Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

A Constituent Institution of Manipal University

III SEMESTER B.TECH. (Printing & Media)

END SEMESTER EXAMINATIONS, NOV/DEC 2016

SUBJECT: ENGINEERING MATHEMATICS III [MAT 2106]

REVISED CREDIT SYSTEM
(02/12/2016)

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer **ALL** the questions.
- Missing data may be suitable assumed.

1A. Find the Fourier series expansion of $f(x) = x - x^2$ in $-\pi \le x \le \pi$ and hence prove that $\frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} \dots\dots\dots\dots \infty = \frac{\pi^2}{12}$. **04**

Given $f(x + 2\pi) = f(x)$.

1B. Find the half range sine series for $f(x) = \begin{cases} \frac{1}{4} - x\,; & 0 \le x < \frac{1}{2} \\ x - \frac{3}{4}\,; & \frac{1}{2} < x \le 1 \end{cases}$ **03**

Given $f(x + 2) = f(x)$.

1C. Obtain the first three coefficients in the Fourier cosine series for y, where y is given in the table. **03**

x^o	0	60	120	180	240	300
y	4	8	15	7	6	2

2A. Calculate the mean and median for the following frequency distribution **04**

Class interval	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60
frequency	3	7	15	12	8	5

2B. Find the quartile deviation for the following distribution. **03**

Class interval	3 – 4.9	5 – 6.9	7 – 8.9	9 – 10.9	11 – 12.9	13 – 14.9	15 – 16.9
Frequency	5	8	30	82	45	24	6

2C. The scores of two golf players A and B in 12 rounds are given below. Who is the better player and who is the more consistent player? **03**

A	74	75	78	72	78	77	79	81	79	76	72	71
B	87	84	80	88	89	85	86	82	82	79	86	80

3A. State and Prove the Green's theorem in the plane. **04**

3B. Compute the kurtosis for the following distribution. **03**

Class	60 – 62	63 – 65	66 – 68	69 – 71	72 - 74
Frequency	5	18	42	27	8

3C. Fit a straight line for the following data using least square method. **03**

X	0	1	2	3	4
Y	1.0	1.8	3.3	4.5	6.3

4A. Is $\vec{F} = (y^2 cosx + z^3\ )i + (2y\ sinx - 4)j + (3xz^2 + 2)k$ is conservative? If so find scalar potential. **04**

4B. Find the work done in moving a particle in the field $\vec{F} = 3x^2\hat{\imath} + (2xz - y)\hat{\jmath} + z\hat{k}$ along the straight line from $(0, 0, 0)$ to $(2, 1, 3)$. **03**

4C. Find the directional derivative of $f(x, y, z) = xy^2 + y\,z^3$ at $(2, -1, 1)$ in the direction of $\hat{\imath} + 2\hat{\jmath} + 3\,\hat{k}$. **03**

5A. Derive the one dimensional Wave Equation with suitable assumptions. **04**

5B. Solve by the method of separation of variables $\frac{\partial u}{\partial x} = 2\frac{\partial u}{\partial t} + u$ where $u(x, 0) = 6e^{-3x}$ **03**

5C. Solve $U_{xy} - U_{yy} = 0$ given v = x and $z = x + y$. **03**