x	20	25	30	35	40	45
$f(x)$	354	332	291	260	231	204

(e) Using Lagranges interpolation formula, calculate $f(3)$ from the following table:

x	0	1	2	4	5	6
$f(x)$	1	14	15	5	6	19

(f) Use Newton's divided difference formula to find the polynomial from the following data:

x	5	6	9	11
y	12	13	14	16

5. Attempt any <u>two</u> parts of the following: 2×10=20

(a) Use Crout's method to solve the following equations:

$$5x_1 + 3x_2 + 7x_3 = 4$$

$$x_1 + 5x_2 + 2x_3 = 2$$

$$7x_1 + 2x_2 + 10x_3 = 5$$

(b) Evaluate $\int_4^{5.2} \log x \, dx$ using (i) Simpson's 1/3 rule (ii) Simpson's 3/8 rule.

(c) Find the values of $y(0.1)$ and $y(0.2)$ from the differential equation using Euler's method by taking $h = 0.05$:

$$\frac{dy}{dx} = x^2 + y^2, \quad y(0) = 0.5$$

—x—

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NAS301/NAS401

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 199302

Roll No.

B.Tech. (Semester-IV)

SPL. THEORY EXAMINATION, 2014-15

MATHEMATICS-III

Time : 3 Hours] *[Total Marks : 100*

Note: Attempt <u>all</u> questions. All questions carry equal marks.

1. Attempt any <u>four</u> parts of the following: 4×5=20

(a) Show that the function defined by $f(z) = \sqrt{|xy|}$ is not regular at the origin, although Cauchy-Riemann equations are satisfied there.

(b) Find the analytic function whose real part is $e^{2x}(x\cos 2y - y\sin 2y)$.

(c) State and prove Cauchy's integral formula.

(d) Obtain the Taylor's series expansion of $f(z) = \frac{1}{z^2 - 4z + 3}$ about the point $z = 4$. Find its region of convergence.

(e) Evaluate $\int_0^{2\pi} \frac{\cos 3\theta}{5+4\cos\theta}$.

(f) Evaluate $\int_0^{\infty} \frac{\cos ax}{x^2+1} dx;\ a \geq 0$.

2. Attempt any two parts of the following: 2×10=20

(a) Find the Fourier cosine transform of $\frac{1}{1+x^2}$.

(b) Solve the equation $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$, subject to the conditions:

(i) $u = 0$ when $x = 0,\ t > 0$

(ii) $u = \begin{cases} 1, & 0 \leq x < 1 \\ 0, & x > 1 \end{cases}$ when $t = 0$

(iii) $u(x, t)$ is bounded

(c) Solve the difference equation by z=transform

$y_{k+2} - 2y_{k+1} + y_k = 2^k,\ y_0 = 2,\ y_1 = 1$.

3. Attempt any two parts of all the following: 2×10=20

(a) Find the first four Moments about the mean for the following frequency distribution:

Marks	0–10	10–20	20–30	30–40	40–50
No. of students	5	10	40	20	25

(b) In a partially destroyed Laboratory record of an analysis of a correlation data, the following results only are legible:

Variance of x = 9

Regression equations:

$8x - 10y + 66 = 0,\ 40x - 18y = 214$

Find (i) the mean values of x and y (ii) the standard deviation of y and the coefficient of correlation between x and y.

(c) The life (in hours) of electronic tube of certain type is supposed to be normally distributed with μ = 155 hours and σ = 19 hours. What is the probability that the life of the tube will be (i) between 136 hours and 174 hours, (ii) between 117 hours and 193 hours, (iii) less than 117 hours (iv) more than 193 hours?

4. Attempt any four parts of the following: 4×5=20

(a) Find a real root of $\cos x - xe^x = 0$ correct to three decimal places by bisection method.

(b) Find the real root of the equation $x \log_{10} x = 1.2$ using Newton-Raphson method correct to four decimal places.

(c) Determine the missing values in the following table:

x	0	5	10	15	20	25
y	6	10	–	17	–	31

(d) Estimate the value of $f(42)$ from the following data: