THIRD SEMESTER B.TECH DEGREE EXAMINATION

(2013 Scheme)

13.301 ENGINEERING MATHEMATICS-II (ABCEFHMNPRSTU)

MODEL QUESTION PAPER

Time: 3 hours Maximum marks: 100

PART-A

*Answer **all** questions. **Each** question carries 4 marks*

1. A particle moves so that its position vector is given by

$\vec{r} = coswt\ \hat{\imath} + sinwt\ \hat{\jmath}$, show that the velocity $\overrightarrow{V}$ of the particle is perpendicular to $\vec{r}$.

2. If $f(x) = x\ ,\ o < x < \frac{\pi}{2}$

$= \pi - x\ ,\ \frac{\pi}{2} < x < \pi$. Show that $f(x) = \frac{4}{\pi}\ (sinx - \frac{sin3x}{3^2} + \frac{sin5x}{5^2} - \cdots)$

3. Find the cosine transform of $f(x) = sinx$ in $0 < x < \pi$.

4. Solve the partial differential equation if $\frac{\partial z}{\partial x} = 6x + 3y\ ; \frac{\partial z}{\partial y} = 3x - 4y$.

5. State the assumptions involved in the derivation of one dimensional Heat equation.

PART-B

*Answer **one full** question from **each** module. **Each** question carries **20** marks.*

MODULE-I

6. a) Find the constants a and b so that the surfaces $5x^2 - 2yz - 9x = 0$ and $ax^2y + bz^3 = 4$, may cut orthogonally at the point $(1, -1, 2)$.

b) If φ is a scalar point function, use Stoke's theorem to prove that $Curl(grad\ \varphi) = 0$.

c) Evaluate by Green's theorem in the plane for $\int_C\ (y - sinx)dx + cosx\ dy$ where C is the boundary of the triangle whose vertices are $(0,0), (\frac{\pi}{2}, 0)\ and\ (\frac{\pi}{2}, 1)$.

7. a) If $\vec{r} = x\ \hat{\imath} + y\ \hat{\jmath} + z\ \hat{k}$ prove that $\nabla r^n = nr^{n-2}\ \vec{r}$ where $r = |\vec{r}|$.

b) Show that $\vec{F} = e^x\left[(2y + 3z)\hat{\imath} + 2\hat{\jmath} + 3\hat{k}\right]$ is irrotational and find its scalar potential.

c) Using divergence theorem, evaluate $\iint_S\ F.n\hat{}\ ds$ where $\overrightarrow{F} = 4x\hat{\imath} - 2y^2\hat{\jmath} + z^2\hat{k}$ and S is the surface bounding $x^2 + y^2 = 4, z = 0$ and $z = 3$

MODULE-II

8. a) Obtain the Fourier series of the function $f(x) = \left(\frac{\pi - x}{2}\right)^2$ in $(0,2\pi)$

b) Find the Fourier transform of $f(x) = 1\ , |x| < a$

$= 0\ , |x| \geq a$

Hence evaluate $\int_0^\infty \frac{sinx}{x} dx$

9. a) Find the Fourier series of $f(x) = -x + 1\ , -\pi \leq x \leq 0$

$= x + 1\quad ,\quad 0 \leq x \leq \pi$

b) Find the Fourier cosine transform of $f(x) = e^{-4x}$ and

hence show that $\int_0^\infty \frac{cos2x}{x^2+16} dx = \frac{\pi}{8} e^{-8}$

MODULE-III

10. a) Solve the pde $pxy + pq + qy = yz$.

b) Solve the pde $(D^2 - DD' + 2D'^2)z = e^{3x+4y} + \sin(x - y)$

11. a) Solve the partial differential equation $x(y^2 - z^2)p - y(z^2 + x^2)q = z(x^2 + y^2)$

b) Solve the pde $(D^2 + DD' - 6D'^2)z = ycosx$

MODULE-IV

12. a) Using the method of separation of variables, solve $\frac{\partial u}{\partial x} - 2\frac{\partial u}{\partial t} = u$ given that

$u = 3e^{-5x} + 2e^{-3x}$ when $t = 0$.

b) A string of length l is fixed at both the ends. The midpoint of the string is taken to a height b and then released from rest in that position. Find the displacement of the string.

