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MIT WORLD PEACE UNIVERSITY | PUNE
TECHNOLOGY, RESEARCH, SOCIAL INNOVATION & PARTNERSHIPS

MIT-WPU

PRN:

End Semester Examination

May-June 2023

MAS2069B - Calculus and Basic Statistics

Schedule ID: 18501

Faculty/School	Faculty of Engineering & Technology	**Term**	IV
Program	Second Year,B. Tech	**Duration**	**1 Hours 30 Minutes**
Specialization		**Max. Marks**	**40**

Instructions to the Candidate:

1. Write the PRN on the top right-hand corner of the question paper.
2. Draw neat diagrams.
3. Assume suitable data, if necessary.

Section - 1 (4 X 10 Marks)
Answer any 4 questions

1	(a) Solve the linear differential equation $(D^2-4D+4)y=e^{2x}\sin 3x$, where $D=\frac{d}{dx}$ (b) Find the work done in moving a particle once round the ellipse $\frac{x^2}{25}+\frac{y^2}{16}=1, z=0$ under the field of force given by $\bar{F}=(2x-y+z)\bar{i}+(x+y-z^2)\bar{j}+(3x-2y+4z)\bar{k}$	**10 marks**	CO1, CO2	Applying
2	(a) Find the directional derivatives of the function $\emptyset=e^{2x+y+z}$ at (0,0,0) in the direction of the tangent to the curve $x=e^{-t}$, $y=2\sin t+1$, $z=t-\cos t$ at $t=0$ (b) Evaluate $\iint_S \nabla\times\bar{F}\cdot\hat{n}\,dS$ using Stoke's theorem, where $\bar{F}=xy^2\,\bar{i}+y\bar{j}+z^2x\bar{k}$, for the surface of a rectangular lamina bounded by $x=0$, $x=1$, $y=0$, $y=2$, $z=0$.	**10 marks**	CO1, CO3	Applying
3	(a) The life of twelve cars manufactured by two companies A and B are given below in years: A: 14, 15, 18, 12, 18, 17 B: 21, 18, 14, 22, 23, 19 Which company will you choose to purchase car? Give reasons. (Use method: coefficient of variation) (b) The first four moments of a distribution about 5 are 2, 20, 40 and 50. Find the first four moments about mean.	**10 marks**	CO4	Analysing

4	(a) Find the coefficient of correlation between population density (x) per square miles and death rate (y) per thousand persons from the given data related to 5 cities. 0.108 	X	200	500	400	700	800
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Y	12	18	16	21	10 | (b) Use method of least squares to fit a straight line of the form $y = mx + c$ to the following data: | x	1	3	5	8	9	10
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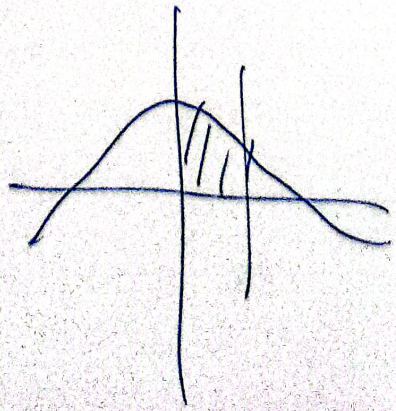
y	12	22	32	47	52	57		**10 marks** 10	CO4	Evaluating
5	a) Three screws are drawn at random from a lot of 100 screws, 10 of which are defective. Find the probability of the event that all 3 screws drawn are non defective, assuming that we draw (i) with replacement, (ii) without replacement (iii) 2 defectives without replacement. Suppose 3% of bolts made by a machine are defective, the defects occurring at random during production. If bolts are packaged 50 per box, find (a) exact probability and (b) Poisson approximation to it, that a given box will contain 5 defectives. 6.295×10^{-3}	**10 marks** 5	CO5	Applying
6	a) *In a sample of 1000 cases, the mean of a certain test is 14 and standard deviation is 2.5. Assuming the distribution to be normal and A(0 ≤ z ≤ 0.8) = 0.2881, A(0 ≤ z ≤ 1.6) = 0.4452, A(0 ≤ z ≤ 2.4) = 0.4918 and A(0 ≤ z ≤ 0.4) = 0.1554], Find (i) how many students score between 12 and 15 ?* $\bar{x} = 14$, $\sigma = 2.5$ 493.5 *(ii) How many score above 18 ?* 54.8 *(iii) how many score below 8 ?* 8 *(iv) how many score 16 ?* 116 b) **Suppose that the lifetime of a certain battery is exponentially distributed with the mean life of 1600 hrs. What is the probability that (i) the battery will work upto 2400hrs, (ii) battery will survive after 1000hrs.**	**10 marks** 5	CO5	Analysing

END OF QUESTION PAPER



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