Third Semester B.E. Degree Examination, December 2011
Engineering Mathematics – III

Time: 3 hrs. Max. Marks:100

Note: 1. *Answer any FIVE full questions, selecting at least TWO questions from each part.*
2. Missing data will be suitably assumed.

PART – A

1 a. Obtain the Fourier series for the function $f(x)=\begin{cases}\pi x & : 0\le x\le 1\\ \pi(2-x) & : 1\le x\le 2\end{cases}$ and deduce that $\frac{\pi^2}{8}=\sum_{n=1}^{\infty}\frac{1}{(2n-1)^2}$. **(07 Marks)**

b. Obtain the half range Fourier sine series for the function. **(07 Marks)**

$f(x)=\begin{cases}1/4-x\ ;\ 0<x<1/2\\ x-3/4\ ;\ 1/2<x<1\end{cases}$.

c. Compute the constant term and the first two harmonics in the Fourier series of f(x) given by the following table. **(06 Marks)**

x	:	0	1	2	3	4	5
f(x)	:	4	8	15	7	6	2

2 a. Find the Fourier transform of $f(x)=\begin{cases}1-x^2 & \text{for } |x|\le 1\\ 0 & \text{for } |x|>1\end{cases}$ and hence evaluate $\int_0^{\infty}\left(\frac{x\cos x-\sin x}{x^3}\right)\cos\frac{x}{2}dx$. **(07 Marks)**

b. Find the Fourier cosine transform of $f(x)=\frac{1}{1+x^2}$. **(07 Marks)**

c. Solve the integral equation $\int_0^{\infty}f(\theta)\cos\alpha\theta d\theta=\begin{cases}1-\alpha\ ; & 0\le\alpha\le 1\\ 0\ ; & \alpha>1\end{cases}$. Hence evaluate $\int_0^{\infty}\frac{\sin^2 t}{t^2}dt$. **(06 Marks)**

3 a. Solve two dimensional Laplace equation $u_{xx}+u_{yy}=0$, by the method of separation of variables. **(07 Marks)**

b. Solve the one dimensional heat equation $\frac{\partial u}{\partial t}=\frac{c^2\partial^2 u}{\partial x^2}$, $0<x<\pi$ under the conditions :

i) $u(0,+)=0, u(\pi,t)=0$ ii) $u(x,0)=u_0\sin x$ where u_0 = constant $\neq 0$. **(07 Marks)**

c. Obtain the D` Alembert's solution of one dimensional wave equation. **(06 Marks)**

4 a. Fit a curve of the form $y=ae^{bx}$ to the following data : **(07 Marks)**

x	:	77	100	185	239	285
y	:	2.4	3.4	7.0	11.1	19.6

b. Using graphical method solve the L.P.P minimize $z=20x_1+10x_2$ subject to the constraints $x_1+2x_2\le 40$; $3x_1+x_2\ge 0$; $4x_1+3x_2\ge 60$; $x_1\ge 0$; $x_2\ge 0$. **(06 Marks)**

c. Solve the following L.P.P maximize $z=2x_1+3x_2+x_3$, subject to the constraints $x_1+2x_2+5x_3\le 19$, $3x_1+x_2+4x_3\le 25$, $x_1\ge 0, x_2\ge 0, x_3\ge 0$ using simplex method. **(07 Marks)**

PART – B

5 a. Using the Regula – falsi method, find the root of the equation $xe^x = \cos x$ that lies between 0.4 and 0.6. Carry out four iterations. **(07 Marks)**

b. Using relaxation method solve the equations :
$10x - 2y - 3z = 205$; $-2x + 10y - 2z = 154$; $-2x - y + 10z = 120$. **(07 Marks)**

c. Using the Rayleigh's power method, find the dominant eigen value and the corresponding eigen vector of the matrix. $A = \begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$ starting with the initial vector $[1,1,1]^T$. **(06 Marks)**

6 a. From the following table, estimate the number of students who have obtained the marks between 40 and 45 : **(07 Marks)**

