

FYBBI sem II Reg Exam April-2023

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SUBJECT: Quantitative Methods-II		
CLASS: F.Y.B.COM(B&I)	SEM-II	SEAT NO.
Name:	1514123	



- Note: (i) All Questions are compulsory with internal choice.
(ii) Simple Calculator is allowed.
(iii) Graph papers will be provided on request.

Q.1

[A] Fill in the blanks. (Any 8 out of 10)

[8]

- The mean time a health insurance company takes to pay claims is less than 14 working days. The alternative hypothesis is...
(H_1 : Population mean time =14, H_1 : Population mean time >14,
 H_1 : Population mean time <14, H_1 : Population mean time \neq 14)
- A Type II error is committed when
(we reject a null hypothesis that is true., we don't reject a null hypothesis that is true.,
we reject a null hypothesis that is false., we don't reject a null hypothesis that is false.)
- Hypothesis $H_0: \mu = 14$ against $H_1: \mu < 14$. The problem is
(Right tailed., Left tailed., Two-tailed. Data is insufficient)
- Hypothesis $H_0: \pi \leq 0.05$ against $H_1: \pi > 0.05$
(Right tailed., Left tailed., Two-tailed. Data is insufficient)
- For the linear equation $x+4y = 12$, the point at which it intersects x-axis on graph is ____
((0,0), (0,3), (12,0), (12,3))
- L.P.P. is:
(Linear Programming Problem, Limit Procedure Program,
Logarithmic Programming Problem, Linear problem Programming)
- The region satisfying the inequality $3x-5y > 0$ is:
Towards origin, away from origin, Cannot be decided, exactly on line)
- A point optimizing the objective function and satisfying the constraint and non-negative condition is known as.....
(Solution, Feasible solution, Optimal solution, Not a solution)
- A matrix of order $1 \times n$ is known as:
(Row matrix, Column matrix, Square matrix, Diagonal Matrix)
- If A is $m \times n$ matrix and B is $o \times p$ matrix. Then AB can be calculated if
($m=n$, $n=o$, $m=p$, $o=p$)

[B] State True or False. (Any 7 out of 10)

[7]

- A matrix of order $n \times n$ is known as row matrix.
- A Type I error is committed when we reject a null hypothesis that is true.
- A matrix is triangular arrangement of number.
- We can add two matrices of different order.
- Critical value at 5% level of significance for two tailed hypotheses is 1.96.
- A point satisfying the constraint and non-negative condition is known as feasible solution.
- A diagonal matrix has all its elements as zero.
- The graphical method of solving is used to solve L.P.P. with two variables.
- The determinant of the matrix $A = \begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}$ is -2.
- Testing of hypothesis is done with sample of data collected.

Q:2 Solve the following:

[15]

[A] The quality-control manager at a light bulb factory needs to determine whether the mean life of a large shipment of light bulbs is equal to 375 hours. The population standard deviation is 100 hours. A random

sample of 64 light bulbs indicates a sample mean of 350 hours. At the 0.05 level of significance, is there evidence that the mean life is different from 375 hours?

Formulate the null and alternative hypothesis.

Define your rejection rule. Show the rejection region in a diagram.

Can null hypothesis be rejected? What is your conclusion?



[B] Starting annual salaries for individual with master's and bachelor's degree in business were collected in two independent random samples. Use the following data to carry out 5% significance tests for the difference in the salary.

	Master's Degree	Bachelor's Degree
Sample size	60	80
Sample mean	45000	35000
Population Standard deviation	4000	3500

OR

[C] Historical data indicate that 4 percent of the components produced at a certain manufacturing facility are defective. A particularly acrimonious labor dispute has recently been concluded, and management is curious about whether it will result in any change in this figure of 4 percent. If a random sample of 500 items indicated 16 defectives, is this significant evidence, at the 5 percent level of significance, to conclude that a change has occurred?

[D] The student union of a large university gathered a random sample of 525 students to determine whether they are in favour of a new grading system. The results are summarised in the table below:

	Sample size	Number in favour of new grading system
Humanities	325	221
Science	200	120

Do the results indicate a difference between humanities and science in the population proportions in favour of the new grading system?

Q:3 Solve the following:

[15]

[A] A manufacturer produces two products A and B. He has his machines in operation for 24 hours a day. Production of each unit of A requires 2 hours of processing in machine M_1 and 6 hours in machine M_2 .

Production of each unit of B requires 6 hours of processing in machine M_1 and 2 hours in machine M_2 . The manufacturer earns a profit of Rs. 50 on each unit of A and Rs. 20 on each unit of B. Formulate the LPP.

[B] Solve the following LPP.

$$\text{Minimize, } Z = x + 1.5y$$

$$\text{Subjected to } 20x + 20y \geq 160, 20x + 60y \geq 300 \text{ and } x, y \geq 0$$

OR

[C] Daily requirement of two vitamins V_1 , V_2 and the mineral M for a certain person is at least 10 units of V_1 , 12 units of V_2 and 20 units of M. He meets this requirement by consuming tablets with brand names X

and Y. A tablet X has 4 units of V_1 , 3 units of V_2 and no M. A tablet Y has 1 units of V_1 , 2 units of V_2 and 4 units of M. Cost of a tablet X is 40 paise and that of a tablet Y is 60 paise. Formulate the LPP.

[D] Solve the following LPP.

$$\begin{aligned} & \text{Minimize, } Z = x + 1.5y \\ & \text{Subjected to } 20x + 20y \geq 160, 20x + 60y \geq 300 \text{ and } x, y \geq 0 \end{aligned}$$



Q:4 Solve the following:

[15]

[A] Given the following matrices:

$$A = \begin{pmatrix} 2 & 4 \\ 8 & 3 \end{pmatrix} B = \begin{pmatrix} -1 & 2 \\ 7 & 7 \end{pmatrix} \text{ calculate } AB \text{ and } BA. \text{ Verify whether } AB=BA?$$

[B] Solve the following system of equations by Cramer's method.

$$x + 3y = 2, 2x + 5y = 14$$

OR

[C] Given the following matrices:

$$A = \begin{pmatrix} 2 & 4 \\ 8 & 3 \end{pmatrix} B = \begin{pmatrix} -1 & 2 \\ 7 & 7 \end{pmatrix} \text{ calculate } 2A - 3B.$$

[D] Find the determinant of the following matrix.

$$A = \begin{pmatrix} 1 & 2 & 3 \\ 1 & 2 & 4 \\ 1 & 3 & 4 \end{pmatrix}$$

Q:5 Solve the following:

[15]

[A] A manufacturer produces two products A and B. He has his machines in operation for 24 hours a day. Production of each unit of A requires 2 hours of processing in machine M_1 and 6 hours in machine M_2 . Production of each unit of B requires 6 hours of processing in machine M_1 and 2 hours in machine M_2 . The manufacturer earns a profit of Rs. 50 on each unit of A and Rs. 20 on each unit of B. Formulate the LPP.

[B] Given the following matrices:

$$A = \begin{pmatrix} 1 & 2 & 3 \\ 0 & 2 & 1 \\ 2 & 4 & 1 \end{pmatrix} B = \begin{pmatrix} 0 & 2 & 1 \\ 2 & 1 & 3 \\ 2 & 3 & 2 \end{pmatrix} \text{ calculate } AB.$$

OR

[C] Write short notes with example. (ANY THREE)

- i. Type I error
- ii. Power of a test
- iii. Optimal solution of LLP
- iv. Square matrix
- v. Diagonal matrix