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10MAT31

Third Semester B.E. Degree Examination, June/July 2015

Engineering Mathematics - III

Time: 3 hrs. Max. Marks:100

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

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 – A

1 a. Expand f(x) = x sin x as a Fourier series in the interval $(-\pi, \pi)$, Hence deduce the following:

i) $\frac{\pi}{2} = 1 + \frac{2}{1.3} - \frac{2}{3.5} + \frac{2}{5.7}$

ii) $\frac{\pi - 2}{4} = \frac{1}{1.3} - \frac{1}{3.5} + \frac{1}{5.7} - + \ \ldots$ **(07 Marks)**

b. Find the half–range Fourier cosine series for the function

$$f(x) = \begin{cases} kx, & 0 \le x \le \ell/2 \\ k(\ell - x), & \ell/2 < x \le \ell \end{cases}$$

Where k is a non-integer positive constant. **(06 Marks)**

c. Find the constant term and the first two harmonics in the Fourier series for f(x) given by the following table.

x :	0	$\pi/3$	$2\pi/3$	π	$4\pi/3$	$5\pi/3$	2π
F(x) :	1.0	1.4	1.9	1.7	1.5	1.2	1.0

(07 Marks)

2 a. Find the Fourier transform of the function $f(x) = xe^{-a|x|}$ **(07 Marks)**

b. Find the Fourier sine transforms of the

Functions $f(x) = \begin{cases} \sin x, & 0 < x < a \\ 0, & x \ge a \end{cases}$ **(06 Marks)**

c. Find the inverse Fourier sine Transform of

$F_x(\alpha) = \frac{1}{\alpha} e^{-a\alpha}$ a > 0. **(07 Marks)**

3 a. Find various possible solution of one dimensional wave equation $\frac{\partial^2 u}{\partial t^2} = C^2 \frac{\partial^2 u}{\partial x^2}$ by separable variable method. **(07 Marks)**

b. Obtain solution of heat equation $\frac{\partial u}{\partial t} = C^2 \frac{\partial^2 u}{\partial t^2}$ subject to condition u(0,t) =0, u (ℓ,t) = 0, u (x, 0) = f(x). **(06 Marks)**

c. Solve Laplace equation $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$ subject to condition u (0, y) = u(ℓ,y) =0, u (x, 0) = 0, u (x, a) = $\sin\left(\frac{\pi x}{\ell}\right)$. **(07 Marks)**

4 a. The pressure P and volume V of a gas are related by the equation $PV^r = K$, where r and K are constants. Fit this equation to the following set of observations (in appropriate units)

P :	0.5	1.0	1.5	2.0	2.5	3.0
V:	1.62	1.00	0.75	0.62	0.52	0.46

(07 Marks)

b. Solve the following LPP by using the Graphical method :

Maximize : $Z = 3x_1 + 4x_2$

Under the constraints $4x_1 + 2x_2 \le 80$

$2x_1 + 5x_2 \le 180$

$x_1, x_2 \ge 0$. **(06 Marks)**

c. Solve the following using simplex method

Maximize : $Z = 2x + 4y$, subject to the

Constraint : $3x + y \le 2z, \quad 2x + 3y \le 24, \quad x \ge 0, \ y \ge 0.$ **(07 Marks)**

PART – B

5 a. Using the Regular – Falsi method, find a real root (correct to three decimal places) of the equation cos x = 3x – 1 that lies between 0.5 and 1 (Here, x is in radians). **(07 Marks)**

b. By relaxation method

Solve : - x + 6y + 27z = 85, 54x + y + z = 110, 2x + 15y + 6z = 72. **(06 Marks)**

c. Using the power method, find the largest eigen value and corresponding eigen vectors of the matrix $A = \begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$

taking $[1, 1, 1]^T$ as the initial eigen vectors. Perform 5 iterations. **(07 Marks)**

6 a. From the data given in the following Table ; find the number of students who obtained (i) Less than 45 marks ii) between 40 and 45 marks.

