2$ may be harmonic and find its conjugate. 7M

8. a) Evaluate $\int_c \frac{\log z \, dz}{(z-1)^3}$ where $c : |z-1| = \frac{1}{2}$ 7M

b) Expand $\log z$ by Taylor's series about $z = 1$ 7M

***

Code : 1G631

R-13

II B.Tech. I Semester Regular Examinations Nov/Dec 2014

Strength of Materials-I

(Civil Engineering)

Max. Marks: 70 **Time: 03 Hours**

Answer *any five* questions

All Questions carry equal marks (14 Marks each)

****

1. a) Draw the stress strain diagram for mild steel and explain the salient points. 4M

   b) A composite bar made up of steel and aluminum is held between the two supports which are 1200 mm apart. The length and diameter of steel bar are 800 mm and 20 mm and that of aluminum bar are 400 mm and 30 mm respectively. Modulus of elasticity for steel is 200 GPa and that of aluminum is 70 GPa. Coefficient of thermal expansion of steel is 12×10^{-6} /°C and that of aluminum is 24×10^{-6}/°C.Find the stresses in the two bars when the temperature drops from 45°C to 25°C if i. the support are unyielding, and ii. The supports yield by 0.1 mm 10M

2. a) Explain the various types of loads acting on the beams. 4M

   b) A simply supported beam AB of span 8 m is subjected to a uniformly distributed load of 30 KN/m over the left half of span and a concentrated moment of 48 KN-m acting at a distance of 6 m from left support A. Draw the shear force and bending moment diagrams. Also find the position and magnitude of maximum bending moment. 10M

3. a) What are the assumptions in theory of bending 4M

   b) A symmetrical rolled steel joist of I section has flanges 200 mm × 20 mm and 16 mm thick web. The overall depth of section is 500 mm. Find the safe uniformly distributed load that the section will carry over a simply supported span of 8 m if the permissible stress is limited to 120 N/mm^2. 10M

4. A rolled steel joist of I section has top flange: 200×10 mm, bottom flange : 150×10 mm, thickness of web 10 mm and overall depth : 400 mm. Find the maximum shear stress across the section if it is subjected to a shear force of 150 KN. Also, sketch the shear stress distribution across the cross section. 14M

5. a) Derive the differential equation for elastic curve of a beam subjected to transverse loading. 6M

   b) A cantilever AB of length L is subjected to a concentrated load of W at C which is at a distance of $\frac{L}{2}$ from fixed end A. Using double integration method, determine the deflection at the free end C. 8M

6. A simply supported beam AB of span 6 m is subjected to a uniformly distributed load of 30 KN/m over the whole span and a concentrated load of 72 KN acting at a distance of 2 m from the left end A. Determine i. slope of the left support A, and ii. The position and magnitude of maximum deflection. Take E = 200 GPa and I = 16000 cm^4. 14M

7. a) Explain the Mohr's circle of stresses 4M

   b) At a point in a strained material, direct stresses of 100 N/mm^2 tension and 80 N/mm^2 compression are applied on planes at right angles. The greater principal stress is limited to 120 N/mm^2. What shearing stress may be applied to the given planes and what will be the maximum shearing stress at the point. 10M

8. a) Discuss the significance of theories of failure. 2M

   b) A bolt is subjected to an axial pull of 20 KN together with a transverse shear force of 12 KN. Elastic limit for the material in tension 250 N/mm^2, Factor of safety is 3 and Poisson's ratio is 0.3.Determine the diameter of the bolt according to

      i) Maximum principal stress theory and ii. Maximum strain energy theory. 12M

***

R-13

Code : 1G632

II B.Tech. I Semester Regular Examinations Nov/Dec 2014

Surveying

(Civil Engineering)

Max. Marks: 70 **Time: 03 Hours**

Answer *any five* questions

All Questions carry equal marks (14 Marks each)

****

1. a) A survey line AB is running along different slopes as detailed below. There is downward slope of 1 in 10 from station A to chainage 238 m. The ground has an angle of elevation of 8^0 15' from chaninage 238 to chainage 465 m and there is a rise of 25 m form chainage 465 m to station B having chainages of 665 m. All the measurements of chainages have actually been taken along the ground. It was also found that the 20 m chain used for chaining was 5 cm too long throughout the work. Calculate the correct horizontal distance form station A to station B in this case.

   b) State clearly the degree of accuracy required to be achieved in measuring horizontal distances under different conditions.

2. a) What is 'local attraction? Briefly describe it.

   b) A compass was set on the station A and the bearing of AB was 309^0 15'. Then the same instrument was shifted to station B and the bearing of BA was found to be 129^0 15'.

   Is there any local attraction at the station A, or, at the station B?

   Can you give a precise answer? State you comment and support it with rational arguments.

3. a) Draw a neat sketch of an internal focusing telescope of a level showing clearly all the important parts. State the function of each part

   b) Calculate the error in staff reading on account of:

   (i) Curvature of earth: (ii) Normal refraction.

   In leveling operations if the staff held is held at a distance of 800 m from the instrument.

   Show the above two errors clearly on a neatly drawn sketch and also the combined correction to be applied in this case.

4. a) A man travels from a point A to due west and reaches the point B. the distance between A and B = 139.6 m. calculate the latitude and departure of the line AB.

   b) What is 'closing error' in a theodolite traverse? How would you distribute the 'closing error' graphically?

   c) In a closed traverse 'latitudes' and 'departures' of the sides were calculated and it was observed that:

   Latitude = 1.39;

   Departure =-2.17

   Calculate the length and bearing of the 'closing error',

5. A tachometer in placed at a station A and readings on a staff held upon a B.M. of R.L = 100.000 and a station B are 0.640, 2.200, 3.760 and 0.010, 2.120, 4.230 respectively. The angle of depression of the telescope in the first case is - 6^0 19' and in the second case - 7^0 42', Find the horizontal distance from A to B and the R.L. of the station B.

   Assume $\frac{f}{i} = 100; (f + d) = 0.3\ m.$

6. a) Explain the methods used for determining the length of a transition curve.

   b) Define a compound curve. What are the characteristics of a compound curve?

   c) Two straights intersect at chainage 5637 m. the angle of deflection is $20^{0.}$ Radius of the circular curve introduced between the straights is 345 m. calculate the data required for setting out the curve by Rankin's method of deflection angles, taking peg intervals as 30m.

7. a) Explain the terms lift and lead in earthwork.

   b) Write explanatory note on prismoidal correction in computation of earthwork quantities.

   c) Following data refers to a site of a reservoir. The areas given are the ones which will be contained by the proposed dam and contour lines as given below. Find the volume of water stored in the reservoir

Contour in m	**Area enclosed** in hectares
610	22
615	110
620	410
625	890
630	1158

8. Write a short note on

   a) Basic principle of Electronic Distance Measurement
   b) Total Station
   c) Global Positioning System (GPS)

***

R-13

Code : 1G634

II B.Tech. I Semester Regular Examinations Nov/Dec 2014

Building Materials and Construction

(Civil Engineering)

Max. Marks: 70 **Time: 03 Hours**

Answer *any five* questions

All Questions carry equal marks (14 Marks each)

****

1. a) Briefly describe dressing of stone and preservation of stone. 7M

   b) What are the qualities you would look for in good building stone for masonry work? 7M

2. a) Explain the characteristics of good tile. 7M

   b) How can you classify the types of tiles? Explain with neat sketches. 7M

3. a) How is the cement classified? Describe the wet process of manufacturing cement. 7M

   b) What are initial and final setting times of cement? What is their importance 7M

4. a) Describe the physical and mechanical properties of timber? 7M

   b) What is the difference between softwood and hardwood? 7M

5. a) Differentiate and compare English bond, Flemish bond and double Flemish bond? 7M

   b) Write a note on various defects in brick work? 7M

6. a) What do you understand by a shallow foundation? Draw sketches to show various types of shallow foundations 7M

   b) Differentiate between strip footing and trapezoidal footing 7M

7. a) Classify various types of lintels and discuss their relative use. 7M

   b) Explain the method of erection of centering for arch construction. 7M

8. a) Explain various types of plaster finishes. 7M

   b) Explain the procedure of painting for wood surfaces and plastered surfaces. 7M

***

Code : 1G538

R-13

II B.Tech. I Semester Regular Examinations Nov/Dec 2014

Electrical and Mechanical Technology

(Civil Engineering)

Max. Marks: 70 **Time: 03 Hours**

Minimum of ***Two*** questions from each part should be chosen for answering ***Five*** questions

