IV ME, CV (S)

CBCS Scheme

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15MAT41

Fourth Semester B.E. Degree Examination, Dec.2017/Jan.2018
Engineering Mathematics – IV

Time: 3 hrs. Max. Marks: 80

Note: 1. *Answer any FIVE full questions, choosing one full question from each module.*
2. *Use of statistical tables is permitted.*

Module-1

1 a. Employ Taylor's series method to find y at x = 0.1. Correct to four decimal places given $\frac{dy}{dx} = 2y + 3e^x$; $y(0) = 0$. **(05 Marks)**

b. Using Runge Kutta method of order 4, find y(0.2) for $\frac{dy}{dx} = \frac{y-x}{y+x}$; $y(0) = 1$, taking h = 0.2. **(05 Marks)**

c. If $y' = 2e^x - y$; $y(0) = 2$, $y(0.1) = 2.010$, $y(0.2) = 2.040$ and $y(0.3) = 2.090$. Find y(0.4) using Milne's predictor corrector formula. Apply corrector formula twice. **(06 Marks)**

OR

2 a. Use Taylor's series method to find y(4.1) given that $(x^2 + y)y' = 1$ and $y(4) = 4$. **(05 Marks)**

b. Using modified Euler's method find y at x = 0.1, given $y' = 3x + \frac{y}{2}$ with y(0) = 1, h = 0.1. Perform two iterations. **(05 Marks)**

c. Find y at x = 0.4 given $y' + y + xy^2 = 0$ and $y_0 = 1$, $y_1 = 0.9008$, $y_2 = 0.8066$, $y_3 = 0.722$ taking h = 0.1 using Adams-Bashforth method. Apply corrector formula twice. **(06 Marks)**

Module-2

3 a. Given $y'' = xy'^2 - y^2$ find y at x = 0.2 correct to four decimal places, given y = 1 and y' = 0 when x = 0, using R-K method. **(05 Marks)**

b. If α and β are two distinct roots of $J_n(x) = 0$, then prove that $\int_0^1 xJ_n(\alpha x)J_n(\beta x)dx = 0$ if $\alpha \neq \beta$. **(05 Marks)**

c. If $x^3 + 2x^2 - x + 1 = aP_0(x) + bP_1(x) + cP_2(x) + dP_3(x)$ then, find the values of a, b, c, d. **(06 Marks)**

OR

4 a. Apply Milne's method to compute y(0.8) given that $y'' = 1 - 2yy'$ and the table.

x	0	0.2	0.4	0.6
y	0	0.02	0.0795	0.1762
y'	0	0.1996	0.3937	0.5689

Apply corrector formula twice. **(05 Marks)**

b. Show that $J_{\frac{1}{2}}(x) = \sqrt{\frac{2}{\pi x}} \sin x$. **(05 Marks)**

c. Derive Rodrigue's formula $P_n(x) = \frac{1}{2^n n!} \frac{d^n}{dx^n}\left[(x^2 - 1)^n\right]$. **(06 Marks)**

Module-3

5 a. Define analytic function and obtain Cauchy Riemann equation in Cartesian form. **(05 Marks)**

b. Evaluate $\int_C \frac{\sin \pi z^2 + \cos \pi z^2}{(z-1)^2(z-2)} dz$; c is the circle $|z| = 3$ by using theorem Cauchy's residue. **(05 Marks)**

c. Discuss the transformation $w = e^z$ with respect to straight line parallel to x and y axis. **(06 Marks)**

OR

6 a. Find the analytic function whose real part is $u = \frac{x^4y^4 - 2x}{x^2 + y^2}$. **(05 Marks)**

b. State and prove Cauchy's integral formula. **(05 Marks)**

c. Find the bilinear transformation which maps the points $z = 1, i, -1$ into $w = 2, i, -2$. **(06 Marks)**

Module-4

7 a. Find the constant c, such that the function $f(x) = \begin{cases} cx^2, & 0 < x < 3 \\ 0, & \text{otherwise} \end{cases}$ is a p.d.f. Also compute $p(1 < x < 2)$, $p(x \leq 1)$, $p(x > 1)$. **(05 Marks)**

b. If the probability of a bad reaction from a certain injection is 0.001, determine the chance that out of 2000 individuals, more than two will get a bad reaction. **(05 Marks)**

c. x and y are independent random variables, x take the values 1, 2 with probability 0.7; 0.3 and y take the values -2, 5, 8 with probabilities 0.3, 0.5, 0.2. Find the joint distribution of x and y hence find cov(x, y). **(06 Marks)**

