Code No. 3009 / S

FACULTY OF ENGINEERING

B.E. 2/4 I-Semester (Supplementary) Examination, May / June 2017

Subject : Mathematics – III (Common to All Except ECE / I.T.)

Time : 3 hours **Max. Marks : 75**

Note: Answer all questions from Part-A. Answer any FIVE questions from Part-B.

PART – A (25 Marks)

1 Form a partial differential equation by eliminating arbitrary function f from $z = f\left(\frac{xy}{z}\right)$. 3

2 Solve pq=xy. 2

3 Find Fourier series for $f(x)=x^2$ in the interval (-2, .2). 3

4 One-dimensional heat equation is ___________. 2

5 If A, B are any two events and $P(A \cap B) = 0.4$ and $P(A/B) = 0.7$ then find $P(\overline{B})$. 3

6 A continuous random variable x has the pdf $f(x) = 3x^2$ where $0 < x < 1$. Find the value of b if $P(x > b) = 0.05$. 2

7 Find MGF of Poisson distribution. 3

8 Write applications of F-Test. 2

9 Show that the coefficient of correlation is geometric mean of regression coefficients. 3

10 Find angle between two regression lines $x = 0.7y + 5.2$ and $y = 0.3x + 2.8$. 2

PART – B (50 Marks)

11 a) Solve $x^2(y-z)\,p + y^2(z-x)\,q = z^2(x-y)$. 5

b) Solve $p(1+q) = qz$. 5

12 a) Expand $f(x) = x \sin x$ as a Fourier series in the interval $[-\pi, \pi]$. 5

b) Find half range Fourier sine series for 5

$$f(y) = \begin{cases} x & 0 < x < 1/2 \\ 1-x & 1/2 < x < 1 \end{cases}$$

..2

13 a) The contents of the boxes are as follows : 5

Box 1 : 1 white, 2 black, 3 red balls
Box 2 : 2 white, 1 black, 1 red balls
Box 3 : 4 white, 5 black, 3 red balls

Two balls are drawn at random from a chosen box and they happen to be one white and red. What is the probability that the balls are drawn from box 2?

b) If x, y are any two random variables, then show that E(x+y) = E(x) + E(y). 5

14 a) In a test of 2000 electric bulbs, it was found that life of a electric bulbs was normally distributed with an average life of 2040 hours and S.D. of 60 hours. Estimate the number of bulbs likely to burn i) more than 2150 hours ii) less than 1950 hours. 5

b) Find mean and variance of Chi-square distribution. 5

15 a) In a partially destroyed laboratory record, only lines of regression y on x and x on y are available as 4x – 5y + 33 = 0 and 20x – 9y = 107 respectively. Calculate mean values of x and y and coefficient of correlation. 5

b) Fit a straight line y = ax + b for the following data. 5

x	0	1	2	3	4
y	1	1.8	1.3	2.5	6.3

16 a) Define i) Random variable ii) Mathematical expectation iii) MGF iv) Discrete R.V. and v) Continuous R.V. 5

b) Fit a Poisson distribution to the following data. 5

x	0	1	2	3	4
f	46	38	22	9	1

17 Solve the equation $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$ with the boundary conditions u(0, t) = u(1, t) = 0 and u(x, 0) = 3 sin πx, where 0 < x < 1, t > 0. 10

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Code No. 3023/S

FACULTY OF ENGINEERING

B.E. 2/4 (ECE) I - Semester (Suppl.) Examination, May / June 2017

Subject : Applied Mathematics

Time : 3 Hours **Max. Marks: 75**

Note: Answer all questions from Part-A and answer any five questions from Part-B.

PART – A (25 Marks)

1 Form a partial differential equation by eliminating the arbitrary constants a and b from $z = ae^{bx}\sin by$. (3)

2 Solve $q = 2yp^2$. (2)

3 If f(z) = u + iv is analytic and v = constant, show that f(z) is constant. (3)

4 Define harmonic function. Give an example. (2)

5 Find the Taylor series expansion of $f(z) = \frac{1}{z^2}$ about z = 1. (3)

6 Define fixed point of a transformation w =f(z). Find the fixed points of $w=4z^2$. (2)

7 Find the first two approximations to a root of $xe^x - 1 = 0$ by bisection method. (3)

8 Evaluate Δ (x + cosx) with h = 1. (2)

9 Write down the normal equations to fit a curve of the form $y=ae^{bx}$. (3)

10 Two lines of regression are 8x – 10y + 66 = 0, 40x – 19y = 214 and var(x) =9. Find the standard deviation of y. (2)

PART – B (50 Marks)

11 (a) Find the general solution of the differential equation $(x^2 - yz)p + (y^2 - zx)q = z^2 - xy$. (5)

(b) Solve yp + xq + pq = 0 by Charpit's method. (5)

12 (a) Construct the analytic whose real part is $x^3 - 3xy^2 + 3x^2 - 3y^2 + 1$. (5)

(b) State and prove Cauchy's integral theorem. (5)

13 (a) Classify the singular pints of $f(z) = \frac{z+1}{z^2(z-1)(z-3)^3}$ and find also the residue at z =1. (5)

(b) State residue theorem and hence evaluate $\oint_c z^2 e^{\frac{1}{z}}\, dz$ where c is | z | = 1. (5)