Marks	:	30 – 40	40 – 50	50 – 60	60 – 70	70 – 80
Number of students	:	31	42	51	35	31

b. Using Lagrange's formula, find the interpolating polynomial that approximate the function described by the following table : **(07 Marks)**

x	:	0	1	2	5
f(x)	:	2	3	12	147

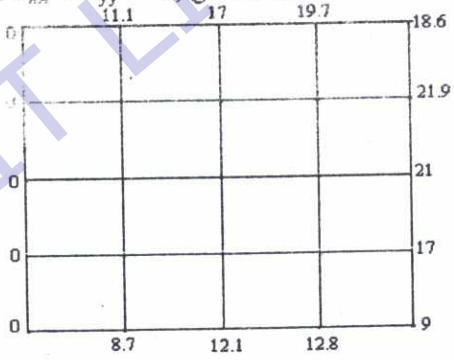
Hence find f(3)

c. A curve is drawn to pass through the points given by the following table :

x	:	1	1.5	2	2.5	3	3.5	4
y	:	2	2.4	2.7	2.8	3	2.6	2.1

Using Weddle's rule, estimate the area bounded by the curve, the x – axis and the lines $x = 1$, $x = 4$. **(06 Marks)**

7 a. Solve the Laplace's equation $u_{xx} + u_{yy} = 0$, given that : **(07 Marks)**



b. Solve $\frac{\partial^2 u}{\partial t^2} = 4\frac{\partial^2 u}{\partial x^2}$ subject to $u(0, t) = 0$; $u(4, t) = 0$; $u(x, 0) = x(4 - x)$. Take $h = 1$, $k = 0.5$. **(07 Marks)**

c. Solve the equation $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$ subject to the conditions $u(x, 0) = \sin \pi x$, $0 \le x \le 1$; $u(0\ t) = u(1, t) = 0$ using Schmidt's method. Carry out computations for two levels, taking $h - 1/3$, $k = 1/36$. **(06 Marks)**

8 a. Find the Z – transform of : i) $(2n-1)^2$ ii) $\cos\left(\frac{n\pi}{2} + \pi/4\right)$ **(07 Marks)**

b. Obtain the inverse Z – transform of $\frac{4z^2 - 2z}{z^3 - 5z^2 + 8z - 4}$. **(07 Marks)**

c. Solve the difference equation $y_{n+2} + 6y_{n+1} + 9y_n = 2n$ with $y_0 = y_1 = 0$ using Z transforms. **(06 Marks)**

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10CV32

Third Semester B.E. Degree Examination, December 2011
Building Materials and Construction Technology

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting at least two from each part.***

PART – A

1 a. List requirements that foundations should satisfy. **(05 Marks)**

b. Define shallow and deep foundations. Explain with neat sketches. **(05 Marks)**

c. Design a trapezoidal combined footing of length, L, short width B1 and larger width, B2, connecting column A (500mm × 500mm in plan) carrying a load of 600 kN and column B (600mm × 600mm in plan) carrying a load of 1000 kN. One edge of column A coincides with property boundary as shown in Fig.Q.1(c), in which, location of centroid of trapezium is also given. Allowable bearing capacity of foundation soil is 200 kPa. Assume self load of foundation as 10% of sum of column loads and the short width, B1, of foundation to be 0.8m. Calculate length of combined footing and larger width of combined footing.

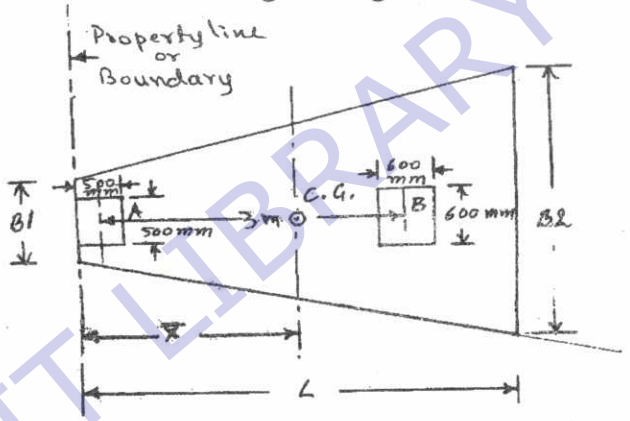

Fig.Q.1(c)

$$\bar{x} = \frac{<(B1 + 2B2)}{3(B1 + B2)}.$$

(10 Marks)

