

**PSG COLLEGE OF ARTS & SCIENCE  
(AUTONOMOUS)**

**BVoc DEGREE EXAMINATION DECEMBER 2024  
(Third Semester)**

**Branch - FOOD PROCESSING TECHNOLOGY**

**MATHEMATICS AND STATISTICS**

Time: Three Hours

Maximum: 75 Marks

**SECTION-A (10 Marks)**

Answer ALL questions

ALL questions carry EQUAL marks (10 × 1 = 10)

Module No.	Question No.	Question	K Level	CO
1	1	A square matrix A is said to be an ____ matix, if $A\bar{A}=\bar{A}A=I$ , where I is a unit matrix. (a) Diagonal (b) Scalar (c) Square (d) Orthogonal	K1	CO1
	2	A matrix is said to be idempotent matix, if (a) $A=\bar{A}$ (b) $A^2=\bar{A}^1$ (c) $A^2=A$ (d) $\bar{A}=A$	K2	CO1
2	3	The Arithmetic mean of n observations $x_1, x_2, \dots, x_n$ is given by (a) $1/n \sum x_i^2$ (b) $1/N \sum x_i$ (c) $1/n \sum x_i$ (d) $1/N \sum x_i^2$	K1	CO2
	4	The least value of root mean square deviation is called (a) Variance (b) Mea (c) Standard deviation (d) Median	K2	CO2
3	5	The correlation coefficient lies between (a) $-1 \leq r \leq 1$ (b) $0 \leq r \leq 1$ (c) $-1 \leq r \leq 2$ (d) $-1 \leq r \leq 0$	K1	CO3
	6	Probable error of r is (a) $0.6745 \frac{1-r^2}{\sqrt{n}}$ (b) $0.6754 \frac{1+r^2}{\sqrt{n}}$ (c) $0.6547 \frac{1-r^2}{\sqrt{n}}$ (d) $1-r^2/\sqrt{n}$	K2	CO3
4	7	Which is Null Hypothesis (a) $H_0: \mu \neq \mu_0$ (b) $H_0: \mu \neq \mu_0$ (c) $H_0: \mu = \mu_0$ (d) $H_0: \mu = \mu_0$	K1	CO4
	8	Standard Error for sample mean( $\bar{x}$ ) (a) $\frac{\sqrt{n}}{\sigma}$ (b) $\frac{\sqrt{PQ}}{N}$ (c) $\frac{\sigma}{\sqrt{n}}$ (d) $\frac{\sqrt{pq}}{n}$	K2	CO4
5	9	Chi-Square test formula (a) $\sum (O_i - E_i)^2 / E_i$ (b) $\sum (O_i - E_i)^2 / O_i$ (c) $\sum (O_i + E_i)^2 / E_i$ (d) $\sum (O_i + E_i)^2 / O_i$	K1	CO5
	10	ANOVA in null hypothesis (a) $H_0: \mu_1 = \mu_2 = \dots = \mu_k = \mu$ (b) $H_0: \mu_1 \neq \mu_2 \neq \mu_3 = \dots \neq \mu_k = \mu$ (c) $H_1: \mu_1 = \mu_2 = \dots = \mu_k = \mu$ (d) $H_1: \mu_1 \neq \mu_2 \neq \dots \neq \mu_k \neq \mu$	K2	CO5

Cont...

**SECTION - B (35 Marks)**Answer **ALL** questions**ALL** questions carry **EQUAL** Marks

(5 × 7 = 35)

