Hall Ticket Number :

Code: 4GC31

R-14

II B. Tech. I-Semester Regular Examinations Nov/Dec 2015

Mathematics–II

(Common to CE & ME)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70Marks)

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UNIT-I

1. a) Reduce the Matrix $\begin{pmatrix} 5 & 3 & 14 & 4 \\ 0 & 1 & 2 & 1 \\ 1 & -1 & 2 & 0 \end{pmatrix}$ into Echelon form and hence find its Rank.

   b) Find the inverse of the matrix $\begin{pmatrix} 1 & 0 & 2 \\ 0 & 1 & 2 \\ 1 & 2 & 0 \end{pmatrix}$ using Cayley- Hamilton theorem

OR

2. a) Determine the values of λ for which the following set of equations may possess non-trivial solution. $3x + y - \lambda z = 0$, $4x - 2y - 3z = 0$, $2\lambda x + 4y + \lambda z = 0$. For each permissible value of λ, determine the general solution.

   b) Find the Eigen values and the corresponding Eigen vectors of the matrix $\begin{pmatrix} -2 & 5 \\ -1 & 4 \end{pmatrix}$

UNIT-II

3. a) Find the real root of the equation $x \tan x + 1 = 0$, using Newton Raphson Method.

   b) The velocity ***v*** of the particle at a distance s from a point on its path is given the following table

s(ft.)	0	10	20	30	40	50	60
v (ft.)	47	58	64	65	61	52	38

Estimate the time taken to travel 60 ft. by using Simpson's 1/3 rule.

OR

4. a) Using Regula falsi method, find the real root of the equation $2x - \log_{10} x - 6 = 0$ correct to three decimal places.

   b) Apply Lagrange's method to find the value of f(x) when x = 10 from the given data.

x	5	6	9	11
f(x)	12	13	14	16

UNIT-III

5. a) Using the Taylor's series method, solve $\frac{dy}{dx} = 2y + 3e^x, y(0) = 0 \; at \; x = 0.1, 0.2.$

   b) Using Runge-Kutta method of 4th order, find $y \; for \; x = 0.2,$ given that $\frac{dy}{dx} = xy + y^2, y(0) = 1.$

OR

6. Using Milne's predictor-corrector method, find $y(0.4)$, given that $\frac{dy}{dx} = 1 + xy, y(0) = 2.$ Find the initial values using Taylor's series method.

UNIT-IV

7. a) Obtain the Fourier series to represent $f(x) = \frac{1}{4}(\pi - x)^2$ in $0 < x < 2\pi$.

   b) Solve the differential equation $4u_x + u_y = 3u \text{ and } u(0,y) = e^{-5y}$, by the method of separation of variables

OR

8. a) Find the half-range cosine series for $f(x) = x(2-x)$ in $0 \leq x \leq 2$. and deduce the value of $\frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + \frac{1}{5^2} - \cdots$

   b) Form the Partial differential equation by eliminating the arbitrary function $\emptyset$ from the relation $\emptyset(x^2 + y^2 + z^2, xyz) = 0$.

UNIT-V

9 a) Show that $f(z) = \frac{xy^2(x+iy)}{x^2+y^4}$, $z \neq 0$ and f(0) = 0 is not analytic at z = 0 although C-R equations are satisfied at the origin.

   b) Use Cauchy's integral formula to evaluate $\oint_c \frac{z+4}{z^2+2z+5} dz$ where c is the circle $|z+1| = 1$.

OR

10. a) Show that the function $u = \frac{1}{2}$ log ($x^2 + y^2$) is harmonic and find its harmonic Conjugate.

   b) Use Cauchy's integral formula to evaluate $\oint_c \frac{(e^z + z\sinh z)}{(z-\pi i)^2} dz$ where c is the circle $|z| = 4$.

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Hall Ticket Number :

R-14

Code: 4G538

II B. Tech. I-Semester Regular Examinations Nov/Dec 2015

Electrical & Mechanical Technology

(Civil Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70Marks)

Use separate booklets for Part-A & Part-B

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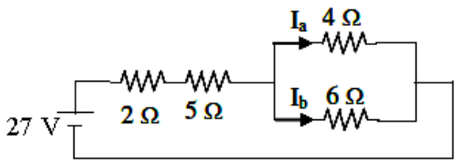
PART-A

UNIT-I

1. a) State and explain Kirchhoff's laws with examples.

   b) Find the currents I_a and I_b the following circuit. What is the total power loss in the circuit?



OR

2. a) Explain the Principle of Operation of DC Generator.

   b) A 4-pole wave connected DC generator having 60 slots on its armature with 6 conductors per slot, run at 750 rpm and generate an open circuit voltage of 230V. Find the useful flux per pole.