OR

8 a. Obtain mean and variance of binomial distribution. **(05 Marks)**

b. The length of telephone conservation in a booth has been an exponential distribution and found on an average to be 5 minutes. Find the probability that a random call made from this booth (i) ends less than 5 minutes, (ii) between 5 and 10 minutes. **(05 Marks)**

c. The joint distribution of two discrete variables x and y is $f(x, y) = k(2x + y)$ where x and y are integers such that $0 \leq x \leq 2$; $0 \leq y \leq 3$. Find: (i) The value of k; (ii) Marginal distributions of x and y; (iii) Are x and y independent? **(06 Marks)**

Module-5

9 a. Explain the terms: (i) Null hypothesis; (ii) Type I and type II errors; (iii) Significance level. **(05 Marks)**

b. A die thrown 9000 times and a throw of 3 or 4 was observed 3240 times. Is it reasonable to think that the die is an unbiased one? **(05 Marks)**

c. Find the unique fixed probability vector for the regular Stochastic matrix:

$$A = \begin{bmatrix} 0 & 1 & 0 \\ 1/6 & 1/2 & 1/3 \\ 0 & 2/3 & 1/3 \end{bmatrix}$$ **(06 Marks)**

OR

10 a. A certain stimulus administered to each of the 12 patients resulted in the following change in blood pressure 5, 2, 8, –1, 3, 0, 6, –2, 1, 5, 0, 4. Can it be concluded that the stimulus will increase the blood pressure. ($t_{0.05}$ for 11 d.f = 2.201) **(05 Marks)**

b. It has been found that the mean breaking strength of a particular brand of thread is 275.6 gms with $\sigma = 39.7$ gms. A sample of 36 pieces of thread showed a mean breaking strength of 253.2 gms. Test the claim at 1+.. and 5–*l*. level of significance. **(05 Marks)**

c. A man's smoking habits are as follows. If he smokes filter cigarettes one week, he switches to non filter cigarettes the next week with probability 0.2. One the other hand, if he smokes non filter cigarettes one week there is a probability of 0.7 that he will smoke non filter cigarettes the next week as well. In the long run how often does he smoke filter cigarettes? **(06 Marks)**

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15CV42

Fourth Semester B.E. Degree Examination, Dec.2017/Jan.2018
Analysis of Determinate Structures

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing one full question from each module.

Module-1

1 a. Differentiate between statically determinate and indeterminate structures. **(06 Marks)**

b. What are linear and non-linear systems? Explain. **(02 Marks)**

c. Determine the degree of static indeterminaly for the following structures [Fig.Q1(c)]:

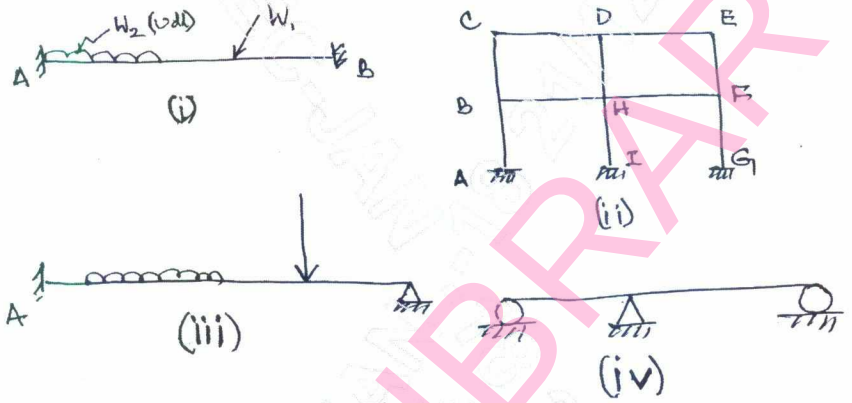

Fig.Q1(c) **(08 Marks)**

OR

2 Determine the forces in all the members of the truss shown in the Fig.Q2 by the method of joints and verify the forces in members BC, CF and FE by the method of sections.

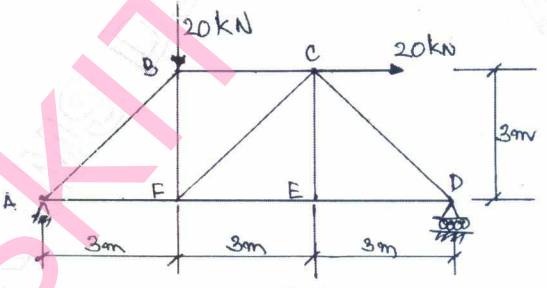

Fig.Q2 **(16 Marks)**

Module-2

3 a. Derive the moment-curvature equation for deflection. **(06 Marks)**

b. A simply supported beam AB has a span of 5m and carries a point load of 50 kN at a distance of 3m from left end A as shown in Fig.Q3(b). Find the deflection under the load and also maximum deflection in the beam.

