Code No. 11009

FACULTY OF ENGINEERING

B.E. 2/4 I - Semester (Backlog) Examination, November / December 2018

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

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 Eliminate the arbitrary function of f to obtain a partial differential equation from $x^2 - y^2 + z^2 = f(xy)$ (3)

2 Find the complete integral of px(1+y)=qy. (2)

3 Find a_o in the Fourier series expression of the (3)

function $f(x) = \begin{cases} -x-® , & -® < x < 0 \\ x+® , & 0 < x < ® \end{cases}$

4 Solve $2u_x + u_t = 0$ where $u(0, t) = 5e^{-6t}$. (2)

5 Six boys and six girls sit in a row randomly. Find the probability that the six girls sit together. (3)

6 If the probability density function of a random variable ‘X’ is (2)

$$f(x) = \begin{cases} k\ x^{m-1}(1-x)^{n-1}\ for & 0 < x < 1 \\ 0\quad , & otherwise \end{cases}$$

where m > 0 and n > 0 then find the falue of k.

7 State any two applications of t – distribution. (3)

8 Find the mean of χ^2- distribution. (2)

9 Fit a straight line of the form y = a + bx to the following data. (3)

x	-1	3	5	7
y	1	7	10	13

10 Show that the geometric mean of regression coefficients is the coefficient of correlation. (2)

PART – B (50 Marks)

11 (a) Solve $(x^2 + y^2 + yz)=p+(x^2 + y^2- xz)q = z(x+y)$. (5)
(b) Find a complete integral of $p^2x + q^2y = z$ by using Charpit’s method. (5)

12 Find the Fourier series of the function. (10)

$$f(x)=\begin{cases} x \quad , & -® < x < 0 \\ ® + x \quad , & 0 < x < ® \end{cases}$$. Hence deduce that

$$1-\frac{1}{3}+\frac{1}{5}-\frac{1}{7}+........=\frac{®}{4}.$$

13 Solve the Laplace equation $\frac{\partial^2 u}{\partial x^2}+\frac{\partial^2 u}{\partial y^2}=0$ subject to the conditions

u(0, y) = u(a, y) =0, u(x, 0) = x and u(x, b) = 0. (10)

14 A random variable X has the following probability distribution. (10)

x	1	2	3	4	5
P(x)	c	c	3c	c^2+c	$6c^2$

Then find the value of c. Also evaluate P(X < 3), P(1 < X < 4) and P(X ≥ 4)

15 Let X be a random variable which follows normal distribution with mean 120 and the standard deviation 20. Evaluate
(i) P(X ≥ 140) (ii) P(X ≤ 80) and (iii) P(100 ≤ X ≤ 115)
(Given P(0 ≤ Z ≤ 1) = 0.3413, P(0 ≤ Z ≤ 2) = 0.4772. P(0 ≤ Z ≤ $\frac{1}{4}$) = 0.08971). (10)

16 (a) Using the method of least squares fit a curve of the form $y = ax^b$ to the following data. (5)

x	2	3	5	6
y	32	108	500	864

(b) Find the mean of two variables x and y and the correlation coefficient between x and y if the regression lines of y on x and x on y are
x + 6y =6, 2x + 3y = 9 respectively. (5)

17 (a) Define Gamma distribution and find its variance. (5)
(b) Using the method of least squares, fit a parabola of the form (5)
$y = a+ bx + cx^2$ to the following data

x	-1	2	3	4	5
y	15	12	27	70	81

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Code No. 11022

FACULTY OF ENGINEERING

B.E. 2/4 (ECE) I - Semester (Backlog) Examination, November / December 2018

Subject : Applied Mathematics

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

Note: Answer all questions from Part-A & 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 $z = ax^3 + by^3$ (2)

