PARUL UNIVERSITY
FACULTY OF ENGINEERING & TECHNOLOGY
B.Tech. Summer 2018 – 19 Examination

Semester: 3   Date: 30/05/2019
Subject Code: 03191204   Time: 02:00pm to 04:30pm
Subject Name: Mathematics-III   Total Marks: 60

Instructions:
1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

Q.1 Select the correct alternative - (Each of one mark)   **(15)**
1. The general solution of $y'' - 9 = 0$ is ___ .
    (a) $y = (c_1 + c_2 x)e^{3x}$ (b) $y = c_1 e^{-3x} + c_2 e^{-3x}$ (c) $y = c_1 e^{-3x} + c_2 e^{3x}$ (d) $y = c_1 e^{3x}$
2. The probability that the sun will rise tomorrow is ___ .
    (a) 0   (b) 1   (c) 0.5 (d) 1.5
3. The median of the data $x = \{1,4,7,11,12\}$ is ___ .
    (a) 7   (b) 11   (c) 4   (d) 5
4. If $CV_X < CV_Y$ then ___ .
    (a) There is less variability in X   (b) There is less variability in Y
    (c) There is more variability in X   (d) none of these
5. The order and degree of the equation $\left(\frac{dx}{dy}\right)^2 + 5y = x$ are ___ .
    (a) 1 and 2   (b) 2 and 1   (c) 1 and 1   (d) 2 and 2

Do as directed:
6. Find the complete solution of Clairaut equation: $z = px + qy + p^2 q^2$.
7. If number of trials $n = 10$, probability of success in one trial $p = 0.6$, then find the mean for Binomial distribution.
8. If the complementary function of a PDE is $CF = c_1 \cos x + c_2 \sin x$, then find Wronskian W.
9. If the coefficient of correlation between the two variables X and Y is $r = 0.7$, then they have ____ (type) of correlation.
10. If $P(A) = 0.65, P(B) = 0.4$ and $P(A \cap B) = 0.15$ then find $P(A \cup B)$.
11. Find the mean of the data : $x = \{12,10,3,11,15\}$
12. Find the general solution of the equation: $y'' + 6y' + 9y = 0$.
13. If correlation coefficient $r = 0$, then the regression coefficients are ___.
14. $\Delta f(x) = f(x + h) - f(x)$ (true/false)
15. If mean of a Poisson variable is 2, then find $P(X = 0)$.

Q.2 Answer the following questions. (Attempt any three)   **(15)**
A) Using Newton's forward interpolation formula, find the value of $f(1.6)$.

x	1	1.4	1.8	2.2
$f(x)$	3.49	4.82	5.96	6.5

B) In a pharmaceutical factory, machines A and B manufacture 40% and 60% of the total output. Of this production of tablets, machines A and B produce 5% and 10% defective tablets. A tablet is picked at random and is found to be defective. What is the probability that the tablet was produced by the machine A?

C) Using Method of Undetermined Coefficient, Solve $y'' - 3y' + 2y = e^x$.

D) Find the general solution to the partial differential equation $xp + yq = x - y$.

Q.3 A) A card is selected from the pack of 52 playing cards. Find the probability that the selected card is   **(07)**
(i) king (ii) queen (iii) face card (iv) spade   (v) either a red or black card (vi) either king or diamond.

B) Solve the partial differential equation $(y^2 + z^2)p - xyq - xz = 0$ using Lagrange multiplier method.   **(08)**

B) Solve $x \left(\frac{\partial u}{\partial x}\right) - 2y \left(\frac{\partial u}{\partial y}\right) = 0$ using method of separation of variables. **(08)**

Q.4 A) Solve the Cauchy Euler equation $x^2 y'' - xy' + 2y = 6$. **(07)**

A) A body executes damped forced vibrations given by the equation **(07)**

$y'' + 8y' + 64y = 128\cos 8t$, solve the equation, when $y(0) = \frac{1}{3}$, y'(0)=0

B) Find the best-fit values of a and b so that y=a+bx fits the data given in the table. **(08)**

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