13. a) Solve $\frac{\partial u}{\partial t} = \alpha^2 \frac{\partial^2 u}{\partial x^2}$ subject to the condition, $u(0,t) = 0 = u(\pi,t)$ and

$u(x,0) = \pi x - x^2$ in $(0,\pi)$

b) A rod of length l has its ends A and B kept at 0^0C and 100^0C respectively until steady conditions prevail. The temperature at A is suddenly raised to 25^0C and at the same time that B is lowered to 75^0C and the end temperatures are thereafter maintained. Find the temperature function $U(x,t)$.

THIRD SEMESTER BTECH DEGREE EXAMINATION 2014

BRANCH: CIVIL ENGINEERING

(SCHEME: 2013)

13.302 MECHANICS OF STRUCTURES (C)

MODEL QUESTION PAPER

Time: 3 hours Maximum marks: 100

PART-A

*Answer **all** questions. **Each** question carries 4 marks*

1. A bar of length 1.5 m tapers uniformly from a diameter of 200 mm at one end to a diameter of 75 mm at the other end. It is subjected to an axial pull of P. Determine the elongation of the bar if the maximum tensile stress is limited to 320 N/mm^2

2. State the various assumptions in the theory of simple bending

3. Prove that the maximum shear stress in a circular section is 4/3 times the average stress.

4. Distinguish between close coiled and open coiled spring

5. Derive expressions for strain energy in bending and shear

PART-B

*Answer **one full** question from **each** module. **Each** question carries **20** marks.*

MODULE - I

6. At a point in a strained material, the resultant intensity of stress on a certain plane is $60N/mm^2$ (tensile) inclined at 30^o to its normal. The normal stress on a plane at right angles to the earlier plane is 40 N/mm^2 (tensile). Determine:

i) The principal planes and their corresponding stresses.

ii) The planes and magnitudes of maximum shear

iii) The normal and shear stresses on a plane inclined at 30^o with the direction of $40N/mm^2$ stress.

7. A steel rod of rectangular cross section 100 mm x 50 mm and length 120 mm is subjected to a tensile load of 600 kN applied axially along the length and 240 kN compressive load at right angles to it on the 100 mm wide faces. Find the changes in length, breadth, thickness and volume of the rod if $E= 2 \times 10^5$ N/mm^2 and m= 4 for the rod material. Also determine the modulus of rigidity of the material

MODULE - II

8. A cantilever beam AB fixed at A carries a uniformly distributed load of 2 kN/m for the whole span and a concentrated load 5 kN at 2m from A. Span AB is 4 m. Draw the bending moment and shear force diagram. Also calculate the bending moment and shear force at concentrated load point.

9. Compare the weights of two equally strong beams of circular cross-section made of the same material, one being of solid section and the other of hollow section with inside diameter being 2/3 of outside diameter.

MODULE - III

10. Determine the diameter of solid shaft which will transmit 300 kW at 100 rpm. The angle of twist must not exceed one degree per metre length and the maximum torsional shear stress is to be limited to 80 N/mm2

11. A close coiled helical spring is made of 10 mm diameter steel wire, the coil consisting of 10 complete turns with a mean diameter of 120 mm. The spring carries an axial pull of 200 N. Determine the shear stress induced in the spring, the deflection of the spring, its stiffness and the strain energy stored by it if the modulus of rigidity of spring material is 80 GPa.

MODULE - IV

12. a) Define radial pressure, hoop stress and longitudinal stress in thick cylinders subjected to pressure. Derive Lame's equation for radial pressure and hoop stress.

b) Calculate the thickness of the metal necessary for a steel cylindrical shell of internal diameter 120 mm to withstand an internal pressure of 4.5 kN/cm^2, if the maximum permissible tensile stress in the section is 12 kN/cm^2.

13. A load of 150 N falls through a height of 2 cm onto a collar rigidly attached to the lower end of a vertical bar 1.5 m long and of 1.5 cm2 cross-sectional area. The upper end of the vertical bar is fixed. Determine the

a) maximum instantaneous stress induced in the vertical bar

b) maximum instantaneous elongation

c) strain energy stored in the vertical rod. Take E= 2x 10^5 N/mm^2.