2 a. Explain the meaning of masonry bonds. Indicate which component of masonry is a weaker component. For brick masonry, indicate what the features of masonry bonds that increase the strength of the wall. **(05 Marks)**

b. Sketch plans of consecutive two layers of English and Flemish bonds for a single brick thick wall. Name bricks in different locations on the sketch. **(10 Marks)**

c. Sketch random rubble masonry instones in elevation and section. Mark through stone and lap length on the sketch. **(05 Marks)**

3 a. Sketch a semi-circular arch and show on it the following : Key stone; Springing line; Voussers; Intrados; Extrados; Rise; Span; Spandrel. **(07 Marks)**

b. Indicate structural advantage of an arch over a beam of same span. **(07 Marks)**

c. Sketch an RCC lintel for window in brick masonry. Show arrangements of steel bars in it. **(06 Marks)**

4 a. Sketch a king post roof truss with timber, provided with tile roofing. Name various components of truss on the sketch. Indicate which members are subjected to compression and which members are subjected to tension. **(08 Marks)**

b. Name different types of floorings used in buildings. Indicate types of floorings suitable for following situations :
   i) Floor should not make noise while in use.
   ii) Floor should be warm in winter and cool in summer.
   iii) Flooring should be inexpensive.
   iv) Floor should be waterproof. **(06 Marks)**

c. Sketch an RCC flat roof and indicate details of reinforcements. Discuss two advantages and two disadvantages of such a roof. **(06 Marks)**

PART – B

5 a. Sketch a door with a single shutter and its door frame. Name different components of frame and shutter. **(10 Marks)**

b. Write a note on window's functions in Northern hemisphere of the Earth. **(05 Marks)**

c. Explain with a sketch louvered window with glass louvers. Explain use of plastic louvers in an office building. **(05 Marks)**

6 a. Sketch a dog legged stair case in R.C.C. in plan and sectional elevation for a residential building. **(10 Marks)**

b. Stair hall of a public building is 6m long and 5.1m wide in plan. Vertical distance from flooring of ground floor to top level of flooring of first floor is 4.5m. Design a staircase with three flights. Sketch the staircase in plan and show details. **(10 Marks)**

7 a. Describe procedure for application of paint on wood surface and on new plastered surface with cement mortar. **(10 Marks)**

b. Discuss defects in plastering. **(04 Marks)**

c. Describe procedure of providing stucco plastering. **(06 Marks)**

8 Write short notes on :
a. Damp proof curse.
b. Classification of glasses.
c. Mason's scaffolding.
d. Varnish. **(20 Marks)**

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10CV/EV33

Third Semester B.E. Degree Examination, December 2011
Strength of Materials

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting atleast TWO questions from Part – A and Part – B.***

PART - A

1 a. Define i) stress ii) strain iii) modulus of elasticity. **(04 Marks)**

b. Derive an expression for the deformation to the tapering circular cross - sectional bar subjected to an axial force P. Use standard notations. **(08 Marks)**

c. A member is formed by connecting a steel bar to an aluminium bar as shown in fig. Q1(c), assuming that, the bars are prevented from buckling sideway. Calculate the magnitude of an axial force that will cause the total length of the member to decrease by 0.4mm. The values of elastic modulli for steel and aluminum are 210 Gpa and 70 Gpa respectively. **(08 Marks)**

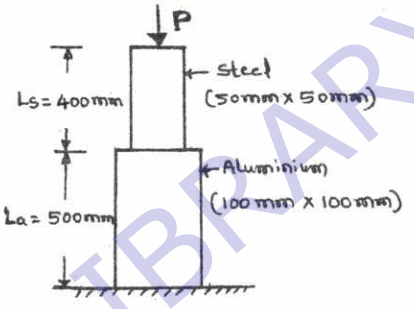


Fig. Q1(c)