Module No.	Question No.	Question	K Level	CO																								
1	11.a.	Find $AA^T$ if $A = \begin{bmatrix} 1 & 2 & -2 \\ -1 & 3 & 0 \\ 0 & 2 & 1 \end{bmatrix}$	K1	CO1																								
	(OR)																											
	11.b.	Find the conjugate of transpose matrix ( $A^T$ ) of the Matix $A = \begin{bmatrix} -i & 3+2i & -2-i \\ -3+2i & 0 & 3-4i \\ 2-i & -3-4i & 2i \end{bmatrix}$	K4																									
2	12.a.	Find the arithmetic mean of the following frequency distribution: X : 1 2 3 4 5 6 7 F : 5 9 12 17 14 10 6	K1	CO2																								
	(OR)																											
	12.b.	In usual notation, we are given $n_1=100, \bar{x}_1=15, \sigma_1=3, n_2=150, \bar{x}_2=16, \bar{x}=15.6$ . find $\sigma_2=?$	K6																									
3	13.a.	Prove that Two independent variables are uncorrelated.	K1	CO3																								
	(OR)																											
	13.b.	Given regression equations: $8x-10y+66=0$ , $4x-18y=214$ and variance of $x=9$ i) the mean values of $x$ and $y$ ii) the correlation coefficient between $x$ and $y$	K5																									
4	14.a.	A random sample of 500 apples was taken from a large consignment and 60 was found to be bad. Obtain the 98% confidence limits for the percentage of bad apples in the consignment.	K1	CO4																								
	(OR)		K3																									
	14.b.	Write down the best procedure of hypothesis.																										
5	15.a.	Carry out the analysis of variance for the following table: <table><tr><td rowspan="2">Varieties</td><td colspan="4">chemists</td></tr><tr><td>1</td><td>2</td><td>3</td><td>4</td></tr><tr><td>A</td><td>8</td><td>5</td><td>5</td><td>7</td></tr><tr><td>B</td><td>7</td><td>6</td><td>4</td><td>4</td></tr><tr><td>C</td><td>3</td><td>6</td><td>5</td><td>4</td></tr></table>	Varieties	chemists				1	2	3	4	A	8	5	5	7	B	7	6	4	4	C	3	6	5	4	K3	CO5
		Varieties		chemists																								
			1	2	3	4																						
		A	8	5	5	7																						
B	7	6	4	4																								
C	3	6	5	4																								
(OR)																												
15.b.	The following table shows the distribution of goals in a foot ball match. No. of goals: 0 1 2 3 4 5 6 7 No.of matches: 95 158 108 63 40 9 5 2.	K6																										

**SECTION -C (30 Marks)**

Answer ANY THREE questions  
ALL questions carry EQUAL Marks (3 × 10 = 30)

Module No.	Question No.	Question	K Level	CO																		
1	16	If $A = \begin{pmatrix} 1 & 2 & 3 \\ 2 & 4 & 6 \\ 3 & 6 & 9 \end{pmatrix}$ and $B = \begin{pmatrix} -1 & -2 & -4 \\ -1 & -2 & -4 \\ 1 & 2 & 4 \end{pmatrix}$ Prove that $AB \neq BA$ .	K2	CO1																		
2	17	Explain Diagrammatic and Graphical Intra presentations of data.	K4	CO2																		
3	18	Calculate the correlation coefficient for the following heights (in inches) of fathers(x) and their sons(y). X    65    66    67    67    68    69    70    72 Y    67    68    65    68    72    72    69    71	K3	CO3																		
4	19	In Two large population there are 30 and 25 percent respectively of blue-eyed people. In this difference likely to be hidden in the two populations?	K5	CO4																		
5	20	A test was given to five students taken at random from the fifth class of three schools of a town: The individual scores are, <table><tr><td>School I</td><td>9</td><td>7</td><td>6</td><td>5</td><td>8</td></tr><tr><td>School II</td><td>7</td><td>4</td><td>5</td><td>4</td><td>5</td></tr><tr><td>School III</td><td>6</td><td>5</td><td>6</td><td>7</td><td>6</td></tr></table> Carry but the analysis of variance.	School I	9	7	6	5	8	School II	7	4	5	4	5	School III	6	5	6	7	6	K6	CO5
School I	9	7	6	5	8																	
School II	7	4	5	4	5																	
School III	6	5	6	7	6																	