



VIT

Vellore Institute of Technology

(Approved as an Autonomous Institute under Section 3 of UGC Act, 1956)

SCHOOL OF ADVANCED SCIENCES CONTINUOUS ASSESSMENT TEST - II WINTER SEMESTER 2025-2026

REG.NO.:

SLOT: F2+TF2

Programme Name & Branch : B.Tech. – SCOPE,SCHEME,SENSE,SELECT,SCORE,SMEC
Course Code and Course Name : BMAT202L – Probability and Statistics
Faculty Name(s) : Common slot QP
Class Number(s) : Common slot QP
Date of Examination : 22/03/2026
Exam Duration : 90 minutes **Maximum Marks: 50**

General instruction(s):

- Answer All Questions
- Statistical tables are permitted.
- M - Max mark; CO – Course Outcome; BL – Blooms Taxonomy Level (1 – Remember, 2 – Understand, 3 – Apply, 4 – Analyse, 5 – Evaluate, 6 – Create)
- Course Outcomes
 CO2: Understand the basic concepts of random variables and find an appropriate distribution for analyzing data specific to an experiment.
 CO3: Apply statistical methods like correlation, regression analysis in analyzing, interpreting experimental data.
 CO4: Make appropriate decisions using statistical inference that is the central to experimental research.

Q. No	Question	M	CO	BL																																	
1.	<p>A health researcher studies the systolic blood pressure of individuals based on Age and Body Mass Index (BMI). Estimate the systolic blood pressure of an individual with age 51 and BMI 28 with the help of the following information.</p> <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Blood Pressure (y)</th> <th>118</th> <th>130</th> <th>125</th> <th>140</th> <th>110</th> <th>150</th> <th>135</th> <th>128</th> <th>145</th> <th>120</th> </tr> </thead> <tbody> <tr> <td>Age (x_1)</td> <td>30</td> <td>45</td> <td>40</td> <td>55</td> <td>28</td> <td>60</td> <td>50</td> <td>42</td> <td>58</td> <td>35</td> </tr> <tr> <td>BMI (x_2)</td> <td>22</td> <td>27</td> <td>25</td> <td>30</td> <td>21</td> <td>32</td> <td>29</td> <td>26</td> <td>31</td> <td>23</td> </tr> </tbody> </table>	Blood Pressure (y)	118	130	125	140	110	150	135	128	145	120	Age (x_1)	30	45	40	55	28	60	50	42	58	35	BMI (x_2)	22	27	25	30	21	32	29	26	31	23	10	CO3	2
Blood Pressure (y)	118	130	125	140	110	150	135	128	145	120																											
Age (x_1)	30	45	40	55	28	60	50	42	58	35																											
BMI (x_2)	22	27	25	30	21	32	29	26	31	23																											
2.	<p>a) A certain experiment is repeated independently, and the probability of success in each trial is 0.01. Let X denote the number of successes in n trials, where $X \sim \text{Binomial}(n, 0.01)$. How many trials n are required so that the probability of at least one success is greater than $\frac{1}{2}$?</p> <p>b) The number of monthly breakdowns of a computer system is a random variable X having a Poisson distribution with $E(X^2) = 12$. (Here $E(Y)$ represents the expected value of the random variable Y). Find the probability that the computer will function for a month, i) without breakdown. ii) with exactly one breakdown.</p>	5 5	CO2	3																																	
3.	<p>a) The lifetime of a machine component follows an exponential distribution with rate $\lambda = 0.4$ per year. i) Find the probability that the component lasts more than 3 years. ii) Find the probability that the component fails between 2 and 5 years.</p>	5	CO2	2																																	



SCHOOL OF ADVANCED SCIENCES
CONTINUOUS ASSESSMENT TEST - II
WINTER SEMESTER 2025-2026

	b) Find the mean and variance of a normal random variable Y such that $P(Y \geq a) = 0.33$ and $P(a \leq Y \leq b) = 0.3050$	5		
4.	A random sample of size 30 is taken from a normal population whose variance is known to be 900. Then, determine the level of significance for the test where, i) If the critical region is $\bar{x} > 357$, and null hypothesis, $H_0 : \mu = 350$ and the alternate hypothesis, $H_1 : \mu > 350$. ii) If the critical region is $\bar{x} > 360$ and $\bar{x} < 340$, where the null hypothesis $H_0 : \mu = 350$ is tested against the alternate hypothesis, $H_1 : \mu \neq 350$. (Here μ and \bar{x} are the population and sample mean associated with the test respectively).	10	CO4	3
5.	The mean weight and standard deviation of seven randomly selected basketball players are 82.4 kg and 6.3 kg, respectively. The corresponding values for five randomly selected football players are 86.1 kg and 5.8 kg, respectively. Based on this data, can we conclude that basketball players are, in general, lighter than football players? (Test at 5% level of significance).	10	CO4	2