Code No. 3023

FACULTY OF ENGINEERING

B.E. 2/4 (ECE) I - Semester (Main) Examination, November / December 2016

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 Find a partial differential equation by eliminating the arbitrary function f from
z = f (sinx + cosy). (3)

2 Solve p – q = z sin (x+y). (2)

3 Determine $\lim\limits_{z \to 0} \dfrac{\bar{z}}{z}$, if it exists. (3)

4 Evaluate $\int_c \dfrac{2z+7}{(z^2+1)(z-9)} dz$ where C is $|z| = \dfrac{1}{2}$. (2)

5 If z = a is a simple pole of f(z), prove that the residue of f(z) at z = a is $\lim\limits_{z \to a}(z-a)f(z)$. (3)

6 Find the image of the region | z | > 1 under the transformation $w = \dfrac{i}{z-i}$. (2)

7 Explain Newton-Raphson method. (3)

8 Find the approximate value of y(0.1) for y'=1 + y^2, y(0) =1 by Euler's method. (2)

9 Find the normal equations to fit a quadratic curve y = a + bx + cx^2 for the data. (3)

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

10 If one of the regression coefficients is greater than 1, show that the other regression coefficient is less than 1. (2)

PART – B (50 Marks)

11 (a) Solve x(y^2 - z^2)p + y(z^2- x^2)q – z(x^2 - y^2)=0. (5)
   (b) Reduce the equation z^2 = pqxy to the form F(p. q) = 0 and hence solve it. (5)

12 (a) Show that u(x, y) = 2x + y^3 – 3x^2y is harmonic and find its conjugate harmonic function. (5)

   (b) State Cauchy's integral formula and use it to evaluate $\oint_c \dfrac{e^z}{z^2+1}$

   where C is |z - i| =1. (5)

13 (a) Find the Laurent series expansion of $f(z) = \dfrac{z}{(z-1)(z-3)}$ in the region

   0 < | z - 1 | < 2. (5)

   (b) Evaluate $\int_0^\infty \dfrac{x^2}{(x^2+9)(x^2+4)^2} dx$. (5)

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14 (a) Use Lagrange's interpolation formula to find f(10) from the following data. (5)

x	5	6	0	11
f(x)	12	13	14	16

(b) Compute $f^{11}(1.5)$ by Newton's backward formula for the following data: (5)

x	1	1.2	1.4	1.6
f(x)	1.01	1.18	1.33	1.56

15 (a) Fit a curve of the form $y = ae^{bx}$ to the following data: (5)

x	0.5	1.0	2.0	2.5	3.0
y	0.57	1.46	5.10	7.65	9.20

(b) The ranks of 10 students in two subjects A and B are as follows: (5)

A:	3	5	8	4	7	10	2	1	6	9
B:	6	4	9	8	1	2	3	10	5	7

Find the rank correlation coefficient.

16 (a) Solve $p^2 + q^2 = 1$ by Chapit's method. (5)

(b) Evaluate $\int_0^{4+2i} \bar{z}\, dz$ along the curve $z = t^2 + it$. (5)

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

(b) Find the regression line of x on y for the following data: (5)

x	1	5	3	2	1	1	7	3
y	6	1	0	0	1	2	1	5

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