

Please check that this question paper contains 9 questions and 2 printed pages within first ten minutes.

EVENING

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Uni. Roll No.

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Program: B.Tech. (Batch 2018 onward)

Semester: 4th

Name of Subject: Mathematics - III

Subject Code: BSME-101

Paper ID: 16197

Time Allowed: 03 Hours

Max. Marks: 60

NOTE:

- 1) Parts A and B are compulsory
- 2) Part-C has Two Questions Q8 and Q9. Both are compulsory, but with internal choice
- 3) Any missing data may be assumed appropriately

Part - A

[Marks: 02 each]

Q1.

- a) Find the complete solution of the differential equation $\frac{\partial^4 z}{\partial x^4} + \frac{\partial^4 z}{\partial y^4} = 0$
- b) Classify the partial differential equation $x^2 \frac{\partial^2 u}{\partial t^2} + 3 \frac{\partial^2 u}{\partial x \partial t} + x \frac{\partial^2 u}{\partial x^2} + 17 \frac{\partial u}{\partial t} = 100u$
- c) What do you understand by Chi-Square test as a test of goodness of fit?
- d) State necessary and sufficient condition for function $f(z)$ to be analytic.
- e) Discuss the singularity of $f(z) = \frac{1}{z-a}$ at $z = a$.
- f) Two cards are drawn from a well shuffled pack of 52 cards. Find the probability that they are both aces if the first card is not replaced.

Part - B

[Marks: 04 each]

- Q2. Solve $2r - s - 3t = 5 \frac{e^x}{e^y}$
- Q3. Determine analytic function $w = u + iv$ whose real part $u = \log \sqrt{x^2 + y^2}$
- Q4. Solve the differential equation $x^2(y - z)p + y^2(z - x)q = z^2(x - y)$
- Q5. Find the Bilinear Transformation which maps $z = 1, i, -1$ into $w = i, 0, -i$
- Q6. Find the coefficient of correlation for the following data $N = 10$,
 $\bar{X} = 5.5, \bar{Y} = 4, \sum X^2 = 385, \sum Y^2 = 192, \sum (X + Y)^2 = 947$

Q7. The probabilities of X, Y, and Z becoming managers are $\frac{4}{9}, \frac{2}{9}, \frac{1}{3}$ respectively. The probabilities that Bonus scheme will be introduced if X, Y, Z become managers $\frac{3}{10}, \frac{1}{2}, \frac{4}{5}$ respectively. What is the probability that bonus scheme will be introduced?

Part - C

[Marks: 12 each]

Q8. A tightly stretched string with fixed point $x = 0$ and $x = 1$ is initially in a position given by $y = y_0 \sin^3 \frac{\pi x}{l}$, if it is released from rest from this position, find the displacement $y(x, t)$.

OR

The following table gives the number of days in 50 days period during which automobile accidents occurred in a certain part of a city. Fit a Poisson distribution to the data-

No of accidents	0	1	2	3	4
No. of days	19	18	8	4	1

Q9. Evaluate $\int_0^{2\pi} \frac{\cos 2\theta}{1-2p\cos\theta+p^2} d\theta, 0 < p < 1$

OR

A random sample of 9 boys had heights (inches) 45, 47, 50, 52, 48, 47, 49, 53 and 51. Discuss the suggestion that the mean height in the population is 47.5 (Given the table value of t for 8 d.f. at 5% level = 2.306)