14 (a) Apply Newton's backward formula to find f(1.9) for the following data. (5)

x	1	1.4	1.8	2.2
f(x)	3.4	4.8	5.9	6.5

(b) Find an approximate value of y(0.2) for $y' = \frac{y-x}{y+x}, y(0) = 1$ by Runge - Kutta method of order 4. (5)

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15 (a) Fit a straight line of the form y = ax + b to the following data: (5)

x	1	2	3	4	6	8
y	2.4	3	3.6	4	5	6

(b) Find the rank correlation coefficient to the following data: (5)

x	1	2	3	4	5	6	7
y	2	4	5	3	8	6	7

16 (a) If f(z) is an analytic function, prove that (5)

$$\left(\frac{\partial^2}{\partial x^2}+\frac{\partial^2}{\partial y^2}\right)\left[\operatorname{Re} f(z)\right]^2 = 2\,|\,f'(z)\,|^2 \;.$$

(b) Using Cauchy's integral formula, evaluate $\oint_C \frac{\sin^2 z}{\left(z-\frac{®}{6}\right)^2}\,dz$, where C is |z|=1. (5)

17 (a) Find the bilinear transformation which maps the points z = 1, i, -1 into the points w = 0, 1, ∞. (5)

(b) Show that the angle between the two regression lines is

$$- = \tan^{-1}\left(\frac{1-r^2}{r}\;\frac{\pm_x \pm_y}{\pm_x^2+\pm_y^2}\right).$$ (5)

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Code No. 3039 / S

FACULTY OF INFORMATICS

B.E. 2/4 (IT) I - Semester (Suppl.) Examination, May / June 2017

Subject : Discrete Mathematics

Time : 3 Hours **Max. Marks: 75**

Note: Answer all questions from Part-A and answer any five questions from Part-B.

PART – A (25 Marks)

1 If a|b and a|c then prove that a|(b+c) where a, b, c are integers. [2]

2 Write the Converse, Inverse and Contra positive of the following implication: "When I stay uplate, it is necessary that I sleep until noon". [3]

3 State Product Rule. [2]

4 Suppose that a department contains 15 women and 10 men. How many ways are there to form a committee of 6 members if it must have more women than men? [3]

5 Define Probability. [2]

1 Solve the Recurrence Relation $a_n + 3a_{n-1} + 3a_{n-2} + a_{n-3} = 0$. [3]

2 Define Partial Ordering and a Poset. [2]

3 Define chromatic number of a graph. [3]

4 Define Strongly and Weakly connected graphs. [2]

10 What is the postfix form of the expression [(x+y) ↑2]+[(x-4)/3]? [3]

PART- B (50 Marks)

11 (a) Show that the following compound proposition is a tautology. [5]

$[(p \vee q) \wedge (p \rightarrow r) \wedge (q \rightarrow r)] \rightarrow r$

(b) Show that $p \leftrightarrow q$ and $(p \wedge q) \vee (\rceil p \wedge \rceil q)$ are logically equivalent. [5]

12 (a) Give a proof by contradiction of the theorem " if 3n+2 is odd then 'n' is odd. [5]

(b) If 'n' and 'k' are positive integers with $n \geq k$ then prove that [5]

$c(n + 1, k) = c(n, k - 1) + c(n, k)$

13 (a) Find is the variance of the random variable 'X' whose value when two dice are rolled is X[(i,j)] =2i, where 'i' is the number appearing on the first die and 'j' is the number appearing on the second die. [5]

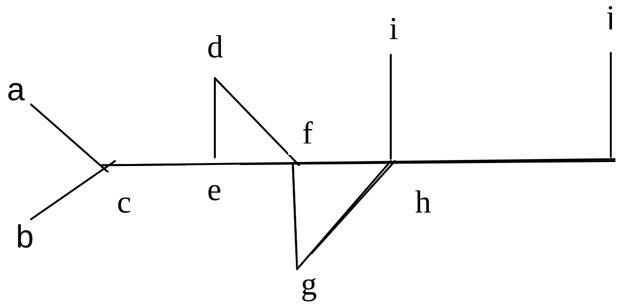
(b) Use generating function to show that $\sum_{k=0}^{\infty}(C\,(n,k))^2 = C(2n,n)$ where 'n' is a positive integer [5]

14 (a) Draw the Hasse diagram representing the partial ordering {(a,b)/ 'a' divides 'b'} on {2,4,5,10,12,25}. [5]

(b) State and prove Euler's formula on planar graphs. [5]

15 (a) If 'G' is a connected planar simple graph with 'e' edges and 'v' vertices, show that $e \leq 3v - 6$. [4]

(b) Use Depth First Search algorithm to find a spanning tree for the graph given below: [6]



16 (a) If 'm' is a positive integer and if $a \cong b \pmod{m}$ and $c \cong d \pmod{m}$ then prove that $(a+c) \cong (b+d) \pmod{m}$ and $ac \cong bd \pmod{m}$. [5]

(b) What is the probability that a bit string of length 4 is generated at random so that each of 16 bit strings of length 4 is equally likely, contains atleast two consecutive 0's, given that its first bit is a '0'?
(Assume that 0 bits and 1 bits are equally likely) [5]

17 (a) Solve the recurrence relation $a_n - 8a_{n-1} + 16a_{n-2} = 4^n$. [5]

(b) Prove that a tree with 'n' vertices has exactly (n-1) edges. [5]

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