MORNING

06 OCT 2023

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

[Total No. of Questions: 09]
Uni. Roll No. .....

[Total No. of Pages: 02]

Program: B.Tech. (Batch 2018 onward)
Semester: 4th
Name of Subject: Mathematics-III
Subject Code: BSME-101
Paper ID: 16197
Scientific calculator is Allowed.

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 PDE: $\left(D^2+4DD'+3D'^2\right)z=0$.

b) Classify the partial differential equation : $5\frac{\partial^2 u}{\partial x^2}-9\frac{\partial^2 u}{\partial x\partial t}+4\frac{\partial^2 u}{\partial t^2}=0$.

c) A normal population has a mean of 6.8 and standard deviation of 1.5. A sample of 400 members gave a mean 6.75. Is the difference significant ? (tabulated value = 1.96)

d) A coin is tossed three times. Determine the probability of getting exactly 2 heads .

e) Discuss the nature of singularity of $f(z)=\tan\left(\frac{1}{z}\right)$ about $z=0$.

f) Define Harmonic function .

Part – B **[Marks: 04 each]**

Q2. Solve : $(y-z)p+(x-y)q=z-x$.

Q3. Solve : $\frac{\partial^2 z}{\partial x^2}+\frac{\partial^2 z}{\partial x\partial y}-6\frac{\partial^2 z}{\partial y^2}=\cos(2x+y)$.

Q4. The marks secured by recruits in the selection test (X) and the proficiency test (Y) are given below. Find the rank correlation coefficient .

X	10	15	12	17	13	16	24	14	20
Y	30	42	45	46	33	34	40	35	39

P.T.O.

Q5. If on an average 1 vessel in every 10 is wrecked, find the probability that out of 5 vessels expected to arrive, at least 4 will arrive safely .

Q6. Expand $f(z)=\dfrac{1}{z^2-4z+3}$ in the region $1<|z|<3$.

Q7. Evaluate $\int_C \dfrac{3z^2+z}{(z^2-1)}\,dz$, where C is $|z-1|=1$, using Cauchy Integral formula .

Part – C

[Marks: 12 each]

Q8. The vibrations of an elastic string is governed by the partial differential equation $\dfrac{\partial^2 u}{\partial t^2}=c^2\dfrac{\partial^2 u}{\partial x^2}$. The length of string is l and ends are fixed. The initial velocity is zero and the initial deflection is λx. Find the deflection $u(x,t)$ at any time t.

OR

Fit a Poisson distribution to the following data and calculate the expected frequencies.

x	0	1	2	3	4
f	211	90	19	5	0

Q9. Evaluate $\int_0^{2\pi} \dfrac{1}{(17-8\cos\theta)}\,d\theta$ by using Contour integration .

OR

The following data is collected on two characters:

	Smokers	Non smokers
Literate	83	57
Illiterate	45	68

Based on this information can you say that there is any association between habit of smoking and literacy . (Tabulated value = 3.841)

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