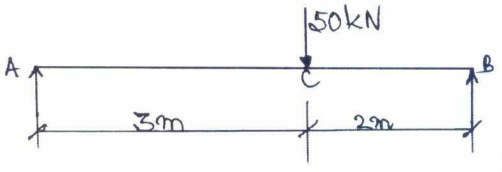

Fig.Q3(b) **(10 Marks)**

OR

4 a. Determine the slope and deflection at the free end of a cantilever shown in Fig.Q4(a) by the moment area method.

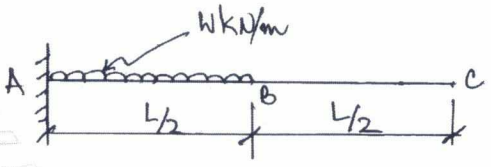

Fig.Q4(a) **(08 Marks)**

b. Determine the slope and deflection under the load for the beam shown in Fig.Q4(b) using conjugate beam method.

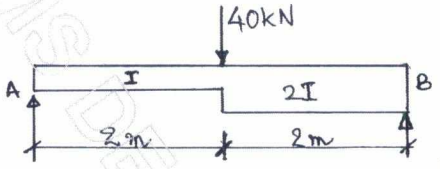

Fig.Q4(b) **(08 Marks)**

Module-3

5 a. Obtain the expression for strain energy stored in a member when it is subjected to axial load. **(08 Marks)**

b. Determine the deflection under the given 60 kN load acting on the beam as shown in Fig.Q5(b) by strain energy method.

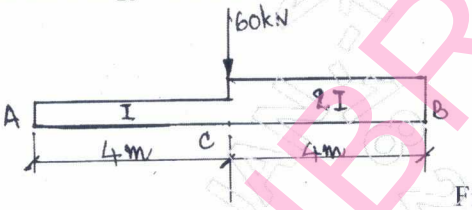

Fig.Q5(b) **(08 Marks)**

OR

6 a. Find the value of vertical deflection at C for the structure shown in Fig.Q6(a) by Castiglione's theorem.

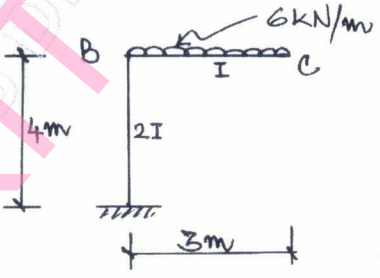

Fig.Q6(a) **(08 Marks)**

b. Determine the vertical and horizontal deflections at joint C of the truss shown in Fig.Q6(b). The cross sectional area of inclined member (tie) is 2000 mm^2 while the area of horizontal member is 1600 mm^2. Take E = 200 kN/mm^2.

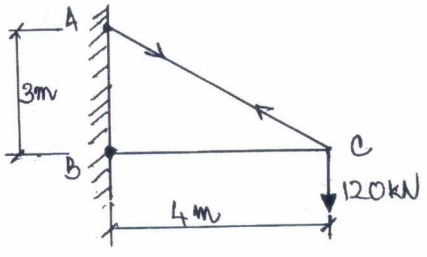

Fig.Q6(b) **(08 Marks)**

Module-4

7 A three hinged parabolic arch has a span of 30 m and rise of 6m. It carries a udl of 3 kN/m over the left half of the span and a point load of 6 kN at 9m from right end. Find the BM, normal thrust and radial shear at a section of 9m from left end support. Also find the maximum bending moment along the span. **(16 Marks)**

OR

8 A cable is suspended between two points A and B 120 m apart and a central dip of 8m. It carries a udl of 20 kN/m. Determine:

i) The maximum and minimum tension in the cable.
ii) Length of the cable.
iii) The size of cable if the permissible stress of cable material is 200 N/mm^2. **(16 Marks)**

Module-5

9 a. Define a influence line diagram and mention its applications. **(06 Marks)**

b. Draw the influence line diagrams for:

i) Reactions at supports of a simply supported beam.
ii) Shear force of a simply supported beam carrying concentrated unit load. **(10 Marks)**

OR

10 For a simply supported beam of span 25m with the series of concentrated loads to be taken as rolling load system as shown in Fig.Q10. Compute the following by influence line principles.