2 Find the complete integral of (3)
$p^2y(1 + x^2) = qx^2$

3 Show that f(z) = $\bar{z}$ is not analytic at any point. (2)

4 Evaluate $\int_C \frac{\sin z}{6z + ®}$ where C is the circle | z | = 1 with positive orientation. (3)

5 Find the Taylor series of $f(z) = \frac{1-z}{z-2}$ around z = 1. (2)

6 Find the residue of $f(z) = \frac{3z+2}{z(z-1)(z-2)}$ at z = 2. (3)

7 Find the Lagrange interpolating polynomial which fits the following data. (2)

x	2	3
f(x)	8	11

8 If y′ = x + y – xy, y(0) =2 then evaluate y(0.2) by using Euler's method. (Take h = 0.1) (2)

9 Show that the correlation coefficient is the geometric mean of the regression coefficients. (2)

10 Show that $t \le r \le 1$, r is the coefficient of correlation. (3)

PART – B (50 Marks)

11 (a) Find the complete integral of (5)
$xp + 3yq = 2(z – x^2 q^2)$ by using Charpit's method.
(b) Solve p + q = x + y + z (5)

12 (a) Determine the analytic function f(z) = u + iv if u + v = e^x (cosy + sin y). (5)
(b) State and prove Cauchy's integral theorem. (5)

13 (a) Find the Laurent series of the function (5)
$f(z) = \frac{3}{2+z-z^2}$ in the regions
(i) 1| < | z | < 2 (ii) | z | > 2
(b) Evaluate $\int_0^{2®} \frac{\sin ¯}{3+\cos ¯} d¯$. (5)

..2

14 (a) Find an approximate root of $x^3 + 4x - 7 = 0$ by using bisection method. (perform 4 iterations). (5)

(b) Construct the forward difference table for the data: (5)

x	1	2	3	4
f(x)	1	18	71	178

Hence determine the corresponding interpolating polynomial.

15 (a) Find the regression line of Y on X from the following data: (5)

X	10	15	35	40	50
Y	100	90	110	80	120

(b) Using the method of least squares, fit a curve $y = a + bx + cx^2$ to the following data. (5)

x	-1	1	2	3	5
y	7	5	1	- 5	- 23

16 (a) Evaluate $\int_C \bar{z}\,.dz$ where C is the line segment form – 1 – i to 3 + i. (5)

(b) Find the bilinear transformation which maps the points z=1, I, -1 onto w = 0, 1, ∞ respectively. (5)

17 (a) If $\frac{dy}{dx} = \frac{1}{x+y}$, y(0)=1 then evaluate y (0.1) by using Runge-Kutta fourth order method. (5)

(b) Find the rank correlation coefficient between X and Y from the following data which represents the marks of 5 students in two papers X and Y. (5)

X	10	12	15	14	19
Y	40	41	48	60	50

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Code No. 11039

FACULTY OF ENGINNERING

B.E. 2/4 (IT) I-Semester (Backlog) Examination, November / December 2018

Subject : Discrete Mathematics

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 Show that the function $f : Z^+ \rightarrow Z^+$ defined by f(x) is invertible. 3

2 Find prime factorization of 7007. 2

3 How many strings with seven or more characters can be formed from "EVERGREEN". 2

4 State the generalized pigeonhole principle. 2

5 In how many different ways can eight identical cookies be distributed among three distinct children if each child receives at least two cookies and no more than 4 cookies? 3

6 State divide and conquer recurrence relation and give an example. 2

7 Write short notes on representation of relations. 3

8 Define Euler circuit and give an example. 3

9 Define minimum spanning tree. 2

10 Define graph isomorphism and give an example. 3

PART – B (50 Marks)

11 a) Show that $\sim(p \vee (\sim p \wedge q))$ and $\sim p \wedge d$ are logicall equivalent by developing a series of logical equivalences. 5

b) What is the truth value of f(x)p(x) is the statement "$x^2 > 10^4$ and the universe of discourse consists of positive integers not exceeding 4? 5

12 Using mathematical induction to prove formula of sums of geometric progression given? 10

$$\sum_{j=0}^{n} ar^j = a + ar + ar^2 + ...ar^k = \frac{ar^{n+1} - a}{r - 1}$$

When r ≠ 1, where n is non-negative integers.