Marks	30 – 40	40 – 50	50 – 60	60 – 70	70 - 80
No. of Students	31	42	51	35	31

(07 Marks)

b. Using the Lagrange's formula, find the interpolating polynomial that approximates to the function described by the following table:

x	0	1	2	3	4
f(x)	3	6	11	18	27

Hence find f (0.5) and f (3.1). **(06 Marks)**

c. Evaluate $\int_0^1 \frac{x}{1+x^2} dx$ by using Simpson's $\left(3/8\right)^{th}$ Rule, dividing the interval into 3 equal parts.

Hence find an approximate value of $\log\sqrt{2}$. **(07 Marks)**

7 a. Solve the one – dimensional wave equation $\frac{\partial^2 u}{\partial x^2} = \frac{\partial^2 u}{\partial t^2}$

Subject to the boundary conditions u (0, t) = 0, u (1, t) = 0, t ≥ 0 and the initial conditions $u(x, 0) = \sin \pi x, \ \frac{\partial u}{\partial t}(x, 0) = 0, \ 0 < x < 1.$ **(07 Marks)**

b. Consider the heat equation $2\frac{\partial^2 u}{\partial x^2} = \frac{\partial u}{\partial t}$ under the following conditions:

i) $u(0, t) = u(4, t) = 0, \ t \geq 0$

ii) $u(x, 0) = x(4 - x), \ 0 < x < 4$.

Employ the Bendre – Schmidt method with $h = 1$ to find the solution of the equation for $0 < t \leq 1$. **(06 Marks)**

c. Solve the two – dimensional Laplace equation $\frac{\partial^2 u}{\partial x^2} = \frac{\partial^2 u}{\partial y^2} = 0$ at the interior pivotal points of the square region shown in the following figure. The values of u at the pivotal points on the boundary are also shown in the figure. **(07 Marks)**

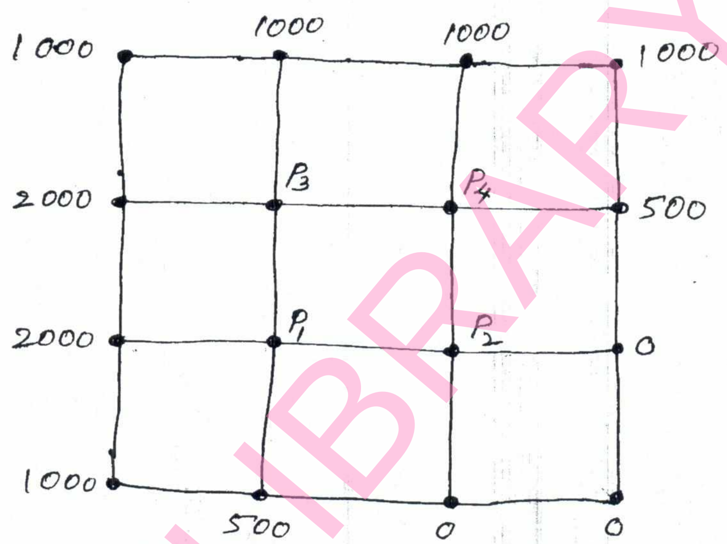

Fig. Q7 (c)

8 a. State and prove the recurrence relation of Z – Transformation hence find $Z_T(n^p)$ and $Z_T\left[\cosh\left(\frac{n\pi}{2} + \theta\right)\right]$. **(07 Marks)**

b. Find $Z_T^{-1}\left[\frac{z^3 - 20z}{(z-2)^3(z-4)}\right]$ **(06 Marks)**

c. Solve the difference equation

$y_{n+2} - 2y_{n+1} - 3y_n = 3^n + 2n$

Given $y_0 = y_1 = 0$. **(07 Marks)**

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10CS32

Third Semester B.E. Degree Examination, June/July 2015
Electronic Circuits

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. With the help of circuit diagram, explain the accurate method of voltage divider bias. **(08 Marks)**

b. For the emitter bias network determine:
i) I_B ii) I_C iii) V_{CE} iv) V_C v) V_E vi) V_B vii) V_{BC} viii) i/p resistance. **(04 Marks)**