THIRD SEMESTER B.TECH DEGREE EXAMINATION

Branch : CIVIL ENGINEERING

13.303 FLUID MECHANICS I (C)

MODEL QUESTION PAPER

Time : 3 Hours Max Marks :100

PART A

*Answer **all** questions. Each question carries 4 marks.*

1. Explain the stability criteria of floating and submerged bodies
2. Explain the uses and limitations of flownet
3. Obtain an expression for kinetic energy correction factor
4. Obtain the discharge equation for Cipoletti weir
5. Write a note on 'Equivalent Pipe' (5x4=20 Marks)

PART B

*Answer any **one** full question from each Module. Each full question carries 20 Marks*

MODULE - I

6. (a) Explain the procedure of estimating hydrostatic force acting on curved surfaces (8 Marks)

(b) An inverted U tube manometer using oil of specific gravity 0.8 as manometric fluids connected to the pipes A and B carrying liquids of specific gravities 1.2 and 1 respectively. Pipes A and B are at the same level. Height of the liquid connected to the pipe A from the centre of the pipe is 40 cm. Find the manometer reading. Pressure in pipe B is 2000Pa above pressure in pipe A. (12 Marks)

OR

7. (a) Derive an expression for the centre of pressure of a lamina kept submerged and placed in inclined position (8 marks)

(b) A solid cone floats in water with its apex downwards. Determine the least apex angle of cone for stable equilibrium. The specific gravity of material of the cone is 0.8. (12 Marks)

MODULE - II

8. (a) Obtain the equation for the stream line for a two dimensional flow field for which the velocity components are given by $u = \frac{-y}{b^2}$ and $v = \frac{x}{a^2}$. The stream line passes through the point (a,0) (10 Marks)

(b) Derive continuity equation in three dimensional cartesian co-ordinates (10 Marks)

OR

9. (a) Differentiate between path line and streak line (4 Marks)

(b) Differentiate convective acceleration and local acceleration (4 Marks)

(c) The velocity components in a two dimensional flow field for an incompressible fluid are expressed as $u = \frac{y^3}{3} + 2x - x^2 y$ $v = xy^2 - 2y - \frac{x^3}{3}$. Show that the functions represent a case of irrotational flow. Also get an expression for the velocity potential. (12 Marks)

MODULE - III

10. 215 litres of Gasoline (Specific gravity 0.85) flow upwards per second in an inclined venturimeter fitted to a 300 mm diameter pipes. The venturimeter is inclined at 60^o to the vertical and its throat having diameter of 150 mm is 1.2 m from the inlet along its length. Pressure gages fitted at inlet and throat show pressures 0.141 N/mm^2 and 0.077 N/mm^2. Calculate the coefficient of discharge of venturimeter. If instead of pressure gauges, the inlet and throat of the venturimeter are connected to the limbs of U-tube mercury manometer, determine the deflection of mercury column. Neglect losses. (20 Marks)

OR

11. (a) Derive Bernoulli's equation along a streamline (10 Marks)

(b) A cylindrical tank is having hemispherical base. The height of cylindrical portion is 5 m and diameter is 4 m. At the bottom of this tank, an orifice of diameter 200 mm is fitted. Fine the time required to empty the tank completely. Take C_d=0.6. (10 Marks)

MODULE - IV

12. Two parallel plates kept 0.1 m apart have laminar flow of oil between them with maximum velocity of 1.5 m/sec. Calculate the discharge per m width, the shear stress at the plates, the pressure difference between two points 20 m apart, the velocity gradient at the plates and the velocity at 0.02 m from the pipe. Take viscosity of oil as 2.45 Ns/m^2 (20 Marks)

OR

13. A pipe bend tapers from a diameter of 500 mm at inlet to diameter of 250 mm at outlet and turns through 45^o in a horizontal plane. The pressure at inlet is 40 kPa. If the pipe is conveying oil of specific gravity 0.8, find the magnitude and direction of the resultant force on the bend when the oil flow rate is 150 l/sec. (20 Marks)

THIRD SEMESTER B.TECH DEGREE EXAMINATION

Branch : CIVIL ENGINEERING

13.304 CONCRETE TECHNOLOGY AND ADVANCED CONSTRUCTION (C)

MODEL QUESTION PAPER

Time : 3 Hours Max Marks :100

PART A

*Answer **all** questions. Each question carries 4 marks.*

1. Discuss briefly about hydration of Portland cement.

2. Detail the classification of aggregates based on size, shape and unit weight.

3. Write short notes on polymers in concrete.

4. Explain the factors affecting durability of hardened concrete.

5. Write brief notes on earth-moving machinery in construction sites.

PART B

*Answer any **one** full question from each Module. Each full question carries 20 Marks*

MODULE - I

6. (a) Explain the testing procedure to determine the setting time and soundness of cement as per Indian standards.

