

Reg. No.:

Name :



VIT[®]
BHOPAL
www.vitbhopal.ac.in

TERM END EXAMINATIONS (TEE) – February-March 2023

Programme	: B.Tech.	Semester	: Winter 2022-23
Course Title/ Course Code	: Probability, Statistics And Reliability/ MAT3003	Slot	: A21+A22+A23
Time	: 1½ hours	Max. Marks	: 50

Answer ALL the Questions

Q. No.	Question Description	Marks
--------	----------------------	-------

PART - A (30 Marks)

- | | | |
|---|---|----|
| 1 | (a) In a certain college 25% of boys and 10% of girls are studying mathematics. The girls constitute 60% of the student body.
(i) What is the probability that mathematics is being studied?
(ii) If a student is selected at random and is found to be studying mathematics, find the probability that the student is a girl?
(iii) If a student is selected at random and is found to be studying mathematics, find the probability that the student is a boy? | 10 |
|---|---|----|

OR

- | | | |
|-----|---|----|
| (b) | Find the probability that out of 100 patients
(i) Between 84 and 95 inclusive
(ii) Fewer than 86, will survive a heart-operation given that the chances of survival is 0.9. | 10 |
| 2 | (a) Find (i) marginal distributions $f(x)$ and $g(y)$, (ii) $E(X)$ and $E(Y)$, (iii) $\sigma(X, Y)$ (iv) $\rho(X, Y)$ for the following joint distribution. (v) Are X and Y independent random variables? | 10 |

$X \backslash Y$	-4	2	7
1	1/8	1/4	1/8
5	1/4	1/8	1/8

OR

- | | | |
|-----|---|----|
| (b) | Predict the blood pressure (B.P) of a woman of age 40 years from the following data which shows the ages X and systolic blood pressure. | 10 |
|-----|---|----|

Age (X)	56	42	72	36	63	47	55	49	38	42	68	60
B.P (Y)	147	125	160	118	149	128	150	145	115	140	152	155

- 3 (a) A company claims that the mean thermal efficiency of diesel engines produced by them is 32.3%. To test this claim, a random sample of 40 engines were examined which showed the mean thermal efficiency of 31.4% and standard deviation of 1.6%. Can the claim be accepted or not, at 1% level of Significance? 10

OR

- (b) Test for goodness of fit of a Poisson distribution at 1% level of significance to the following observed data of e-mails received: 10

No. of e-mails Observed	0	1	2	3	4	5	6	7	8	9	10
frequency	3	15	47	76	68	74	46	39	15	9	5

PART - B (20 Marks)

- 4 The daily consumption of electric power (in millions of kW-hours) is a Random variable having the probability density function. 10

$$f(x) = \begin{cases} \frac{1}{9}xe^{-x/3}, & x > 0 \\ 0, & x \leq 0 \end{cases}$$

If the total production is 12 million kW-hours, determine the probability that there is power cut (shortage) on any given day.

- 5 Three different methods of teaching English are used on three group of students. Random samples of size 4 are taken from each group and the marks obtained by the sample students in each group are given. Use ANOVA to find out whether teaching methods had any effects on the students' performance at 0.01 levels 10

Group A	16	17	13	18
Group B	15	16	13	17
Group C	15	14	13	14

↔↔↔↔