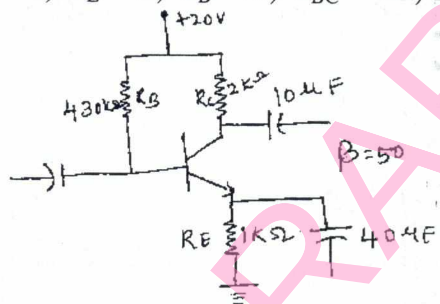

Fig.Q.1(b)

c. Explain the gate characteristics of SCR. **(08 Marks)**

2 a. With the help of neat diagram, describe the operation of N-channel depletion and MOSFET's. **(08 Marks)**

b. Explain any three FET applications with circuit diagram. **(06 Marks)**

c. Explain CMOS inverter operation. **(06 Marks)**

3 a. Define: i) Responsivity ii) Response time iii) Noise equivalent power (NEP). **(06 Marks)**

b. Explain the construction of an LCD. **(08 Marks)**

c. Explain the cathode ray tube displays. **(06 Marks)**

4 a. Explain the darlington amplifiers. Determine the value of input impedance and output impedance and gain using proper circuit diagram. **(12 Marks)**

b. Determine the lower cut off frequency of the BJT amplifier shown in Fig.Q.4(b) given that h-parameters of the transistor are $h_{ie} = 1.5K\Omega$ and $h_{fe} = 100$. **(08 Marks)**

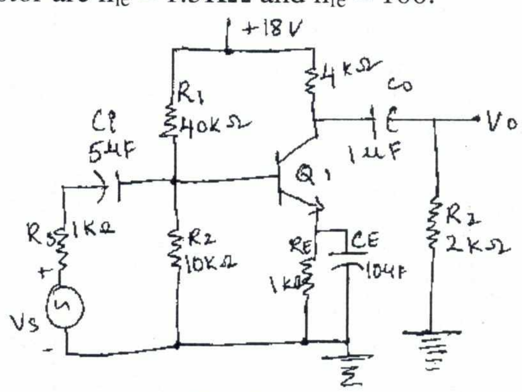

Fig.Q.4(b)

PART – B

5 a. Describe the effect of negative feedback on gain. **(06 Marks)**
b. Explain the series-series feedback with schematic arrangement. **(08 Marks)**
c. Write the advantages of negative feedback:
i) Effect on bandwidth
ii) Effect on noise
iii) Desensitivity of gain. **(06 Marks)**

6 a. Explain the astable multivibrator with waveform. **(10 Marks)**
b. Explain R_c high-pass circuit as differentiator. **(05 Marks)**
c. A simple low-pass R_c network is fed with a 10V step. If R = 1KΩ and C = 0.01μF. what will be the time period in which the o/p will change from 1.0 to 9.0V **(05 Marks)**

7 a. Explain buck regulator and inverting regulator, with neat diagram. **(12 Marks)**
b. Explain the regulated power supply parameters:
i) Load regulation
ii) Line regulation
iii) Output impedance
iv) Ripple rejection factor. **(08 Marks)**

8 a. Explain the absolute value circuit. **(08 Marks)**
b. Explain with the neat diagram voltage-to-current converter. **(06 Marks)**
c. Explain the differential amplifier input stage of Op-amp. **(06 Marks)**

