Reg. No.									

MANIPAL INSTITUTE OF TECHNOLOGY

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III SEMESTER B.TECH. Print and Media Technology

END SEMESTER MAKEUP EXAMINATIONS, December, 2018

SUBJECT: ENGINEERING MATHEMATICS III [MAT 2106]

REVISED CREDIT SYSTEM

(27/12/2018)

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

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

1A. If $\overrightarrow{F} = (x + 2y + 4z)i + (2x - 3y - z)j + (4x - y + 2z)k$, prove that $\overrightarrow{F}$ is a conservative vector field and find the scalar potential. **4**

1B. Calculate mean deviation about median and also coefficient of dispersion. **3**

Class Interval	0-10	10-20	20-30	30-40	40-50	50-60
Frequency	2	10	20	15	10	3

1C. Find Fourier cosine series for $f(x) = x(\pi - x); 0 < x < \pi$. **3**

2A. Derive D'Alemberts solution of wave equation. **4**

2B. Find standard deviation and coefficient of variation. **3**

Class Interval	25-34	35-44	45-54	55-64	65-74	75-84
Frequency	4	20	38	24	10	4

2C. Find $\nabla.(|r|^3\ \overrightarrow{r})$. **3**

3A. An incomplete frequency distribution for the weights of 120 boys is given below. **4**

Weight(in kgs)	30-40	40-50	50-60	60-70	70-80
No. of boys	12	--	35	--	11

Find the missing frequencies given that the mode is 51.25 and $N = 120$.

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3B.	Find Fourier series expansion of $f(x)$ if $f(x) = \frac{\pi - x}{2}$, in $(-\pi, \pi)$.	**3**
3C.	Find correlation coefficient for the following data; x: 164, 176, 178, 184, 175, 167, 173, 180 y: 158, 164, 165, 171, 163, 156, 163, 169	**3**
4A.	Evaluate $\iint_S F.n\, ds$ where $F = \left(2xy + \frac{x^2}{2}\right) i + y^2 j - xzk$ and S is the surface bounded by the cylinder $x^2 + y^2 = 4, x = 0, y = 0, z = 0$ *and* $z = 3$.	**4**
4B.	Fit a straight line of the form $y = a + bx$ for the following data; x: 1, 2, 3, 4, 5, 6, 7, 8 y: 2, 5, 9, 12, 15, 17, 18, 20	**3**
4C.	Solve by the method of indicated transformations: $U_{xy} - U_{yy} = 0, v = x, z = x + y$.	**3**
5A.	Calculate Karl Pearson's coefficient of skewness. Class Interval: 100-104, 104-108, 108-112, 112-116, 116-120, 120-124 Frequency: 6, 14, 18, 20, 10, 2	**4**
5B.	Solve by method of separation of variables $3\frac{\partial u}{\partial x} + 2\frac{\partial u}{\partial y} = 0$ where $u(x, 0) = 4e^{-x}$.	**3**
5C.	Verify Green's Theorem for $\oint_C (xy + y^2)dx + x^2 dy$ and C is the closed curve of the region bounded by $y = x$ and $y = x^2$ from (0,0) to (1,1).	**3**