VASAVI COLLEGE OF ENGINEERING *(Autonomous)*, HYDERABAD
B.E. II Year I-Semester Supplementary Examinations, May/June-2017

Mathematics-III
(Civil, CSE, ECE and Mech.)

Time: **3 hours**

Max. Marks: **70**

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

Part-A (10 X 2=20 Marks)

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

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

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

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

5. List the disadvantages of the Taylor series method.

6. What are advantages of method of Runge Kutta method of order 4?

7. Derive the mean of a Poisson distribution.

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

9. Define Karl Pearson's coefficient of correlation.

10. Show a correlation coefficient is geometric mean between regression coefficients.

Part-B (5 × 10 = 50 Marks)

11. a) Expand $f(x) = \begin{cases} \pi + x & if -\pi \le x \le 0 \\ 0 & if\ 0 < x \le \pi \end{cases}$, expand f(x) in Fourier series and hence find the series for $\dfrac{\pi^2}{8}$ [5]

    b) Expand $f(x) = \begin{cases} 0\ if -\frac{\pi}{2} \le x < 0 \\ sinx\ if\ 0 \le x < \pi/2 \end{cases}$ and f(x) is periodic of period 2π in half range sine series.   [5]

12. a) Solve $2yzp + zxq = 3xy$.   [5]

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

13. a) Calculate root of the equation $x.e^x - 1 = 0$ near to 0.5 correct up to two decimals.   [5]

    b) Solve $y'(x) = x^2 + y^2$, $y(1) = 2$ to find $y(1.2)$ within two steps choosing h = 0.1 using Runge Kutta 4th order method.   [5]

14. a) In an examination the grades awarded for 100 marks are as follows: [5]

Grade:	Distinction	First class	Second class	Third class	Fail
Range:	80 – 100	60 – 80	45 – 60	30 – 45	0 – 30

where the lower class is included for awarding grade and upper class is excluded. It is found that 8% of the students got distinction and 8% of students failed. Find the average marks and percentage students obtaining second class.

b) The sizes (n_1, n_2) and means (μ_1, μ_2) of two independent samples are $n_1 = 400$, $n_2 = 225$ [5] and $\mu_1 = 3.5$, $\mu_2 = 3.0$. Find whether they are drawn from the same population.

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

X:	1	2	3	4	5
Y:	0.5	2	4.5	8	12.5

b) Marks in Economics and Statistics for 10 students are as below. Find the coefficient [5] of correlation between the subjects.

	1	2	3	4	5	6	7	8	9	10
Economics:	78	36	98	25	75	82	90	62	65	39
Statistics:	84	51	91	60	68	62	86	58	53	47

16. a) Expand the function $f(x) = x \sin x$ as the fourier series in the interval $-\pi \le x \le \pi$. [4]

b) Solve the PDE $\frac{\partial u}{\partial t} = c^2 \frac{\partial^2 u}{\partial x^2}$ under the conditions that i) $u(0,l) = 0$, ii) $\frac{\partial u}{\partial x} = -au$ at [6] $x = l$ and iii) $u(x,0) = f(x)$

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

a) Using Lagrange formula express the functions $\frac{3x^2+x+1}{(x-1)(x-2)(x-3)}$ as sum of partial [5] fractions.

b) A survey of 320 families with 5 children is as follows. [5]

No. of boys	:	5	4	3	2	1	0	
No. of families	:	14	56	110	88	40	12	320 = total

Is this data consistent with the hypothesis that male and female births are equally probable?

c) If $\sigma_y^2 = 16$ and two lines of regression are given by $5y - 8x + 17 = 0$ and $2y - 5x + 14 = 0$, [5] find i) the mean values of x and y, ii) σ_x^2 and coefficient of correlation between x and y.

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