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10CS33

Third Semester B.E. Degree Examination, June/July 2015
Logic Design

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Define: i) Rise time ii) Fall time iii) Period and iv) Frequency. **(08 Marks)**

b. What is an universal gate? List the universal gates and prove their universalities. **(06 Marks)**

c. Write the verilog code for the circuit given below. **(06 Marks)**

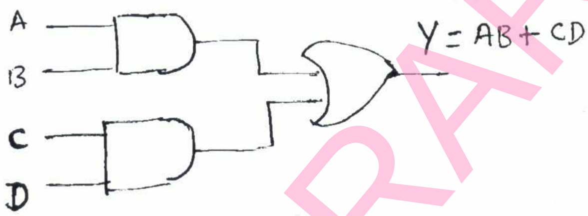

Fig.Q.1(c)

2 a. Using K-map find the reduced SOP form of
$f(A, B, C, D) = \sum M(5, 6, 7, 12, 13) + \sum d(4, 9, 14, 15)$. **(05 Marks)**

b. What is a hazard? List the types of hazards and explain static-0 and static-1 hazards. **(05 Marks)**

c. Simplify the following using Mc-Cluskey method
$F = \sum M\ (0, 1, 2, 8, 10, 11, 14, 15)$. **(10 Marks)**

3 a. Implement the following function using a 8:1 multiplexer:
$f(a, b, c, d) = \sum M(0, 1, 5, 6, 8, 10, 12, 15)$. **(08 Marks)**

b. Realize the following function using the 3:8 decoder
$F_1(A, B, C) = \sum M\ (1, 2, 3, 4)$, $F_2(A, B, C) = \sum M\ (3, 5, 7)$. **(06 Marks)**

c. What is a magnitude comparator? Explain with a neat block diagram an n-bit magnitude comparator. **(06 Marks)**

4 a. With a neat block diagram, explain the working of a Master-Slave JK flip flop. Also write its truth table. **(10 Marks)**

b. Define: i) Flip flop ii) Hold time iii) Set up time iv) Characteristic equation. **(04 Marks)**

c. Calculate the clock cycle time for a system that uses a clock, that has a frequency of
i) 10 MHz ii) 50 MHz iii) 750 kHz. **(06 Marks)**

PART – B

5 a. Draw the logic diagram of a 4-bit serial in serial out shift register using J-K flip flop and explain. **(08 Marks)**

b. Explain briefly serial adder with a neat sketch. **(08 Marks)**

c. Write a verilog code for switched tail counter. **(04 Marks)**

6 a. Briefly explain 3-bit binary ripple up-counter. Also write the truth table and waveform. **(10 Marks)**

b. Design a Modulo-5 up counter (synchronous) using J-k flip flop. **(10 Marks)**

7 a. With neat block diagrams compare Mealy model and Moore model of sequential logic system. **(08 Marks)**

b. Draw the ASM chart for vending machine problem using Mealy model. **(12 Marks)**

8 a. Explain the concept of "Successive approximation" of a A/D converter. **(10 Marks)**

b. Draw a binary ladder network for a digital input 1000 and obtain its equivalent circuit. **(10 Marks)**

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10CS34

Third Semester B.E. Degree Examination, June/July 2015
Discrete Mathematical Structures

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Define the following terms and give an example for each :
i) Set ii) proper subset iii) power set iv) nullset. **(04 Marks)**

b. Using Venn diagram, prove that, for any three sets, A, B, C,
i) $\overline{(A \cup B) \cap C} = (\overline{A} \cap \overline{B}) \cup \overline{C}$
ii) $A - (B \cup C) = (A - B) \cap (A - C)$. **(06 Marks)**

c. In a survey of 120 passengers, an air line found that 48 enjoyed ICE cream with their meals, 78 enjoyed fruits and 66 preferred lime juice. In addition 36 enjoyed any given pair of these and 24 passengers preferred them all. If two passengers are selected at random from the survey sample of 120, what is the probability that :
i) (Event A) they both want only lime juice with their meals?
ii) (Event B) they both enjoy exactly two of the offerings? **(06 Marks)**