2 a. Define i) Poisson's ratio ii) Volumetric strain iii) Bulk modulus of elasticity. **(04 Marks)**

b. A steel rod of 20m long at a temperature of 20^0C. Find the free expansion of the bar, when the temperature is raised to 65^0C. Also calculate the temperature stress produced for the following cases : i) When the expansion of the rod is prevented ii) When the rod is permitted to expand by 5.8mm. Take $\alpha = 12 \times 10^{-6}/^0$C and E = 200 Gpa. **(06 Marks)**

c. A steel rod of 30mm diameter is encased by copper tube of internal diameter 35mm and external diameter 40mm. They are connected rigidly at the ends by rigid plates of negligible thickness. The composite bar is subjected to an axial pull of 120kN, if length of the composite bar is 500mm. Find the stresses in the steel rod and copper tube. Take E_s = 210 Gpa and E_c = 105 Gpa. **(10 Marks)**

3 a. Define principal stresses and principal planes. **(06 Marks)**

b. The state of stress in a two dimensionally stressed body shown in fig. Q3(b). Determine the principal planes, principal stresses, maximum shear stress and their planes. Verify the answer by constructing Mohr's circle. **(14 Marks)**

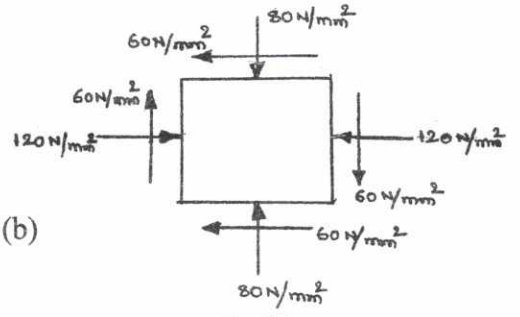
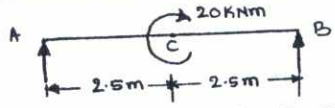


Fig. Q3(b)

4 a. Define i) Bending moment ii) Shear force. **(04 Marks)**

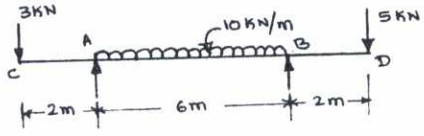
b. Draw the SFD and BMD for the beam shown in fig.Q4(b). **(06 Marks)**

Fig. Q4(b)



c. Draw the SFD and BMD for the beam shown in fig.Q4(c), showing the salient features. Also locate the points of contraflexure if any. **(10 Marks)**

Fig. Q4(c)

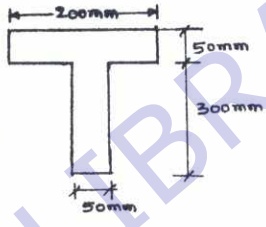


PART - B

5 a. Show that for a rectangular cross section, shear, stress distribution varies parabolically across the depth. Further show that maximum shear stress is 1.5 times average shear stress. **(06 Marks)**

b. A simply supported beam of span 6m has a cross section as shown in fig. Q5(b), it carries two point loads each of 30kN a distance of 2m from each support. Calculate the bending stress and shear stress for maximum values of bending moment and shear force respectively. Draw neat diagrams of bending stress and shear stress distribution across the cross section. **(14 Marks)**

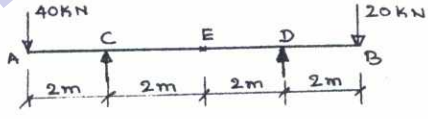
Fig. Q5(b)



6 a. Derive $EI\frac{d^2y}{dx^2} = M$, with usual notations. **(06 Marks)**

b. Calculate the deflection at E for the overhanging beam loaded shown in fig. Q6(b). Take $E = 200Gpa$, $I = 50 \times 10^6\ mm^4$. Use Mecaulay's method only. **(14 Marks)**

Fig. Q6(b)



7 a. State the assumption made in theory of pure Torsion. **(04 Marks)**

b. Derive an expression for the theory of pure Torsion, with standard notations.

ie $\frac{T}{J} = \frac{f_S}{R} = \frac{C_\theta}{L}$ **(08 Marks)**

c. A solid shaft has to transmit 150 KW of power at 180 rpm. If allowable shear stress is 70Mpa and allowable angle of twist is 1^0 in a length of 4m. Find the suitable diameter of solid circular shaft. Take C = 84 Gpa. **(08 Marks)**