UNIT-II

3. a) Explain the Principle of operation of 1-ø Transformers

   b) Write short notes on open circuit and short circuit tests on 1-ø Transformer.

OR

4. a) Explain the Principle of operation of 3- ø Induction motor. Expression for Torque

   b) Define and explain slip of 3-phase induction motor. Calculate the synchronous speed, slip and rotor frequency of a 3-phase 50 Hz, 4-pole induction motor running at 1440 rpm.

PART-B

UNIT-III

5. a) Describe the working principle of an oxy-acetylene gas welding. Discuss various types of flames observed in a gas welding.

   b) Illustrate the purpose of a flux and shielding gas in welding process.

OR

6. a) Define welding? Classify the welding processes and also give the applications of welding processes.

   b) Describe the process of Submerged arc welding stating its advantages and limitations.

UNIT-IV

7. a) Elucidate in detail the splash lubrication system with a block diagram.

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

OR

8. a) What are the important quality parameters of SI and CI engine fuels?

   b) Derive an expression for work done in a two stage reciprocating air compressor.

UNIT-V

9. a) Explain any three refrigerants used in refrigeration systems with their properties.

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

OR

10. a) What is air-conditioning? Explain comfort air-conditioning system with a neat sketch.

    b) Describe a simple vapour compression refrigeration system with a flow diagram.

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Hall Ticket Number :										

R-14

Code: 4G631

II B. Tech. I-Semester Regular Examinations Nov/Dec 2015

Strength of Materials-I

(Civil Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70Marks)

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UNIT-I

1. Starting from fundamentals, prove that the error involved in using the mean diameter to calculate the Young's modulus of a cylindrical tapering bar under axial tension is $[10.\ a/\ D]^2$. Where, the maximum diameter of the tapering bar (D + a) reduces to a minimum diameter (D-a) uniformly over a length of **L.** 14M

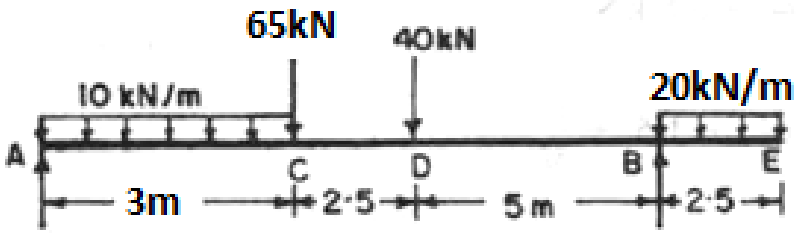
OR

2. a) Explain the static equilibrium and strain compatibility conditions in a composite metal bar subjected to temperature rise. 6M

   b) A bar of 30mm in diameter was subjected to a tensile load of 55kN and the measured extension on 350mm gauge length was 0.15mm and change in diameter was 0.0036mm. Calculate Poisson's ratio and values of three elastic modulii. 8M

UNIT-II

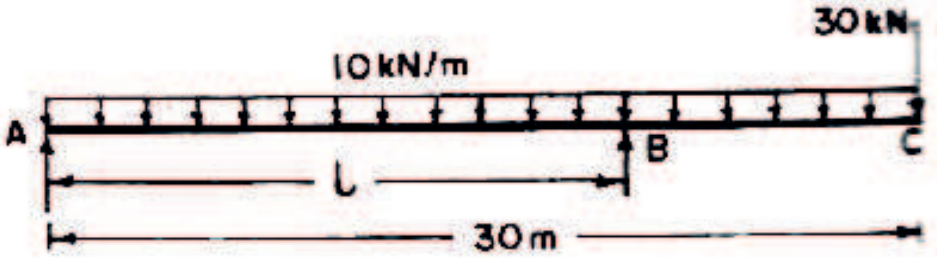
3. Mentioning all salient values, draw shear force and bending moment diagram of the beam shown in figure. Locate the point(s) of contra flexure.



14M

OR

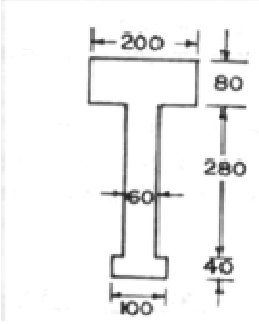
4. Referring to the beam loading, suggest the length l, for the maximum bending moment on the beam to be a minimum.