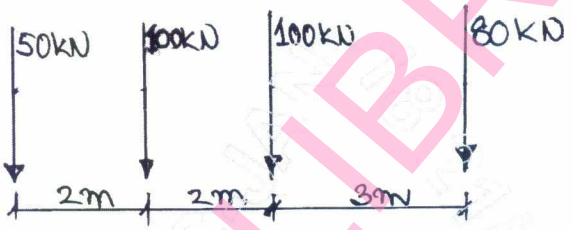

Fig.Q10

i) Maximum reactions.
ii) Maximum bending moment at 8 m from left support. **(16 Marks)**

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15CV43

Fourth Semester B.E. Degree Examination, Dec.2017/Jan.2018
Applied Hydraulics

Time: 3 hrs. Max. Marks: 80

Note: **1.** ***Answer any FIVE full questions, choosing one full question from each module.***
2. ***Assume missing data suitably.***

Module-1

1 a. Using Buckingham's π-theorem, show that the velocity through a circular orifice is given by $V = \sqrt{2gH}\,\phi\left(\frac{D}{H}, \frac{\mu}{\rho VH}\right)$, where H is the head causing flow, D is the diameter of the orifice, μ is coefficient of viscosity, ρ is the mass density and g is the acceleration due to gravity. **(10 Marks)**

b. A pipe of diameter 1.5 m is required to transport an oil of specific gravity 0.9 and viscosity 3×10^{-2} poise at the rate of 3000 *l*/s. Tests were conducted on a 15 cm diameter pipe using water at 20°C. Find the viscosity and rate of flow in the model. Viscosity of water at 20°C = 0.01 Poise. **(06 Marks)**

OR

2 a. A solid cylinder of diameter 4 m has a height of 4m. Find the meta centric height of the cylinder, if the specific gravity of the material of cylinder = 0.6 and it is floating in water with its axis vertical. State whether the equilibrium is stable or unstable. **(08 Marks)**

b. A 1:40 model of an ocean tanker is dragged through fresh water at 2 m/s with a total measured drag of 12 N. The skin drag coefficient 'f' for model and prototype are 0.03 and 0.002 respectively in the equation $R_f = f.AV^2$. The wetted surface are of the model is 25 m^2. Determine the total drag on the prototype and power required to drive the prototype. Take $\rho_p = 1030$ kg/m^3 and $\rho_m = 1000$ kg/m^3. **(08 Marks)**

Module-2

3 a. What is meant by economical section of a channel? Derive the condition for the most economical rectangular section. **(08 Marks)**

b. The discharge of water through a rectangular channel of width 8m is 15 m^3/s. When depth of flow of water is 1.2 m, calculate:
i) Specific energy of the flowing water.
ii) Critical depth and critical velocity
iii) Value of minimum specific energy **(08 Marks)**

OR

4 a. Define specific energy, draw specific energy curve and then derive expressions for critical depth and critical velocity. **(08 Marks)**

b. Find the diameter of a circular sewer pipe which is laid at a slope of 1 in 8000 and carries a discharge of 800 *l*ps when flowing half full. Take the value of Manning's N = 0.02. **(08 Marks)**

Module-3

5 a. A hydraulic jump forms at the downstream end of spillway carrying 17.93 m^3/s discharge. If the depth before jump is 0.8m, determine the depth after the jump and energy loss. Consider 1 m width of channel. **(06 Marks)**

b. Determine the length of the back water curve caused by an afflux of 2m in a rectangular channel of width 40 m and depth 2.5 m. The slope of the bed is given as 1 in 11000. Take Manning's N = 0.03. **(10 Marks)**

OR

6 a. Find the slope of the free water surface in a rectangular channel of width 20 m having a depth of flow 5m. The discharge through the channel is 50 m^3/s. The bed of the channel is having a slope of 1 in 4000. Take the value of Chezy's constant C = 60. **(08 Marks)**

b. What is gradually varies flow and derive an expression for gradually varied flow? Also mention the assumptions mode for derivation. **(08 Marks)**

Module-4

7 a. A jet of water strikes an unsymmetrical moving curved vane tangential at one of the tips. Derive an expression for the force exerted by the jet in the horizontal direction of motion of vane. Also describe the velocity and obtain the expression for work done per second and efficiency. **(08 Marks)**

b. Draw a neat sketch of hydroelectric power plant and mention the function of each component. **(08 Marks)**

OR

8 a. A pelton wheel has a mean bucket speed of 10 m/s with a jet of water flowing at the rate of 700 *l*/s under a head of 30 m. The buckets deflect the jet through an angle of 160°. Calculate the power given by water to the runner and the hydraulic efficiency of the turbine. Assume coefficient of velocity as 0.98. **(08 Marks)**

b. Give a detailed classification of turbines. Also discuss about different heads and efficiencies. **(08 Marks)**

Module-5

9 a. Draw a neat sketch of Kaplan turbine and explain the function of each part in brief. **(08 Marks)**

b. Derive an expression for the minimum starting speed of a centrifugal pump. **(08 Marks)**