(b) Explain two laboratory test methods to determine the strength of aggregate.

7. (a) Explain alkali-aggregate reaction (AAR), factors affecting AAR and measures to control AAR.

(b) Discuss the effect of impurities in mixing water on properties of concrete.

MODULE - II

8. (a) Define workability of concrete. Explain, in detail, any two laboratory methods to determine workability of concrete.

(b) Compare different methods of transporting concrete indicating their relative merits and demerits

9. (a) Explain in detail about the factors affecting workability of concrete.

(b) Compare and contrast light-weight concrete and ferrocement.

MODULE - III

10. (a) What is meant by strength of concrete? Discuss the factors affecting strength of concrete.

(b) Discuss how rebound hammer test is useful in assessing the quality of concrete.

11. (a) Discuss in detail the chemical attack and seawater attack on concrete. What corrective measures may be taken to control attack by aggressive ions?

(b) Explain the general principles of concrete mix deign by IS Method.

MODULE - IV

12. (a) What are the materials used for formwork to concrete? State their relative merits and demerits.

(b) Write short notes on earthquake resisting building construction.

13. (a) Explain, with the aid of neat sketches, different types of cofferdams.

(b) Discuss the method of tunnelling through soft soil.

THIRD SEMESTER B.TECH DEGREE EXAMINATION

Branch : CIVIL ENGINEERING

13.305 SURVEYING I (C)

MODEL QUESTION PAPER

Time : 3 Hours Max Marks :100

PART A

*Answer **all** questions. Each question carries 4 marks.*

1. What is local attraction? How would you detect it at a place?

2. What is orientation in plane table surveying?

3. What are the uses of mass diagram

4. Explain the method of repetition for measurement of horizontal angle.

5. Define celestial sphere. (5 x 4 Marks = 20 Marks)

PART B

*Answer any **one** full question from each Module. Each full question carries 20 Marks*

MODULE - I

6. (a) Explain intersection method of plane table surveying. (5 Marks)

(b) What is ranging of survey lines? Explain the method of reciprocal ranging. (7 Marks)

(c) A line was measured with a steel tape which was exactly 30m at 20℃ and at a pull of 50N. Distance measured at the tape was 364.78m. Temperature during measurement was25℃ and pull applied was 70N. The tape was uniformly supported during the measurement. Find the true length of the line if the cross sectional area of tape was $3mm^2$ and coefficient of expansion is $1.18X10^{-6}$ /℃ and modulus of elasticity $2.1X10^5$ N/mm^2.

(8 Marks)

OR

7. (a) What is declination? What are the different types of variations in declination ? (8 Marks)

(b)The bearings observed in traversing with a compass at a place where local attraction was suspected are given below.

Line	Fore Bearing	Back Bearing
AB	124°30′	304°30′
BC	68°15′	246°00′
CD	310°30′	135°15′
DA	200°15′	17°15′

At what stations do you suspect local attraction? Find the correct bearings of the lines. Also find the true bearings of the lines if the declination is 1°30′W. (12 Marks)

MODULE - II

8. (a) What is reciprocal levelling? How would you determine the correct difference of levels of two points on the opposite banks of a river? (8 Marks)

(b) The following consecutive readings were taken with a dumpy level 3.860, 3.345, 2.850, 1.480, 0.850, 3.650, 2.645, 1.555, 1.835, 0.965, 0.665. The level was shifted after the fifth and eighth readings. The first reading was taken on the Bench Mark of R.L 100. Calculate the reduced levels of the stations by height of instrument method. Also find the difference of level between the first and last points. (12 Marks)

OR

9. (a) Explain the characteristics of contours (8Marks)

(b) The following offsets were taken from a chain to a hedge

Distance (m)	0	10	20	30	40	50	60	70	80
Offsets (m)	8.5	10.5	12.6	11.2	13.6	9.8	14.6	11.8	5.6

Compute the area included between the chain line, the hedge and the offsets by

i) Trapezoidal rule ii) Simpon′s rule (12 Marks)

MODULE - III

10. (a) Explain the measurement of vertical angle by using a theodolite and show how the readings are entered in the page of field book. (10 Marks)

(b) Describe the method of determination of instrument constants of a tachometer (10 Marks)

OR

11. (a) Explain the principle of Stadia tachometry (10 Marks)

(b) A tachometer fitted with an anallatic lens and having the multiplying constant 100 was set up at R which is an intermediate point on a traverse course AB. Following readings were taken with staff held vertically.

