

Faculty of Mathematical and Physical Sciences  
Term Test Question Paper – B. Tech.

Department/Faculty : **Mathematics/FMPS**  
 Programme : **B. Tech**  
 Semester / Batch : **4<sup>th</sup>/ 2018**  
 Course Code : **19MHB211A**  
 Course Title : **Engineering Mathematics-4**  
 Timings : **June 4<sup>th</sup> (8:00 AM – 8:00 PM)**

**Term Test – 2**

**INSTRUCTIONS TO STUDENTS:**

1. Answer any five questions.
2. Use only SI units.
3. Use of non-programmable scientific calculator is permitted.
4. Indicate the question numbers clearly against your answers.

**Maximum Marks: 25**

**Question No. 1:**

**(5 Marks)**

Solve the Wave equation

$$\frac{\partial^2 u}{\partial t^2} = c^2 \frac{\partial^2 u}{\partial x^2}, \quad 0 < x < l, \quad t > 0$$

subject to the initial and boundary conditions:

$$u(0, t) = u(l, t) = 0, \quad t > 0,$$

$$u(x, 0) = \mu(l - x), \quad 0 < x < l$$

$$\frac{\partial u}{\partial t}(x, 0) = 0, \quad 0 < x < l.$$

**Question No. 2 :**

**(5 Marks)**

The following data represent nitrogen oxide (NO) emissions from boilers (in units of 1000 tons) over a period of years between 2010 and 2016. The independent variable (year) has been standardized to yield the following table:

Year (x)	1	2	3	4	5	6	7
NO emission	910	680	520	450	370	380	340

- a. Estimate the linear regression equation  $\mu_{y|x} = \beta_0 + \beta_1 x$ .

- b. Estimate the average NO emission from boilers for the year 2018?

**Question No. 3:**

**(5 Marks)**

The chances of X, Y and Z being directors of a certain company are 30%, 40% and 35% respectively. The probability that bonus scheme will be introduced if X, Y and Z becomes the directors is 0.5, 0.3, 0.8 respectively. Given that bonus scheme is introduced find the probability that Z becomes the director.

**Question No. 4:**

**(5 Marks)**

The probability that a bulb manufactured by a company will be non-defective is 9/10. If 12 such bulbs are manufactured, find the probability that

- (a) Exactly three will be defective.
- (b) At least two will be defective.
- (c) None will be defective.

**Question No. 5:**

Evaluate  $\oint_C \frac{e^z}{z(z-2)(z-3)} dz$  where  $C: |z| = 2.5$ .

**Question No. 6:**

**(5 Marks)**

Solve  $u_{xx} + u_{yy} = 0$ ,  $0 \leq x \leq 1$ ,  $0 \leq y \leq 4$  to obtain  $u(x, y)$  which satisfy the following conditions:  $u(0, y) = 0$ ,  $u(1, y) = 0$ ,  $u(x, 0) = 0$  and  $u(x, 4) = x$ .

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