OR

10 a. A Francis turbine with overall efficiency of 75% required to produce 148.25 KW power. It is working under a head of 7.62 m. The peripheral velocity = $0.26\sqrt{2gh}$ and radial velocity of flow is $0.96\sqrt{2gh}$. The wheel runs at 150 rpm and hydraulic losses in the turbine are 22% of the available energy. Assume radial discharge. Determine:

i) Guide blade angle at the inlet
ii) The wheel vane angle at the inlet
iii) Diameter of the wheel at the inlet
iv) Width of the wheel at the inlet **(08 Marks)**

b. Define multistage centrifugal pump and with neat sketch, explain the multistage centrifugal pumps used for (i) high heads (ii) high discharge. **(08 Marks)**

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15CV/CT44

Fourth Semester B.E. Degree Examination, Dec.2017/Jan.2018
Concrete Technology

Time: 3 hrs. Max. Marks: 80

Note: 1. *Answer FIVE full questions, choosing one full question from each module.*
2. *Use of IS10262 is permitted.*
3. *Any missing data may be suitably assumed.*

Module-1

1 a. List the ingredients of cement. State their importance. **(08 Marks)**
b. What are the products of hydration of cement? **(04 Marks)**
c. Mention the tests conducted on coarse aggregates. **(04 Marks)**

OR

2 a. Describe manufacturing sand and its role in reducing carbon foot print. **(08 Marks)**
b. Explain the importance of plasticizers and Fly Ash as Admixtures in concrete. **(08 Marks)**

Module-2

3 a. List the factors that affect workability of concrete. Mention the laboratory tests conducted to measure workability of a concrete sample. **(08 Marks)**
b. Explain the ill effects of segregation and building in concrete. **(08 Marks)**

OR

4 a. Enumerate the role of curing in the performance of a concrete structural element. Name at least four methods of curing. **(08 Marks)**
b. Explain how heat of hydration is controlled in mass connecting works. **(08 Marks)**

Module-3

5 a. Describe the effect of working ratio on strength of concrete. **(08 Marks)**
b. Brief the Internal and External factors influencing Durability of a concrete structure. **(08 Marks)**

OR

6 a. Write the process of disintegration of concrete due to acid attack. Suggest the remedial measures to control sulphate attack. **(08 Marks)**
b. Give the names of insitu concrete testing methods. Mention the principle and limitations of ultrasonic pulse velocity test. **(08 Marks)**

Module-4

7 a. Explain the concept of "Mix design" pertaining to concrete. **(08 Marks)**
b. Illustrate the steps to be followed as per IS recommendations method for a mix design. **(08 Marks)**

OR

8 Arrive at a mix proportion for a concrete of mix grade 20, to suite the following given data : Max size of agg. = 20mm ; Slump required = 100mm ; Quality control = good ; Exposure condition = mild ; 53 grade OPC having SP.gravity = 3.15 ; Sp. Gravity of FA & CA = 2.55 and 2.70 respectively ; Water absorption = 0.5% and 1.0% for CA and FA respectively. FA is confirming to zone III. **(16 Marks)**

Module-5

9 a. Provide comparison between Insitu concrete and Ready mixed concrete **(08 Marks)**

b. Briefly explain the properties of "Fiber Reinforced Concrete". State the practical application of the same. **(08 Marks)**

OR

10 a. What should be the properties of materials to be used in "Light weight concrete" preparation? **(08 Marks)**

b. State the advantages of "SSC". List the tests to be carried out to determine the properties of SSC. **(08 Marks)**

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15CV45

Fourth Semester B.E. Degree Examination, Dec.2017/Jan.2018
Basic Geotechnical Engineering

Time: 3 hrs. Max. Marks: 80

Note: ***Answer FIVE full questions, choosing one full question from each module.***

Module-1

1 a. With the help of the phase diagram, define the following : **(03 Marks)**
i) Void ratio ii) Porosity iii) Degree of saturation and iv) Water content.

b. A sample have bulk density of 26kN/m^3 , Specific gravity of 2.76 and water content 16%. Determine dry density, void ratio, porosity and degree of saturation. What is the density, if the soil is fully saturated due to rain? **(06 Marks)**

c. How coarse grained soils are classified as per IS? Explain. If soil have $C_u = 7$, $C_c = 2$, % Gravel = 20% , Sand = 75% , classify the soil. **(07 Marks)**

OR

2 a. Considering soil as a three phase system, derive the relation $\gamma_d = \frac{G\gamma_w}{1+e}$. **(05 Marks)**

b. Explain Consistency limits of soil. How do you describe the consistency if the soil has liquid limit of 55% , plasticity index of 30% and natural water content of 65%. **(05 Marks)**

c. At a site the dry density of soil is 16kN/m^3, the weight of soil filled in a container of one liter in its loosest states and densest state are 15N and 17N respectively. Determine maximum and minimum void ratio of this soil. What is the relative density of natural soil at site? Take G = 2.67. **(06 Marks)**

Module-2

3 a. List the different types of clay minerals commonly found in soils. Explain any one with their structure. **(04 Marks)**

b. Distinguish between standard and modified Proctor tests. **(04 Marks)**

c. The following data referred to light compaction test as per IS. Take $\gamma_w = 10$kN/m^3.