8 a. What are the limitations of Euler's theory and what is the difference between short and long column? **(04 Marks)**

b. Derive Euler's equation for crippling load of a column whose ends are hinged with the standard notations. **(06 Marks)**

c. Compute ratio of crippling loads by Euler's and Rankine Gordon's formula for an axially loaded tubuler column 6m high with both ends are fixed. The inner diameter of a tubular section is 50mm and it is 10mm thick. Take yield stress $f_y = 415$ Mpa, E = 200 Gpa and Rankine's constant $a = \frac{1}{7500}$. **(10 Marks)**

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10CV/EV34

Third Semester B.E. Degree Examination, December 2011
Surveying – I

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting at least TWO questions from each part.***

PART – A

1 a. Discuss the classification of surveying based on
i) The function of survey and ii) Instruments employed. **(08 Marks)**

b. Explain the following terms :
i) Accuracy ; ii) Precision ; iii) Discrepancy. **(06 Marks)**

c. Discuss briefly the topographic maps, their numbering and scales. **(06 Marks)**

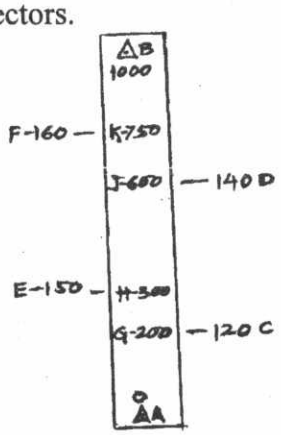
2 a. Explain with a neat sketch the indirect ranging and list the code of signals. **(10 Marks)**

b. A steel tape 30m long between end graduations at a temperature of 27°C under a pull of 45 N when lying on the flat. The tape is stretched over two supports between which it records 30.00m, and is supported at two intermediate supports equally spaced. All the supports are at same level, and the tape is allowed to sag freely between the supports.
If the temperature in the field is 32°C and the pull on tape is 75 N. Calculate the actual length between end graduations and equivalent length at MSL if measurements were made at an elevation of 1000.00 m. Area of c/s of tape = 7.0 mm^2 ; mass of the tape – 1.60 kg ; $\alpha = 1.1 \times 10^{-5}$ per °C ; $E = 2 \times 10^5$ N/mm^2 ; radius of earth = 6370 km. **(10 Marks)**

3 a. List the point to be considered while selecting survey stations in chain surveying. **(06 Marks)**

b. Explain with neat sketches, how do you set out a perpendicular to the chain line from a point out side the chain line. **(06 Marks)**

c. Plot the cross – staff survey of a field ACDBFEA from the field book measurement shown and determine the area of field in hectors. **(08 Marks)**



4 a. Differentiate between :
i) True meridian and magnetic meridian.
ii) Dip and declination
iii) Agonic and isogonic lines. **(06 Marks)**

b. A line AB was drawn to have a magnetic bearing of 34°15′ in an old map when the declination was 3° 30′E. Determine the magnetic bearing of the line, if the present declination is 7°30′W. **(04 Marks)**

c. In a closed traverse ABCDEA, the bearing of the line AB was measured as 150°30′ and the included angles were measured as below :
∠A = 130° 10′ ; ∠B = 89° 45′ ; ∠C = 125° 22′ ; ∠D =135° 34′ ; ∠E = 59° 9′. **(10 Marks)**

PART – B

5 a. Explain the following :
i) Dependent and independent coordinates.
ii) Bowditch rule and transit rule.
iii) Latitude and departure.
iv) WCB and quadrantal bearings. **(08 Marks)**

b. Following are the observed lengths and bearings of the lines of a traverse ABCDEA, the length and bearing of line EA having been omitted, calculate the length and bearing of line EA. **(12 Marks)**

Line	Length (m)	Bearings
AB	204.00	87°30′
BC	226.00	20°20′
CD	187.00	280°0′
DE	192.00	210°30′
EA	?	?