13 Find the solutions to the recurrence relation with initial conditions $a_0 = 2$ $a_1 = 5$ an = $6a_{n-1} - 11a_{n-2}$. 10

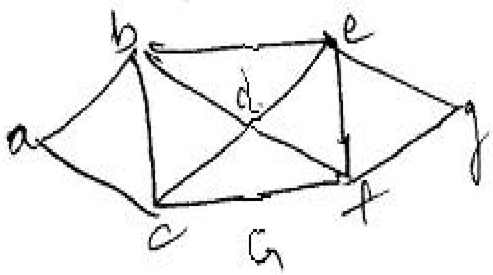
14 How many solutions to the $x_1 + x_2 + x_3 = 11$ have where x_1, x_2, x_3 are non negative integers with $x_1 \leq 3$, $x_2 \leq 4$, $x_3 \leq 6$? 10

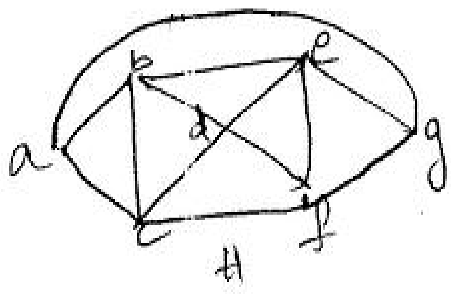
..2

15 Draw Hasse diagram for poset ({1, 2, 3, 4, 6, 8, 12}, 1). Find maximal, minimal, greatest and least element if any. 10

16 a) Define a planar graph. Draw a planar representation of K4. 4

b) Find chromatic number of graph G and H 6





17 Explain Kruskal's algorithm to find minimal spanning three with an example. 10

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Code No: 11378

FACULTY OF ENGINEERING

B.E. II – Semester (CBCS) (Supple.) Examination, Nov./Dec. 2018

Subject: Engineering Physics – II

Time: 3 Hours **Max. Marks: 70**

Note: Answer all questions from Part A and any Five questions from Part B.

PART – A (10x2 = 20 Marks)

1) Calculate the longest wavelength that can be analyzed by rock – salt crystal of spacing 2.5 $\overset{0}{A}$ in the first order.
2) Define space lattice. How it is helpful to describe a crystal structure.
3) What are ferrites?
4) Define critical transition temperature and critical field for superconductors.
5) Calculate the Hall coefficient of a specimen whose electrical conductivity is 2.12 ohm/m and charge carrier mobility is 0.3 m^2/v.sec
6) Discuss the important applications of ferro electric materials.
7) Distinguish between bulk, thin films and nano materials.
8) What are the applications of AFM?
9) Discuss the effect of surface to volume ratio in nano materials.
10) Mention the optical and magnetic properties of nano materials.

PART – B (50 Marks)

11. a) Distinguish solid materials based on band theory of solids 4
    b) Discuss the seven crystal systems in terms of lattice parametric consideration and type of Bravais lattice. 6
12. a) What are magnetic domains? Explain the Hysteresis loop of ferromagnetic material. 5
    b) Write a note on high temperature superconductors and their applications. 5
13. a) How the P-N junction is formed? Explain V-I characteristic graph of forward and reverse bias phenomenon in PN junction diode. 5
    b) How do you determine the dielectric constant by capacitance bridge method? 5
14. a) Explain the principle and applications of X-ray Fluorescence. 5
    b) Explain in detail about thermal evaporation technique to prepare thin films? 5
15. a) What are nano materials? Why do they exhibit different properties? 5
    b) Discuss the ball milling synthesis of nano materials. 5
16. a) Discuss the free electron theory of metals. 5
    b) Write a note on Type-I and Type-II superconductors? Explain their importance. 5
17. a) Explain the phenomenon of ferro electricity and discuss how dielectric constant of Barium Titanate changes with temperature. 5
    b) Describe the working of a thin film solar cell. 5

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