Water content %	8.5	12.2	13.75	15.5	18.2	20.2
Dry unit weight kN/m^3	16.5	17.2	17.5	17.7	17.1	16.4

If specific gravity of soil is 2.7 ① plot compaction curve and find i) OMC and ODD
ii) Plot 20% air void line iii) What is the range of water content that can be allowed to achieve dry density of 16.8 kN/m^3 at site. **(08 Marks)**

OR

4 a. Explain electrical diffuse double layer and adsorbed water. **(04 Marks)**

b. Discuss the effect of compaction and different properties of soil. **(06 Marks)**

c. During a compaction test a soil attains a maximum dry density of 18kN/m^3 at a water content of 12%. Determine the degree of saturation and percent air voids at maximum dry density. Also find the theoretical maximum dry density corresponding to zero air voids at optimum moisture content. Take G = 2.77. **(06 Marks)**

Module-3

5 a. What are the factors affecting permeability? Explain any three. **(04 Marks)**

b. With a neat sketch, explain the method of locating phreatic line for a homogeneous earth dam with horizontal filter. **(06 Marks)**

c. A granular soil deposit is 7m deep over an impermeable layer. The ground water table is 4m below the ground surface. The deposit has a zone of capillary rise of 1.2m with a saturation of 50%. Plot the variations of total stress, pore water pressure and effective stress with the depth of deposit. Take e = 0.6 and G = 2.65. **(06 Marks)**

OR

6 a. Write a note on : i) Characteristics of flow net and ii) Seepage velocity and discharge velocity. **(06 Marks)**

b. Calculate the seepage loss in m^3/day for a hydraulic structure, if the flow net contains 5 flow lines and 9 equipotential lines and the head causing flow is 20m. K of soil is 2.6×10^{-6} cm/sec. **(04 Marks)**

c. In a falling head permeameter test, the initial head is 40cm. The head drops by 5cm in 10 minutes, calculate the time required to run the test for the final head to be at 20cm. If the sample is 6cm in height and $50cm^2$ in cross sectional area, calculate coefficient of permeability taking area of stand pipe as $0.5cm^2$. **(06 Marks)**

Module-4

7 a. Define the following terms : i) Coefficient of compressibility ii) Coefficient of consolidation iii) Primary consolidation and iv) Over consolidated soil. **(08 Marks)**

b. Explain Mass spring analogy of consolidation of soils. **(04 Marks)**

c. An undisturbed sample of clay, 24mm thick consolidated 50% in 20 minutes, when tested in the laboratory with drainage allowed at top and bottom. The clay layer from which the sample was obtained is 4m thick in the field. How much time will it take to consolidate 90% with single drainage subjected to same as lab loading condition? **(04 Marks)**

OR

8 a. Explain Casagrande method of determination of pre consolidation pressure. **(06 Marks)**

b. How do you determine coefficient of consolidation by square root time fitting method? **(06 Marks)**

c. A layer of soft clay is 6m thick and lies under a newly constructed building. The weight of sand overlying the clay layer produces a pressure of $260kN/m^2$ and new construction increases the pressure by $100kN/m^2$. If the compression index is 0.5, compute the settlement. Water content and specific gravity of clay are 40% and 2.65 respectively. **(04 Marks)**

Module-5

9 a. Explain Mohr – Coulomb theory of shear strength. **(04 Marks)**

b. In an unconfined compression test on soil sample of 100mm long and 50mm in diameter fails under a load of 150N at 10% strain. The failure plane makes an angle of 50^0 with the horizontal. Determine shear parameters. **(06 Marks)**

c. The results of shear box test are as follows :

Trial No.	1	2	3	4
Normal stress kN/m^2	50	100	200	300
Shear stress kN/m^2	36	80	154	235

Determine the shear parameters. Would the failure occurs on the plane with in the soil mass when the shear stress is $122kN/m^2$ and normal stress is $246kN/m^2$. **(06 Marks)**

OR

10 a. Explain the classification of shear tests based on drainage condition. **(06 Marks)**

b. A cylindrical specimen of dry sand was tested in a triaxial test. Failure occurred under a cell pressure of $130kN/m^2$ and deviator stress of $420 kN/m^2$. Find the following.

