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Code No. : 21001

VASAVI COLLEGE OF ENGINEERING (Autonomous), HYDERABAD
B.E. II Year I-Semester (Main) Examinations, December – 2015
(For Civil, CSE, ECE and Mechanical Branches)

Mathematics-III

Time: 3 hours

Max. Marks: 70

Note: Answer ALL questions in Part-A and any FIVE questions from Part-B

Part-A (10 X 2=20 Marks)

1. Evaluate the coefficient of $\cos(nx)$ in the Fourier series expansion of the following function $f(x) = \sin x, 0 \leq x \leq 2\pi$.
2. Write Euler's formulae of Fourier series.
3. Solve the partial differential equation $\frac{\partial z}{\partial x} + \frac{\partial z}{\partial y} = 1$
4. Form a partial differential equation by eliminating arbitrary constants 'a' and 'b' from $z = ax + by + a^2 + b^2$
5. Prove the identities (i) $\Delta = E - 1$ (ii) $\nabla = 1 - E^{-1}$
6. Evaluate by Taylor's series method the value of 'y' at $x = 0.1$ from $\frac{dy}{dx} = x^2y - 1, y(0) = 1$.
7. Write the probability density function of the Normal distribution and write the value of the first central moment.
8. Write short notes on level of significance.
9. Write the normal equations to solve a,b,c if for the given data (x_i, y_i) a curve of the form $y = ax + bx^2 + c$ is fitted by the method of least squares.
10. Write any four properties of the regression coefficients.

Part-B (5 X 10=50 Marks)

11. a) Is the function defined as $f(x) = \begin{cases} x + \pi, & 0 \leq x \leq \pi \\ x - \pi, & -\pi < x \leq 0 \end{cases}$ even or odd? If $f(x + 2\pi) = f(x)$, find its Fourier series expansion. [5]
b) Find the half range sine series for the function $f(x) = \cos x$, in $\left[0, \frac{\pi}{2}\right]$ [5]
12. a) A bar of length 10cms has its ends A and B kept at 30° and 100° temperatures respectively, until steady state condition is reached. The temperature at A is suddenly lowered to 0°C and that at B to 0°C and these temperatures are maintained. Find the subsequent temperature in the bar. [5]
b) Solve $z^2 = x.y. \frac{\partial z}{\partial x} \cdot \frac{\partial z}{\partial y}$ [5]

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13. a) Using Runge-Kutta method of fourth order find $y(0.2)$ given that $\frac{dy}{dx} = 3x + \frac{y}{2}$, $y(0) = 1$ taking $h = 0.1$. [5]

b) From the following data of x, y interpolate values of y when $x = 1.91$ [5]

x	1.7	1.8	1.9	2	2.1	2.2
y	5.4739	6.0496	6.6859	7.3891	8.1662	9.0250

14. a) A die is thrown 60 times with the following results. Test whether the die is unbiased. [5]

Faces	1	2	3	4	5	6
Frequency	15	6	4	7	11	17

b) Two independent samples 8 items and 7 items respectively had the following values. Is the difference between means of the samples significant? [5]

Sample-I	11	11	13	11	15	9	12	14
Sample-II	9	11	10	13	9	8	10	--

15. a) Determine the regression lines of Y on X and X on Y from the data given below. [7]

X	10	12	13	16	17	20	25
Y	10	22	24	27	29	33	37

b) Write the concept of method of least squares to fit a curve to the give data. [3]

16. a) Solve by the method of separation of variables $2x \frac{\partial z}{\partial x} - 3y \frac{\partial z}{\partial y} = 0$ [5]

b) Find the Fourier series expression of $f(x) = x - x^2$, for $-\pi < x < \pi$. [5]

17. Answer any two of the following

a) Using Newton-Raphson method find approximate value of $\frac{1}{22}$ [5]

b) Can $f(x) = \frac{1}{2}x^2e^{-x}$ when $x \geq 0$ be regarded as a probability function for a continuous random variable? If, so find Mean and Variance of the random variable. [5]

c) Using method of least squares fit a straight line from the following table. [5]

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