Use separate booklets for ***PART-A & PART-B***

All Questions carry equal marks (14 Marks each)

****

PART-A

1. a) Explain the types of DC motors with necessary equations and circuit diagrams. 8M

   b) A short shunt compound generator supplies 200 A at 100 V. The resistance of armature, series field and shunt field is 0.04 Ω, 0.03Ω, and 60Ω respectively. Find EMF generated. 6M

2. a) Explain the principle of operation of single phase transformer. 7M

   b) The efficiency of 1000 KVA, 110/220V, 50 Hz, single phase transformer is 98.5% at half full load at 0.8 power factor leading and 98.8% at full load unity power factor. Determine full load iron and copper losses. 7M

3. a) A 100 KVA, 3000 V, 50 Hz 3 phase star connected alternator has effective armature resistance of 0.2 ohm. The field current of 40 A produces short circuit current of 200 A and an open circuit voltage of 1040 V (line value). Calculate the full load voltage regulation at 0.8 power factor lagging and 0.8 power factor leading. 8M

   b) Explain the applications of three phase induction motor. 6M

4. With a neat diagram, explain the construction, working principle of permanent magnet moving iron type instrument. 14M

PART-B

5. a) Describe the working of oxy acetylene gas welding? Discuss the different flames employed and their suitability. 8M

   b) Distinguish between welding, brazing and soldering? 6M

6. a) Elucidate in detail splash lubrication system with a block diagram? 7M

   b) Explain the working of a four stroke S.I. engine with the help of a neat sketch? 7M

7. a) Explain any three refrigerants used in refrigeration systems with their properties? 7M

   b) Sketch the layout of an air conditioning system and explain the functions of each component in it? 7M

8. a) Discuss how the size of a power shovel is determined? 7M

   b) Derive an expression for the total indicated work required to run a multi stage reciprocating air compressor? 7M

***

Code : 1G633

R-13

II B.Tech. I Semester Regular Examinations Nov/Dec 2014

Fluid Mechanics

(Civil Engineering)

Max. Marks: 70 **Time: 03 Hours**

Answer *any five* questions

All Questions carry equal marks (14 Marks each)

****

1. a) Define and write short note on the following

   i) Pascal law ii) Hydrostatic law iii) Surface tension

   b) The velocity distribution in a fluid is given by u = 30000 y (1-2y) where u is the velocity in m/sec at a distance of y meters normal to the boundary. If the dynamic viscosity of fluid is 1.8X10 poise, determine the shear stress at y=0.2m.

2. a) Derive an expression for the depth of center of pressure from free surface of liquid of an inclined plane surface submerged in the liquid.

   b) Find the total pressure and position of center of pressure on a triangular plate of base 2.4m and height 3.6m which is immersed in water in such a way that the plan of the plate makes an angle of 60^0 with the free surface of the water. The base of the plate is parallel to water surface and is at a depth of 3.0m from water surface.

3. a) Define and distinguish between stream line, path line and streak line.

   b) Given that $u= x^2-y^2$ and v= -2xy, determine the stream function and potential function for the flow.

4. A bend in pipe line conveying water gradually reduces from 60 cm to 30 cm diameter and deflects the flow through an angle of 60^0. At the larger end the gauge pressure is $1.75Kg/cm^2$. Determine the magnitude and direction of force exerted on the bend,

   a)When there is no flow, b) When the flow is 876 liters/sec.

5. Determine the rate of flow of water through a pipe of diameter 20 cm and length 50m when one end of the pipe is connected to a tank and other end of the pipe is open to the atmosphere. The pipe is horizontal and the water in the tank is 4m above the Centre of the pipe. Consider all minor losses and take f=0.009 in the formula $h_f=4flv^2/2gD$.

6. a) What are the advantages of triangular Notch over rectangular Notch?

   b) A rectangular channel 2m wide has a discharge of 250 liters/sec, which is measured by a right angled V-notch weir. Find the position of the apex of the notch from the bed of the channel if maximum depth of water is not to exceed 1.3m. Take C_d=0.62.

7. Explain the laminar flow behavior between two parallel plates when one plate is at rest and the other plate is moving.

8. a) State Buckingham's π-theorem.

   b) Assuming that the viscous force F ,exerted by a fluid on a sphere of diameter D depends on the viscosity μ, mass density of the fluid "ρ", and the velocity of the sphere v, obtain the expression for the viscous force.

***