i) Angle of shearing resistance.

ii) Normal and shear stresses on the failure plane.

iii) Inclination of failure plane with major and minor principal stress planes. **(10 Marks)**

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15CV46

Fourth Semester B.E. Degree Examination, Dec.2017/Jan.2018
Advanced Surveying

Time: 3 hrs. Max. Marks: 80

Note: ***Answer any FIVE full questions, choosing one full question from each module.***

Module-1

1 a. List the different methods of setting out simple circular curves. Explain the Linear method of setting out simple curve by the method of offset from long chord. **(06 Marks)**

b. Two tangents intersect at chainage 1000mt. The deflection angle being 28 degree, calculate the necessary data to set out a simple circular curve of 200mt radius by Rankines method of deflection angles. Take per interval as 10mt. **(10 Marks)**

OR

2 a. What is a Transition curve? List the functions and essential requirements of an ideal Transition curve. **(04 Marks)**

b. Two straights with a total deflection angle of 72^0 are to be connected by a compound curve of two branches of equal length. The Radius of the first branch is 300mt and that of the second branch is 400mt, chainage of intersection point is 1500 mt. Calculate the chainage of tangent points and that of Point of Compound Curvature (PIC). **(06 Marks)**

c. Two parallel straight gant apart are to be connected by a Reverse curve. If the distance between the two tangent points is 72mt, find the common radius of the two branches. If however, radius of the first branch is 100mt, find the radius of the second branch. **(06 Marks)**

Module-2

3 a. List the various factors that are to be considered in the selection of site for Base line and stations in Triangulations survey. **(08 Marks)**

b. Write a note on Classifications of Triangulations system. **(08 Marks)**

OR

4 a. State and explain Law of Weights. **(08 Marks)**

b. Find the most probable value of the angles A and B from the following equations :
$A = 40^0\ 15'\ 21.4"$; $B = 45^0\ 12'\ 18.4"$; $A + B = 85^0\ 27'\ 45.2"$. **(08 Marks)**

Module-3

5 a. Define the following terms : i) The a celestrial sphere ii) The azimuth iii) The sensible Horizon iv) The hour angle. **(08 Marks)**

b. The standard time meridian in India is $82^0\ 30'$E. If the standard time at any instant is 20 hours 24 min 6 seconds, find the local mean time for two places having longitudes i) 20^0E ii) 20^0W. **(08 Marks)**

OR

6 a. Define the following terms : **(08 Marks)**
i) The visible horizon ii) The Latitude (θ) iii) Hour circle iv) Zenith and Nadir.

b. Find the GMT corresponding to following LMT :
i) 9 hour 10 minutes 12 second AM at a place in longitude $42^0\ 36'$ W.
ii) 4 hour 32 minutes 10 second AM at a place in longitude $56^0\ 32'$ E. **(08 Marks)**

Module-4

7 a. Define the following terms : i) Vertical photograph ii) Flying height iii) Perspective projection iv) Exposure station. **(08 Marks)**

b. A vertical photograph was taken at an altitude of 1200mt above MSL. Determine the scale of the photograph for the terrain lying at elevation of 80mt and 300mt, if the Focal length of the camera is 15cm. **(08 Marks)**

OR

8 a. List the reasons for keeping overlap in photographs. **(06 Marks)**

b. Describe how mosaic differs from a map. **(04 Marks)**

c. The distance from the principal point to an image on a photograph is 6.44cm and the elevation of the object above the datum (sea level) is 250mt. What is the relief displacement at the point if the datum scale is 1 in 10,000 and the focal length of the camera is 20cm? **(06 Marks)**

Module-5

9 a. Explain the working principle of Total station and list the salient features of Total station. **(08 Marks)**

b. Define Remote sensing. List the applications of Remote sensing. **(08 Marks)**

OR

10 a. What is GIS? With a neat sketch, explain the components of GIS. **(08 Marks)**

b. Explain the working principle of GPS and distinguish between hand held GPS and differential GPS. **(08 Marks)**

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CBCS Scheme

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15MATDIP41

Fourth Semester B.E. Degree Examination, Dec.2017/Jan.2018
Additional Mathematics – II

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing one full question from each module.