6 a. Explain the following :
i) Types of adjustments of dumpy level.
ii) Differential leveling and profile lavelling. **(06 Marks)**

b. If the bubble tube has sensitiveness of 23 seconds for 2mm division. Find the error in the staff reading at a distance of 200m caused by bubble being 1.5 divisions out of centre. **(03 Marks)**

c. The following observations were taken in reciprocal lavelling :

	Staff reading at	
Inst at	A	B
A	1.625	2.545
B	0.725	1.405

Determine the R.L of B, if that of A is 500.265 m. Also calculate the angular error in collimation, if the distance between A and B is 1000.00m. **(11 Marks)**

7 a. Reproduced below is the page of a level book. Fill in the missing data. Apply usual checks. **(10 Marks)**

Sl. No.	BS	IS	FS	Rise	Fall	R.L.	Remarks
1	2.150					450.000	B.M.1
2	1.645		X	0.500		X	
3		2.345			X	X	
4	X		1.965	X		X	
5	2.050		1.825		0.400	X	
6		X		X		451.730	
7	-1.690		X	0.120		X	BM 2 staff
8	X		2.100		X	X	inverted to ceiling
9			X	X		449.100	BM 3

b. What is interpolation of contours? Explain with neat sketches, various methods of interpolation of contours. **(07 Marks)**

c. Explain with a neat sketch, how do you trace a contour gradient of 1 in 50 on a map having contour interval 2.0 m. **(03 Marks)**

8 a. Explain with neat sketch, the procedure for
i) Radiation method ; ii) Intersection method. **(08 Marks)**

b. What do you mean by orientation of Plane table? Explain the various methods of orientation. **(10 Marks)**

c. What is resection? State 3-point problem. **(02 Marks)**

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10CV35

Third Semester B.E. Degree Examination, December 2011
Fluid Mechanics

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting at least TWO questions from each part.***

PART – A

1 a. Define the following terms with units :
i) Mass density ii) Weight density iii) Specific volume iv) Specific gravity. **(08 Marks)**

b. Explain briefly the following terms:
i) Surface tension ii) Capillarity. **(06 Marks)**

c. A plate having an area of 0.6 m^2 is sliding down the inclined plane at 30° to the horizontal with a velocity of 0.36 m/s. There is a cushion of fluid 1.8mm thick between the plane and the plate. Find the viscosity of the fluid, if the weight of the plate is 280N. **(06 Marks)**

2 a. State and prove Pascal's law. **(06 Marks)**

b. With neat sketches, define the following :
i) Atmospheric pressure ii) Gauge pressure iii) Vacuum pressure iv) Absolute pressure. **(08 Marks)**

c. A U-tube manometer is used to measure the pressure of oil specific gravity 0.85 flowing in a pipeline. Its left end is connected to the pipe and the right limb is open to the atmosphere. The centre of the pipe is 100mm below the level of mercury (specific gravity = 13.6) in the right limb. If the difference of mercury levels in the right limb and left limb is 160mm. Determine the absolute pressure of the oil in the pipe. **(06 Marks)**

3 a. Define the following terms:
i) Total pressure ii) Centre of pressure. **(04 Marks)**

b. Derive an expression for the depth of centre of pressure from the free surface of liquid of an inclined plane surface submerged in the liquid. **(08 Marks)**

c. A circular opening 2.5m diameter, in a vertical side of tank is closed by a disc of 2.5m diameter which can rotate about a horizontal diameter. Determine
i) The force on the disc.
ii) The torque required to maintain the disc in equilibrium in vertical position when the head of water above the horizontal diameter is 3.5. **(08 Marks)**

4 a. Differentiate between the Eulerian and Lagrangian methods of representing the fluid flow. **(06 Marks)**

b. Derive the three-dimensional continuity equation in the Cartesian coordinates. **(08 Marks)**

c. The velocity potential function for a two-dimensional flow is $\phi = x(2y-1)$. At a point P(4, 5), determine i) the velocity at that point ii) the value of stream function. **(06 Marks)**

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

PART – B

5 a. Derive the Bernoulli's equation from the Euler's equation for a steady flow of fluid and list the assumptions made in it. **(10 Marks)**

b. In a 45° bend a rectangular air duct of 1 m^2 cross sectional area is gradually reduced to 0.5m^2 area. Find the magnitude and direction of the force required to hold the duct in position if the velocity of flow at 1m^2 section is 10 m/s, and pressure is 30 kN/m^2. Take the specific weight of air as 0.0116 kN/m^3 **(10 Marks)**