d. Prove that the open interval (0, 1) is not a countable set. **(04 Marks)**

2 a. Define a proposition, a tautology and contradiction. Prove that, for any proposition p, q, r, the compound proposition :
$[(p \to q) \wedge (q \to r)] \to (p \to r)$ is a Tautology. **(07 Marks)**

b. Prove the logical equivalence by using the laws of logic.
$(p \to q) \wedge [\neg q \wedge [r \vee \neg q)] \Leftrightarrow \neg (q \vee p)$. **(07 Marks)**

c. Show that the hypothesis "If you send me an e – mail message, then I will finish writing the program", "If you do not send me an e – mail message, then I will go to sleep early" and "If I go to sleep early, then I will wake up feeling refreshed" lead to the conclusion "If I do not finish writing the program, then I will wake up feeling refreshed". **(06 Marks)**

3 a. Define : i) open sentence ii) quantifiers iii) free variable iv) bound variable. **(04 Marks)**

b. Negate the following statement : there exists an integer x such that 2x + 1 = 5 and $x^2 = 9$. **(06 Marks)**

c. Over the universe of all quadrilaterals in plane geometry, verify the validity of the argument. "Since every square is a rectangle, and every rectangle is a parallelogram, it follows that every square is a parallelogram". **(06 Marks)**

d. Give an indirect proof of the statement "the product of two even integers is an even integer". **(04 Marks)**

4 a. Define : i) Well ordering principle
ii) State and prove that principle of mathematical induction. **(06 Marks)**

b. For all the positive integers n, prove that, if $n \geq 24$, then n can be written as a sum of 5's and / or 7's. **(07 Marks)**

c. If F_0, F_1, F_2, - - - - - are Fibonacci numbers, prove that :

i) $\sum_{i=0}^{n} F_i^2 = F_n \times F_{n+1}$ ii) $\sum_{i=1}^{n} \frac{F_{i-1}}{2^i} = 1 - \frac{F_{n+2}}{2^n}$. **(07 Marks)**

PART – B

5 a. Let A = {1, 2, 3} and B = {2, 4, 5}. Determine the following :

i) $|A \times B|$

ii) Number of relations from A to B

iii) Number of binary relations on A

iv) Number of relations from A to B that contain (1, 2) and (1, 5)

v) Number of relation from A to B that contain exactly five ordered pairs

vi) Number of binary relations on A that contain at least seven ordered pairs. **(06 Marks)**

b. Prove that a function $f : A \to B$ is invertible if and only if it is one – to – one and onto. **(07 Marks)**

c. Shirts numbered consecutively from 1 to 20 are worn by 20 students of a class. When any 3 of these students are chosen to be a debating team from the class, the sum of their shirt numbers is used as the code number of the team. Show that if any 8 of the 20 are selected, then from these 8 we may form at least two different teams having the same code number. **(07 Marks)**

6 a. Let A = {1, 2, 3, 4, 6} and R be a relation on A defined by aR_b if and only if "a is a multiple of b". Write down the relation matrix M(R) and draw its diagraph. **(06 Marks)**

b. For a fixed integer n > 1, prove that the relation "Congruent modulo n" is an equivalence relation on the set of all integers, z. **(07 Marks)**

c. Draw the Hasse diagram representing the positive divisors of 72. **(07 Marks)**

7 a. If $*$ is an operation on z defined by $x * y = x + y + 1$, prove that $(z, *)$is an abelian group. **(06 Marks)**

b. For a group G, prove that the function $f : G \to G$ defined by $f(a) = a^{-1}$ is an isomorphism if and only if G is abelian. **(07 Marks)**

c. State and prove Lagrange's theorem. **(07 Marks)**

8 a. For all x, y, z, $\in z_2^m$, prove that :

i) $d(x, y) = d(y, x)$

ii) $d(x, y) \geq 0$

iii) $d(x, y) = 0$ if and only if $x = y$

iv) $d(x, z) \leq d(x, y) + d(y, z)$. **(06 Marks)**

b. The generator matrix for an encoding function :

