

B. TECH
(SEM-III) THEORY EXAMINATION 2019-20
MATHEMATICS-IV

Time: 3 Hours

Total Marks: 100

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt all questions in brief.

2 x 10 = 20

Q no.	Question	Marks	CO								
a.	Solve the following partial differential equation $yz - xp = z$.	2	1								
b.	Solve the Cauchy's problem $u_x - u_y = 0$. $u(x, 0) = x$	2	1								
c.	Classify the following equation. $x^2 \frac{\partial^2 u}{\partial t^2} - \frac{\partial^2 u}{\partial x^2} = u$	2	2								
d.	Solve the partial differential equation $\frac{\partial^2 z}{\partial x^2} + \frac{\partial^2 z}{\partial x \partial y} = 0$.	2	2								
e.	Find the median of 6,8,9,10,11,12,13.	2	3								
f.	The first three central moments of a distribution are 0,15,-31. Find the moment of coefficient of skewness.	2	3								
g.	If the p.m.f of a discrete random variable X is <table border="1" style="margin: 10px auto; border-collapse: collapse;"> <tr> <td style="padding: 2px;">X</td> <td style="padding: 2px;">1</td> <td style="padding: 2px;">2</td> <td style="padding: 2px;">3</td> </tr> <tr> <td style="padding: 2px;">f(x)</td> <td style="padding: 2px;">$\frac{1}{2}$</td> <td style="padding: 2px;">$\frac{1}{3}$</td> <td style="padding: 2px;">$\frac{1}{6}$</td> </tr> </table> Determine E(X) and V(X).	X	1	2	3	f(x)	$\frac{1}{2}$	$\frac{1}{3}$	$\frac{1}{6}$	2	4
X	1	2	3								
f(x)	$\frac{1}{2}$	$\frac{1}{3}$	$\frac{1}{6}$								
h.	The probability density function f(x) of a continuous random variable X is defined by $f(x) = \begin{cases} \frac{A}{x^2}, & 5 \leq x \leq 10 \\ 0, & \text{otherwise} \end{cases}$ Find the value of A.	2	4								
i.	Find the mean of the Binomial Distribution $B\left(4, \frac{1}{3}\right)$.	2	4								
j.	A machine which produces mica insulating washers for use in electric device to turn out washers having a thickness of 10 mm. A sample of 10 washers has an average thickness 9.52 mm with a standard deviation of 0.6 mm. Find out t.	2	5								

SECTION B

2. Attempt any three of the following:

3 x 10 = 30

Q no.	Question	Marks	CO
a.	Solve $(D^2 - DD' - 2D'^2)z = (y - 1)e^x$	10	1
b.	A rectangular plate with insulated surface is 10 cm wide and so long compared to its width that it may be considered infinite in length without introducing an appreciable error. If the temperature along the short edge $y=0$ is given by: $u(x,0) = \begin{cases} 20x & 0 \leq x \leq 5 \\ 20(10-x) & 5 < x < 10 \end{cases}$ While the two edges $x=0$ and $x=10$ as well as the other short edge are kept at 0°C . Find the steady state temperature at any point (x,y) of the plate.	10	2