14M

UNIT-III

5. The cross section of a cast iron machine element used as a beam is shown in the figure. The beam resists bending moment about the horizontal neutral axis. The permissible stresses in tension and compression are 50N/mm^2 and 60N/ mm^2. Determine the moment of resistance of the section about the horizontal N A for both positive and negative bending moments



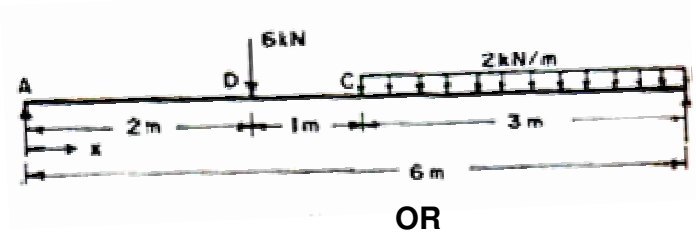
14M

OR

6. A cast iron bracket subjected to bending has a cross section of I shape with unequal flanges. Top flange 200mm wide x 40mm deep, bottom flange 300mm wide x 40mm deep and web 400mm deep x 40mm thick. If the beam section is subjected to a shear force of 1600kN, draw the shear stress distribution over the depth of the section, indicating the principal values. 14M

UNIT-IV

7. A beam, AB of 6m span is simply supported at the ends and is loaded as shown in the Figure. Determine (i) deflection at C &D (ii) maximum deflection and (iii) slope at end A. Take E = 2.1 × 10^5 N/mm^2 and I = 2000cm^4.



14M

OR

8. A girder of uniform section and constant depth of 400 mm is freely supported over a span of 5 m. Calculate the deflection at four quarter junction points(i.e. x = 1.25m, 2.5m and 3.75m) **using moment area method** for a uniformly distributed load on it such that the maximum bending stress induced will not exceed 120 N/mm^2. Take E = 2 ×10^5 N/mm^2. 14M

UNIT-V

9. A rectangular block of a material is subjected to a tensile stress of 100N/ mm^2 on one plane and a tensile stress of 47N/ mm^2 on a plane right angle to the earlier, together with a shear stress of 63N/ mm^2 on all the planes. Determine **i)** the magnitude of principal stresses **ii)** the orientation of principal planes and **iii)** the maximum shear stress. **Use analytical method only.** 14M

OR

10. State and explain any five theories of elastic failure 14M

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Hall Ticket Number :											R-14

Code: 4G632

II B. Tech. I-Semester Regular Examinations Nov/Dec 2015

Surveying

(Civil Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70Marks)

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UNIT-I

1. a) What are the basic principles of surveying? Explain briefly? 5M

   b) Write a short notes on the following

      i) Accuracy
      ii) Precision and
      iii) Relative precision. 9M

OR

2. a) Explain the functioning of each part in the prismatic compass with a help of neat sketch and label the parts also. 7M

   b) List out the available different methods of plotting a compass traverse survey. Explain each of the briefly? 7M

UNIT-II

3. a) A levelling instrument is used to take the following readings on sloping ground with an interval of 30m by a 4 m staff 0.780, 1.535, 1.955, 2.430, 2.985, 3.480, 1.155, 1.960, 2.365, 3.640, 0.935, 1.045, 1.630 and 2.545. The RL of the first point was 180.750. Calculate the RL of the points by the rise and fall method, and also the gradient of the line joining the first and last points 6M

   b) Explain the methods adopted interpolation of contours in detail. 8M

OR

4. a) Derive the formula for the area of a two-level section. 8M

   b) Find the area of a three-level section with the following data: formation width is 9.4 m, side slopes is 2:1, natural ground slopes is15:1 in the higher half and 8:1 in the lower half. Height at midsection is 2.50 m. 6M

UNIT-III

5. a) What are the conditions to be fulfilled in a closed traverse by using gale's traverse system? 4M

   b) Write the procedure to find index error in a theodolite 5M

   c) The included angels of a closed traverse ABCDEF that was run counter-clockwise are 95050`20``, 75 0 03`40``, 159 0 08`20``,1280 33`40`` and 800 25`20`` respectively and corresponding lengths are 72.50m, 80.80m 44.50, 39.90 and 117.20. The bearing of AB is measured as 2870 54`10``. Compute the consecutive and independent coordinates of A as 210N and 120E and correct them for any closing error. 5M

OR

6. List out the permanent adjustments to be carried out on a transit theodolite and explain each of them briefly? 14M

UNIT-IV

7. a) Explain with available methods in practices to solve a three-point problem. 7M

   b) Enlist and explain the function of the instrument's required for plane table surveying. 7M

