VASAVI COLLEGE OF ENGINEERING (Autonomous), HYDERABAD
B.E. II Year I-Semester (Main & Backlog) Examinations, Nov./Dec.-2016

Mathematics-III
(Civil, C.S.E., E.C.E. & Mech.)

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

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

Part-A ($10 \times 2 = 20$ Marks)

1. If $f(x) = \begin{cases} 0 & if\ 0 \leq x \leq 1 \\ 2 & if\ x > 1 \end{cases}$, estimate the value of Fourier series at x = 1.

2. Expand $f(x) = x^2$ in Half range sine series over [0,1].

3. If $V = f(ax - by)$, compute the PDE satisfying the function V.

4. Categorize the PDEs: $\frac{\partial^2 V}{\partial x^2} = \frac{\partial^2 V}{\partial y^2}$ and $\frac{\partial^2 V}{\partial x^2} + \frac{\partial^2 V}{\partial y^2} = 0$

5. What are disadvantages of the Euler's method?

6. Point out the advantages of Lagrange's interpolation.

7. Derive the variance of a Binomial distribution.

8. Evaluate k if $f(x) = k(1 - x^2)$ for $0 \leq x \leq 1$ is pdf of a random variable X.

9. Define coefficient of correlation.

10. Establish the formula $\gamma = \frac{\sigma_{x^2} + \sigma_{y^2} - \sigma_{x-y^2}}{2\sigma_x \sigma_y}$

Part-B ($5 \times 10 = 50$ Marks)

11. a) Expand $f(x) = \begin{cases} 0\ if\ -\pi \leq x < 0 \\ sinx\ if\ 0 \leq x < \pi \end{cases}$ and f(x) is periodic of period 2π in Fourier series. [5]

    b) Expand $f(x) = cosx$ in half range sine series over the interval [0, π/2]. [5]

12. a) Solve 2p + q = 3zxy. [5]

    b) Form partial differential equation for z if $z = f(x^2 + y^2)$. [5]

13. a) Calculate root of the equation $x^3 - 5x + 1 = 0$ in the interval (0, 1) correct up to two decimals. [5]

    b) Solve $y'(x) = x(y - x)$ with y(2) = 3 to find y(2.2) within two steps choosing h = 0.1 by Runge Kutta 4th order method. [5]

14. a) If a normal variable X has mean 9 and standard deviation 3, find P($1 \leq X \leq 10$) and P(X>15). [5]

    b) For large lot of electric bulbs, mean life is 360 hours and standard deviation is 90 hours. A sample of 625 bulbs has mean and standard deviation as 355 and 90 hours respectively. Can we conclude that the sample is drawn from the above lot? [5]

15. a) Fit a straight line of the form y = a + bx by Method of Least Squares for the following   [5]
    data:

X:	10	15	20	25	30	35	40
Y:	11	13	16	20	27	34	41

   b) Find the coefficient of correlation between the variates of X and Y.   [5]

X:	67	68	64	68	72	70	69	70
Y:	65	66	67	67	68	69	71	73

16. a) Expand the function f(x) = x cosx in the interval $-\pi < x < \pi$ [4]

   b) Solve $\frac{\partial^2 u}{\partial t^2} = c^2 \frac{\partial^2 u}{\partial x^2}$ under the conditions i) u(0,t) = 0, ii) u(l,t) = 0,   iii) u(x,0) = 0   and   [6]
   iv) $\frac{\partial u}{\partial t} = \sin^3 x$ at t=0

17. Answer any **two** of the following:

   a) The distance covered by an athlete for the 50 M is given in the following table: [5]

Time (sec)	0	1	2	3	4	5	6
Distance (Meter)	0	2.5	8.5	15.5	24.5	36.5	50

   Determine the speed of athlete at t = 5sec correct to two decimals.

   b) The following table gives the number of air craft accidents that occurred during various   [5]
   days of the week. Find whether the accidents are uniformly distributed over the week.

Days	Sun	Mon	Tues	Wed	Thurs	Fri	Sat	Total
No. of accidents	14	16	8	12	11	9	14	84

   c) The coefficient of correlation between x and y is 0.60. If $\sigma_x = 1.5$, $\sigma_y = 2.0$ and   [5]
   $\bar{x} = 10, \bar{y} = 20$, find the equations of regression lines of i) x on y and ii) y on x.

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