$E : Z_2^3 \to Z_2^6$ is given by

$$G = \begin{bmatrix} 1 & 0 & 0 & 1 & 1 & 0 \\ 0 & 1 & 0 & 0 & 1 & 1 \\ 0 & 0 & 1 & 1 & 0 & 1 \end{bmatrix}$$

i) Find the code words assigned to 110 and 010

ii) Obtain the associated parity – check matrix

iii) Hence decode the received words : 110110, 111101. **(07 Marks)**

c. Prove that every finite integral domain is a field. **(07 Marks)**

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10CS35

Third Semester B.E. Degree Examination, June/July 2015
Data Structures with C

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. What is an algorithm? Briefly explain the criteria that an algorithm must satisfy. **(06 Marks)**

b. Write an recursive function to sum a list of numbers and also show the total step counts for the function. **(07 Marks)**

c. Define three asymptotic notations and give the asymptotic representation of function 10n+5 in all the three notations. **(07 Marks)**

2 a. What is a structure? Give three different ways of defining structure with example to each. **(07 Marks)**

b. What is the degree of the polynomial? Consider the two polynomials $A(x) = x^{1000} + 1$ and $B(x) = 10x^3 + 3x^2 + 1$. Show diagrammatically how these two polynomials can be represented in a array. **(05 Marks)**

c. For the given sparse matrix and its transpose, give the triplet using one dimensional array, A is the given sparse matrix, B will be its transpose. **(08 Marks)**

$$A = \begin{bmatrix} 15 & 0 & 0 & 22 & 0 & -15 \\ 0 & 11 & 3 & 0 & 0 & 0 \\ 0 & 0 & 0 & -6 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 91 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 28 & 0 & 0 & 0 \end{bmatrix}$$

Fig. Q2 (c)

3 a. Convert the following infix expression into postfix expression using stack:

i) $a * (b + c) * d$

ii) $\dfrac{(a + b) * d + e}{(f + a * d) + c}$ **(08 Marks)**

b. Write a C function to evaluate a postfix expression and apply the same to evaluate $AB + CDE - * /$, A = 5, B = 6, C = 4, D = 3, E = 7. **(12 Marks)**

4 a. Write a C function to insert a node at front and rear end in a circular linked list. **(10 Marks)**

b. i) Write a C function to reverse the given singly linked list.

ii) Write a C function to concatenate two singly linked list. **(10 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. What is a binary tree? Show the array representation and linked representation for the following binary tree. **(05 Marks)**

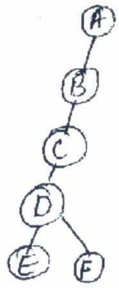

Fig. Q5 (a)

b. Write an expression tree for the expression $A/B*C*D+E$. Give the C function for inorder, preorder, postorder traversals and apply the traversal methods to the expression tree and give the result of traversals. **(10 Marks)**

c. What is a max heap? Construct the max heap for 7, 8, 3, 6, 9, 4, 10, 5 **(05 Marks)**

6 a. What is a binary search tree? Draw the binary search tree for the input:
14, 15, 4, 9, 7, 18, 3, 5, 16, 4, 20, 17, 9
Give recursive search function to search an element in that tree. **(10 Marks)**

b. Construct the binary tree from the given traversals:
Preorder : A B D G C E H I F
Inorder : D G B A H E I C F **(05 Marks)**

c. What is a winner tree? Explain with suitable example a winner tree for k= 8. **(05 Marks)**