OR

8. a) The horizontal angel subtended at a theodolite by a subtense bar with target 3.4 m apart is 0^0 18'20". Compute the horizontal distance between the instrument and the bar. Deduce the error in horizontal distance if the bar is 12 from being normal to the joining the instrument and the bar station. 8M

   b) Write short note on tachometric contouring and tangential tachometry. 6M

UNIT-V

9. a) Enlist the available different types of curves and write their characteristics which differ each of them? 7M

   b) Explain briefly the procedure of setting out of curve with a two theodolite method? 7M

OR

10. a) Describe briefly about the classification of total stations. 5M

    b) Write short notes on

       i. ATR of a total station

       ii. Wave bands used for EDM 4M

    c) Explain the measurement principle in EDM instrument? 5M

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Hall Ticket Number :										

R-14

Code: 4G633

II B. Tech. I-Semester Regular Examinations Nov/Dec 2015

Fluid Mechanics

(Civil Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70Marks)

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UNIT-I

1. a) U-tube manometer containing mercury was used to find the negative pressure in the pipe containing water. The right limb was open to the atmosphere. Find the vaccum pressure in the pipe if the difference of mercury level in the two limbs was 100mm and height of water in the left limb from the centre of the pipe was found to be 40 mm below.

   b) What is Pascal's law? Also prove the same.

OR

2. Define total pressure and centre of pressure. Also derive the expressions for the same for an inclined immersed surface.

UNIT-II

3 a) What is momentum equation? Also give its applications.

   b) Prove that velocity potential exists only for ir-rotational flow.

OR

4. A 300 mm diameter pipe carries water under a head of 20 m with a velocity of 3.5 m/s. If the axis of the pipe turns through 45^0 find the magnitude and direction of the resultant force at the bend.

UNIT-III

5. A pipe 50 mm diameter is 6 m long and the velocity of flow of water in the pipe is 2.4 m/s. What loss of head and the corresponding power would be saved if the central 2m length of pipe was replaced by 72 mm diameter pipe the change of section being sudden? Take f=0.04 for the pipes of both diameters.

OR

6. A 150 mmX75 mm venturi meter with a coefficient of discharge 0.98 is to be replaced by an orifice meter having a coefficient of discharge 0.6. If both the meters are to give the same differential mercury manometer reading for a discharge of 100 lps and the inlet diameter is to remain 150 mm, what should be the diameter of the orifice.

UNIT-IV

7. a) Explain Reynolds experiment.

   b) An oil of viscosity 0.1 Ns/m^2 and relative density 0.9 is flowing through a circular pipe of diameter 50 mm and of length 300 m. The rate of flow of fluid through the pipe is 3.5lps. Find the pressure drop in a length of 200 m.

OR

8. Find the value of maximum velocity in terms of average velocity for laminar flow between two parallel fixed plates.

UNIT-V

9. a) What is dimensional analysis? Explain Buckingham's pi theorem.

   b) Water is flowing through a pipe of diameter 30 cm at a velocity of 4m/s. Find the velocity of oil flowing in another pipe of diameter 10 cm if the condition of dynamic similarity is satisfied between the two pipes. The viscosity of water and oil is given as 0.01 poise and 0.025 poise. Take 'G' of oil as 0.8.

OR

10. a) Explain distorted and undistorted models.

    b) The discharge through a weir is 1.5 m^3/s. Find the discharge through the model of the weir if the horizontal dimension of the model=1/40 the horizontal dimension of the prototype and vertical dimension of the model =1/8 the vertical dimension of the prototype.

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Hall Ticket Number :										

R-14

Code: 4G634

II B. Tech. I-Semester Regular Examinations Nov/Dec 2015

Building Materials and Construction

(Civil Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70Marks)

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UNIT-I

1. a) Explain about quarrying of stones? 7M

   b) What are the properties to be considered before selecting a stone for building? 7M

OR

2. a) Explain the methods of preparing bricks? 7M

   b) "Kiln burning is better than clamp burning". Write a suitable comment on it? 7M

UNIT-II

3. a) What are the characteristics of a good tile? 7M

   b) Classify the different types of gypsum and glass. 7M

OR

4. a) What are the different methods of manufacturing lime? 7M

   b) What are the different types of cement? 7M

UNIT-III

5. Explain about the methods of seasoning of timber? 14M

OR

6. a) Explain the classification of timber? 7M

   b) What are the defects in timber due to insects? 7M

UNIT-IV

7. a) Differentiate between rubble and ashlars masonry? 7M

   b) Explain English and Flemish bonds with a neat sketch? 7M

OR

8. Explain briefly about different types of foundations? 14M

UNIT-V

9. a) What are the different types of stair cases? 7M

   b) Explain about the king post truss with a neat sketch? 7M

OR

10. a) Explain about different water proofing materials used? 7M

    b) Explain about
       i) Scaffolding
       ii) Form work
       iii) White washing 7M

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