6 a. Derive the Darcy-Weisbach equation for head loss due to friction in a pipe. **(08 Marks)**

b. Briefly explain the pipes in series and pipes in parallel. **(06 Marks)**

c. Water is flowing in a pipe of 150mm diameter with a velocity of 2.5 m/s. When it is suddenly brought to rest by closing the value find the pressure rise assuming the pipe is elastic E = 206 GN/m^2 , Poisson's ratio 0.25 and K for water = 206 GN/m^2, pipe wall is 5mm thick. **(06 Marks)**

7 a. Write short notes on:
i) Self recording gauges ii) Staff gauges iii) Weight gauges iv) Float gauges. **(12 Marks)**

b. Explain briefly with a neat sketch, the 'current meter', for measuring velocity in the streams. **(08 Marks)**

8 a. Derive an expression for the discharge over a triangular notch in terms of the head of water over the crest of the notch. **(06 Marks)**

b. What is meant by 'end contraction'? Explain briefly. **(04 Marks)**

c. A 300mm ×150mm venturimeter is provided in a vertical pipeline carrying oil of the specific gravity 0.9, flow being upward. The difference in elevation of the throat section and entrance section of the venturimeter is 300mm. The differential –tube mercury manometer shows a gauge deflection of 250mm. Calculate
i) The discharge of oil
ii) The pressure difference between the entrance section and the throat section.
Take the coefficient of meter as 0.98 and specific gravity of mercury as 13.6. **(10 Marks)**

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10CV36

Third Semester B.E. Degree Examination, December 2011
Applied Engineering Geology

Time: 3 hrs. Max. Marks:100

Note: ***1. Answer any FIVE full questions, selecting at least TWO questions from each part.***
2. Draw neat sketches, wherever necessary.

PART – A

1 a. Write a brief note on importance of geological studies to civil engineers. **(06 Marks)**
b. With neat sketch name the different parts of the Earth's interior. **(06 Marks)**
c. Write a note on any one of the following physical properties by giving mineral examples :
LUSTER ; STREAK ; CLEVAGE ; TENACITY. **(04 Marks)**
d. Write the physical property, uses and occurances of any one of the following minerals :
ASBESTOS ; CALCITE ; HEMATITE ; QUARTZ. **(04 Marks)**

2 a. Write a brief note an origin of igneous rocks. **(06 Marks)**
b. Write a note on aranaceous sedimentary rock by giving examples. **(04 Marks)**
c. Write the properties, occuranes and uses of any one of following rocks :
GRANITE ; MARBLE ; SHALE ; CONGLOMERATE. **(04 Marks)**
d. Write the characters of good building stones. **(06 Marks)**

3 a. Write a note on mechanical weathering process by plants and animals. **(06 Marks)**
b. Write a note on causes of soil erosion. **(04 Marks)**
c. Name the different drainage patterns based an valley and geology. **(04 Marks)**
d. What is wind deflation? Write a note an importance of wind to civil engineers. **(06 Marks)**

4 a. Write a note on causes of landslides. **(04 Marks)**
b. Write a brief note on earthquake resistant structures. **(08 Marks)**
c. With a neat sketch, name the different depth zones starting from the share. **(04 Marks)**
d. What is Tsunami? Add a brief note unit. **(04 Marks)**

PART – B

5 a. What is an out crop? Explain the terms Strike and Dip with a neat sketch. **(05 Marks)**
b. Define the terms Stress Strain and add a brief note on three stages of deformation. **(05 Marks)**
c. Add a note on importance of faults in civil engineering structures like dam and the associated reservoir. **(06 Marks)**
d. Add a note on angular unconformity. **(04 Marks)**

6 a. Add a note on dam foundation on upstream dipping beds. **(04 Marks)**
b. Write a brief note on preventive measure of silting of the reservoirs. **(06 Marks)**
c. Write a note on tunneling through the fold axis anticline. **(04 Marks)**
d. What are the precautionary measures to be taken during the construction of highway in a hilly region? **(06 Marks)**

