Roll No…….. **Total No. of Printed Pages: 2**
Total No. of Questions: [09]

B. Tech (ECE) (Semester-3rd)
MATHEMATICS-III
Subject code: BMATH3-301
Paper ID: [18111314]

Time: 03 Hours **Maximum Marks: 60**

Instruction for candidates:

1. Section A is compulsory. It consists of 10 parts of two marks each.
2. Section B consist of 5 questions of 5 marks each. The student has to attempt any 4 questions out of it.
3. Section C consist of 3 questions of 10 marks each. The student has to attempt any 2 questions.

Section – A **(2 marks each)**

Q1. Attempt the following:

a. Define b_n in Fourier series.
b. Define linear property in Fourier transforms.
c. Define Even and odd functions with the help of an example.
d. Form the partial differential equations:

$$\frac{x^2}{a^2}+\frac{y^2}{b^2}+\frac{z^2}{c^2}=1$$

.

e. Form the partial differential equations:

$$z=f(x^2+y^2)$$

.

f. Classify the following partial differential equations:

$$\frac{\partial^2 z}{\partial x^2}+2\frac{\partial^2 z}{\partial x\partial y}+\frac{\partial^2 z}{\partial y^2}.$$

g. Find the general solution of following partial differential equation:

$$3\frac{\partial^2 z}{\partial x^2}+10\frac{\partial^2 z}{\partial x\,\partial y}+3\frac{\partial^2 z}{\partial y^2}=0.$$

h. Prove that
~(~P)=P
i. Define partial order relation.
j. What do you mean by lower bound and upper bound?

Section – B **(5 marks each)**

Q2. Express $f(x)=|x|,-\pi<x<\pi,$ as Fourier series.

Q3. Solve $\sqrt{p}+\sqrt{q}=1$, where $p=\frac{\partial z}{\partial x}$ and $q=\frac{\partial z}{\partial y}$.

Q4. Solve $\frac{\partial^2 z}{\partial x^2} - 2\frac{\partial^2 z}{\partial x \partial y} + \frac{\partial^2 z}{\partial y^2} = \sin(2x + 3y).$

Q5. Solve by method of separation of variables.

$3\frac{\partial u}{\partial x} + 2\frac{\partial u}{\partial y} = 0,$ where $u(x,0) = 4e^{-x}$.

Q6. Disprove that

$(p \vee q) \vee (p \wedge q) \equiv p$.

Section – C **(10 marks each)**

Q7. Find a Fourier series to represent the function $f(x)$ given by

$$f(x) = \begin{cases} x & , \quad 0 \le x \le \pi \\ 2\pi - x & , \quad \pi \le x \le 2\pi \end{cases}.$$

Q8. Solve $z^2 = pqxy$ by Charpit's method. Where $p = \frac{\partial z}{\partial x}$ and $q = \frac{\partial z}{\partial y}$.

Q9. Prove that two bounded lattices L_1 and L_2 are complemented iff $L_1 \times L_2$ is complemented.