Reg.No.					



# MANIPAL INSTITUTE OF TECHNOLOGY MANIPAL UNIVERSITY, MANIPAL - 576 104



# THIRD SEMESTER B.E DEGREE END SEMESTER EXAMINATION-DECEMBER 2015

### SUB: ENGG. MATHEMATICS III (MAT 2106) PME (REVISED CREDIT SYSTEM)

Time : 3 Hrs.

Max. Marks : 50

Note : Answer the following questions.

1A Find the mean and median of the following distribution.

Γ	Class	20 - 30	30 - 40	40 - 50	50 - 60	60 - 70
	interval					
	Frequency	12	14	6	8	9

- 1B. Solve  $z_{xx} 2z_x + z_y = 0$  by the method of separation of variables.
- 1C. Obtain the first three coefficients in the Fourier cosine series for y, where

y is given in below table.

<i>x</i> <sup>0</sup>	0	60	120	180	240	300
Y	4	8	15	7	6	2

(4 + 3 + 3)

2A. Find Pearson's coefficient of skewness for the following data.

Class	0-10	10 - 20	20 – 30	30 - 40	40 - 50	50 - 60	60 – 70	70- 80
Frequency	10	40	20	0	10	40	16	14

2B. Obtain the Fourier series for the function  $f(x) = \begin{cases} \pi x & 0 \le x \le 1 \\ \pi (2-x) & 1 \le x \le 2 \end{cases}$ 

### 2C. Calculate the coefficient of correlation for the following data.

Х	78	89	97	69	59	79	68	57	
Y	125	137	156	112	107	138	123	108	
								(4 +	3+3

3A. Verify Green's theorem in the plane for  $\oint (xy + y^2)dx + x^2 dy$ , where the closed curve of the region is bounded by y = x and  $y = x^2$ .

#### 3B Calculate the standard deviation for the following data

Class	0-5	5 – 10	10 - 15	15 – 20	20 – 25
Frequency	6	10	12	10	8

3C. Suppose a particle P moves along a curve whose parametric equations are  $x = 40t^2 + 8t$ , y = 2cos3t, z = 2sin3t. Where t is time, determine its velocity and acceleration at t = 0

(4 + 3 + 3)

- 4A. Derive the one dimensional heat equation with suitable assumptions.
- 4B. Fit a curve of the form y = a + bx, where a and b are constants for the following data.

Х	1	2	3	4	5
Y	125	137	156	112	107

- 4C. Find the directional derivative for the scalar function  $\phi(x, y, z) = x^2yz + 4xz^2$  at p(1, -2, -1) In the direction of 2i - j - 2k(4 + 3 + 3)
- 5A. Determine whether  $\vec{F} = (x + 2y + 4z)i + (2x 3y z)j + (4x y + 2z)k$  is conservative? If so find scalar potential.
- 5B. Find the Fourier series expansion of  $f(x) = \begin{cases} -\pi & -\pi < x < 0 \\ x & 0 < x < \pi \end{cases}$ and hence deduce that  $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} \dots \dots \dots \infty = \frac{\pi^2}{8}$ .
- 5C. Solve the partial differential equation  $U_{xx} 4U_{xy} + 3U_{yy} = 0$  using the transformation v = x + y, z = 3x + y.

(4 + 3 + 3)

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