7 a. What is Fibonacci Heap? Give example. Give the steps for election of node and decrease key of specified node in F-heap. **(10 Marks)**

b. Write short note on: i) Binomial heaps ii) Leftist trees. **(10 Marks)**

8 a. Starting with an empty AVL tree perform following sequence of intersion, MARCH, MAX, NOVEMBER, AUGUST, APRIL, JANUARY, DECEMBER, JULY. Draw the AVL tree following each insertion and state rotation type if any for insertion operation. **(10 Marks)**

b. Explain the red-black tree with example. **(06 Marks)**

c. Let h be the height of a red-black tree, let n be the number of internal nodes in the tree and r be the rank of the root then, prove that

i) $h \le 2r$ ii) $n \ge 2^r - 1$ **(04 Marks)**

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MATDIP301

Third Semester B.E. Degree Examination, June/July 2015
Advanced Mathematics – I

Time: 3 hrs. Max. Marks:100

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

1 a. Express the complex number $\dfrac{(5-3i)(2+i)}{4+2i}$ in the form x + iy. **(06 Marks)**
b. Find the modulus and the amplitude of $1 + \cos\theta + i \sin\theta$. **(07 Marks)**
c. Find the cube roots of 1 + i. **(07 Marks)**

2 a. Find the n^{th} derivative of $e^{ax}\cos(bx + c)$. **(06 Marks)**
b. Find the n^{th} derivative of $\dfrac{x}{(x+1)(2x+3)}$. **(07 Marks)**
c. If $x = \tan(\log y)$ prove that $(1 + x^2)\, y_{n+1} + (2nx - 1)\, y_n + n(n-1)\, y_{n-1} = 0$. **(07 Marks)**

3 a. Find the angle of intersection of the curves $r^n = a^n \cos n\theta$, $r^n = b^n \sin n\theta$. **(06 Marks)**
b. Find the Pedal equation of the curve $r = a(1 - \cos\theta)$. **(07 Marks)**
c. Using Maclcaurin's series expand log(1 + x) upto the term containing x^4. **(07 Marks)**

4 a. If $u = f(x + ct) + g(x - ct)$ show that $\dfrac{\partial^2 u}{\partial t^2} = c^2 \dfrac{\partial^2 u}{\partial x^2}$. **(06 Marks)**
b. If $u = f\left(\dfrac{x}{y}, \dfrac{y}{z}, \dfrac{z}{x}\right)$ prove that $xu_x + yu_y + zu_z = 0$. **(07 Marks)**
c. If $u = x + y$, $v = y + z$, $w = z + x$ find the value of $\dfrac{\partial(u,v,w)}{\partial(x,y,z)}$. **(07 Marks)**

5 a. Obtain the reduction formula for $\int \cos^n x\,dx$ where n is a positive integer. **(06 Marks)**
b. Evaluate $\displaystyle\int_0^a \frac{x^4}{\sqrt{a^2 - x^2}}\,dx$. **(07 Marks)**
c. Evaluate $\displaystyle\int_0^a \int_0^x \int_0^{x+y} e^{x+y+z}\, dz\,dy\,dx$. **(07 Marks)**

6 a. Define beta and gamma functions and prove that $\Gamma(n + 1) = n\Gamma(n)$. **(06 Marks)**
b. Show that $\displaystyle\int_0^{\pi/2} \sqrt{\sin\theta}\, d\theta \times \int_0^{\pi/2} \frac{1}{\sqrt{\sin\theta}}\, d\theta = \pi$. **(07 Marks)**
c. Prove that $\beta(m, n) = \dfrac{\Gamma(m).\Gamma(n)}{\Gamma(m+n)}$. **(07 Marks)**

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

b. Solve : $(x^2 - y^2)\,dx - xydy = 0$. **(07 Marks)**

c. Solve : $\frac{dy}{dx} + y\cot x = 4x\,\mathrm{cosec}\,x$. **(07 Marks)**

8 a. Solve : $(D^3 - 6D^2 + 11D - 6)\,y = 0$. **(06 Marks)**

b. Solve : $(D^2 + 2D + 1) = x^2 + e^{+x}$. **(07 Marks)**

c. Solve : $(D^2 + D + 1)y = \sin 2x$. **(07 Marks)**

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