Module-1

1 a. Find the rank of the matrix $A=\begin{bmatrix}2 & 3 & -1 & -1\\ 1 & -1 & -2 & -4\\ 3 & 1 & 3 & -2\\ 6 & 3 & 0 & -7\end{bmatrix}$ by applying elimentary row transformations. **(06 Marks)**

b. Solve the following system of equations by Gauss-elimination method: $x+y+z=9$, $x-2y+3z=8$ and $2x+y-z=3$. **(05 Marks)**

c. Find the inverse of the matrix $\begin{bmatrix}5 & -2\\ 3 & 1\end{bmatrix}$ using Cayley-Hamilton theorem. **(05 Marks)**

OR

2 a. Find the rank of the matrix $\begin{bmatrix}1 & 3 & -1 & 2\\ 0 & 11 & -5 & 3\\ 2 & -5 & 3 & 1\\ 4 & 1 & 1 & 5\end{bmatrix}$ by reducing it to echelon form. **(06 Marks)**

b. Solve the following system of equations by Gauss-elimination method: $x+y+z=9$, $2x-3y+4z=13$ and $3x+4y+5z=40$. **(05 Marks)**

c. Find the eigen values of $A=\begin{bmatrix}8 & -6 & 2\\ -6 & 7 & -4\\ 2 & -4 & 3\end{bmatrix}$. **(05 Marks)**

Module-2

3 a. Solve $(D^4-2D^3+5D^2-8D+4)y=0$. **(05 Marks)**

b. Solve $\frac{d^2y}{dx^2}-4y=\cosh(2x-1)+3^x$. **(05 Marks)**

c. Solve by the method of variation of parameters $y''+a^2y=\sec ax$. **(06 Marks)**

OR

4 a. Solve $\frac{d^3y}{dx^3}-3\frac{d^2y}{dx^2}+4\frac{dy}{dx}-2y=e^x$. **(05 Marks)**

b. Solve $(D^2+5D+6)y=\sin x$. **(05 Marks)**

c. Solve by the method of undetermined coefficients $y''+2y'+y=x^2+2x$ **(06 Marks)**

Module-3

5 a. Find the Laplace transform of $\cos t.\cos 2t.\cos 3t$. **(06 Marks)**

b. Find the Laplace transform $f(t)=\frac{Kt}{T}$, $0<t<\pi$, $f(t+T)=f(t)$. **(05 Marks)**

c. Express $f(t)=\begin{cases}\cos t, & 0<t<\pi\\ \sin t, & t>\pi\end{cases}$ in terms of unit step function, and hence find L[f(t)]. **(05 Marks)**

OR

6 a. Find the Laplace transform of (i) $t\cos at$, (ii) $\frac{1-e^{-at}}{t}$. **(06 Marks)**

b. Find the Laplace transform of a periodic function a period 2a, given that $f(t)=\begin{cases}t, & 0\le t<a\\ 2a-t, & a\le t<2a\end{cases}$ $f(t+2a)=f(t)$. **(05 Marks)**

c. Express $f(t)=\begin{cases}1, & 0<t<1\\ t, & 1<t\le 2\\ t^2, & t>2\end{cases}$ in terms of unit step function and hence find its Laplace transform. **(05 Marks)**

Module-4

7 a. Find the inverse Laplace transform of (i) $\frac{(s+2)^3}{s^6}$, (ii) $\frac{s+5}{s^2-6s+13}$. **(06 Marks)**

b. Find inverse Laplace transform of $\log\left[\frac{s^2+4}{s(s+4)(s-4)}\right]$. **(05 Marks)**

c. Solve by using Laplace transforms $\frac{d^2y}{dt^2}+k^2y=0$, given that $y(0)=2$, $y'(0)=0$. **(05 Marks)**

OR

8 a. Find the inverse Laplace transform of $\frac{4s+5}{(s+1)^2(s+2)}$. **(06 Marks)**

b. Find the inverse Laplace transform of $\cot^{-1}\left(\frac{s+a}{b}\right)$. **(05 Marks)**

c. Using Laplace transforms solve the differential equation $y''+4y'+3y=e^{-t}$ with $y(0)=1$, $y'(0)=1$. **(05 Marks)**

Module-5

9 a. If A and B are any two events of S, which are not mutually exclusive then $P(A\cup B)=P(A)+P(B)-P(A\cap B)$. **(05 Marks)**

b. The probability that 3 students A, B, C, solve a problem are ½, ⅓, ¼ respectively. If the problem is simultaneously assigned to all of them, what is the probability that the problem is solved? **(05 Marks)**

c. In a class 70% are boys and 30% are girls. 5% of boys, 3% of girls are irregular to the classes. What is the probability of a student selected at random is irregular to the classes and what is the probability that the irregular student is a girl? **(06 Marks)**

OR

10 a. If A and B are independent events then prove that $\overline{A}$ and $\overline{B}$ are also independent events. **(05 Marks)**

b. State and prove Baye's theorem. **(05 Marks)**

c. A Shooter can hit a target in 3 out of 4 shots and another shooter can hit the target in 2 out or 3 shoots. Find the probability that the target is being hit:
(i) when both of them try (ii) by only one shooter. **(06 Marks)**

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