Staff Stn	Bearing	Vert angle	Intercept	Axial Read
A	$40^0 35'$	$-4^0 24'$	2.210	1.992
B	$22^0 35'$	$-5^0 12'$	2.020	1.900

Calculate length AB, and level difference between A & B. (10 Marks)

MODULE - IV

12. (a) Explain the different methods of locating soundings (10 Marks)

(b) P, Q and R are three visible stations in a hydrographic survey. The computed side of the triangle PQR are PQ=1000m, QR=1300, RP=1900m. Outside the triangle PQR and nearer to PR, a station X is established and its position is found by three point resection. The angle PXQ and QXR being respectively 40^0 and 50^0, find PX and RX. (10 Marks)

OR

13. (a) Explain the different coordinate systems in field astronomy (10 Marks)

(b) Define the following terms

i) Zenith and Nadir

ii) Astronomical triangle (10 Marks)

THIRD SEMESTER B.TECH EXAMINATION

(2013 Scheme)

Branch: CIVIL ENGINEERING

13.306 ENGINEERING GEOLOGY (C)

MODEL QUESTION PAPER

Time : 3 Hours Max Marks :100

PART A

*Answer **all** questions. Each question carries 4 marks.*

Explain the following:

1. Interior of the earth
2. Rock cycle
3. Unconformities
4. Seismic safety factor
5. Plate tectonics theory

(5x4=20 Marks)

PART B

*Answer any **one** full question from each Module. Each full question carries 20 Marks*

MODULE - I

6. Explain the types, products and engineering significance of weathering.

OR

7. Describe the different agronomic and engineering measures of soil conservation.

MODULE - II

8. Explain the different physical properties of minerals.

OR

9. Discuss the different textures, structures and classifications of igneous rocks.

MODULE - III

10. Explain the geological factors to be considered in the site selection for the construction of dams.

OR

11. Explain the classification and engineering significance of folds.

MODULE - IV

12. Discuss the vulnerability assessment and mitigation measures to be adopted in the case of earthquakes.

OR

13. Give a detailed account of coastal erosion, coastal landforms and coastal protection measures.

THIRD SEMESTER B.TECH DEGREE EXAMINATION

Branch : CIVIL ENGINEERING

13.307 BUILDING DRAWING (C)

MODEL QUESTION PAPER

Time : 3 Hours Max Marks :100

PART A

*Answer **all** questions. Each question carries 4 marks.*

1. Explain ventilation of buildings?
2. Draw the conventional sign for Stone, plain cement concrete, and timber in cross-section.
3. Compare English bond and Flemish bond
4. Explain different views of a building such as plan, section and elevation. What information can be derived through them?
5. List the different types of stairs.

Part B

*Answer **all** questions. Each question carries 40 marks.*

6. (a) Draw the plan and elevation of odd and even course of one and a half brick wall corner in Flemish bond.

OR

(b) Sketch the elevation of a flush door of size 1200 X 2100. Assume any other data necessary. Draw sectional plan ad elevation.

7. (a) Sketch the elevation of a steel roof truss using the following details

Wall thickness	: 300 mm
Bottom tie member	: 2 Nos flat 80 X 6 mm
Pitch of roof	: 30^o
Strut	: Single ISA 70 X45 X 8 mm
Principal rafter	: Two ISA 80 X 50 X 8 mm
Cleat angle	: 75 X 75 X 8 mm
Purlins	: 125 X 75 X 8 mm
All other ties	: 60 mm X 10 mm flat
Roof covering	: G.I. Sheet
Gusset Plate	: 10 mm thick

OR

8. Design and draw details of a dog legged stair case to be provided in a residential building with floor to floor height 3.3m, consider the width of the stair as 1m.