7 a. With a neat sketch name the different zones of vertical distribution of ground water. **(05 Marks)**
b. Write a brief note on unconfined aquifer. **(04 Marks)**
c. Add a brief note on ground water investigation by electrical resistivity method. **(07 Marks)**
d. Write the reasons for sea water intrusion. **(04 Marks)**

8 a. What is remote-sensing? Write its application in civil engineering. **(06 Marks)**
b. Write a brief note an environmental impact of water impoundment. **(06 Marks)**
c. Write a note on effects of blasting of rocks. **(04 Marks)**
d. What is GIS? and name the different components of GIS. **(04 Marks)**

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Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

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MATDIP301

Third Semester B.E. Degree Examination, December 2011

Advanced Mathematics - I

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions.***

1 a. Express $\frac{1}{(2+i)^2}-\frac{1}{(2-i)^2}$ in the form $a+ib$. **(06 Marks)**

b. Find the modulus and amplitude of $\frac{(3-\sqrt{2}i)^2}{1+2i}$. **(07 Marks)**

c. Find the real part of $\frac{1}{1+\cos\theta+i\sin\theta}$. **(07 Marks)**

2 a. Find the n^{th} derivative of $\cos x\cos 2x\cos 3x$. **(06 Marks)**

b. If $y=(\sin^{-1}x)^2$, show that $(1-x^2)y_{n+2}-(2n+1)xy_{n+1}-n^2y_n=0$. **(07 Marks)**

c. Find the nth derivative of $\frac{x+2}{x+1}+\log\left(\frac{x+2}{x+1}\right)$. **(07 Marks)**

3 a. State and prove Euler's theorem. **(06 Marks)**

b. Given $u=\sin\left(\frac{x}{y}\right)$, $x=e^t$, $y=t^2$, find $\frac{du}{dt}$ as a function of t. **(07 Marks)**

c. If $x=r\cos\theta$, $y=r\sin\theta$, find $\frac{\partial(x,y)}{\partial(r,\theta)}$ and $\frac{\partial(r,\theta)}{\partial(x,y)}$. **(07 Marks)**

4 a. Find the angle of intersection of the curves $r=a(1+\cos\theta)$ and $r=b(1-\cos\theta)$. **(06 Marks)**

b. Find the pedal equation of the curve $\frac{2a}{r}=1-\cos\theta$. **(07 Marks)**

c. Expand $e^{\sin x}$ by Maclaurin's series upto the term containing x^4. **(07 Marks)**

5 a. Obtain the reduction formula for $I_n=\int_0^{\pi/2}\sin^n x\,dx$ where n is a positive integer. **(06 Marks)**

b. Evaluate : $\int_1^5\int_1^{x^2}x(x^2+y^2)dx\,dy$. **(07 Marks)**

c. Evaluate : $\int_0^1\int_0^2\int_1^2 x^2yz\,dx\,dy\,dz$. **(07 Marks)**

6 a. Prove that $\beta(m, n) = \frac{\Gamma(m)\Gamma(n)}{\Gamma(m+n)}$. **(06 Marks)**

b. Show that $\Gamma(n) = \int_0^1 \left(\log\frac{1}{x}\right)^{n-1} dx$. **(07 Marks)**

c. Express $\int_0^{\pi/2} \sqrt{\tan\theta}\, d\theta$ in terms of Gamma function. **(07 Marks)**

7 a. Solve : $\frac{dy}{dx} = \frac{x(2\log x + 1)}{\sin y + y\cos y}$. **(06 Marks)**

b. Solve : $(1 + e^{x/y})dx + e^{x/y}\left(1 - \frac{x}{y}\right)dy = 0$. **(07 Marks)**

c. Solve : $(x^2 - ay)dx = (ax - y^2)dy$. **(07 Marks)**

8 a. Solve : $\frac{d^4y}{dx^4} + 8\frac{d^2y}{dx^2} + 16y = 0$. **(06 Marks)**

b. Solve : $(D-2)^2 y = 8(e^{2x} + \sin 2x)$. **(07 Marks)**

c. Solve : $(D^3 + 4D)y = \sin 2x$. **(07 Marks)**

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