MID-WESTERN UNIVERSITY
FACULTY OF MANAGEMENT
FINAL EXAMINATION: 2074
MASTER OF BUSINESS ADMINISTRATION (MBA)
SEMESTER – III

R.No. .....

Subject: Quantitative Techniques for Business | Course Code: MGMT 535
Full Marks: 100 | Time: 4:00 Hours

SECTION A: MULTIPLE CHOICE QUESTIONS (1 × 20 = 20 MARKS)/ (TIME: 20 MINUTES)

Tick the best answers.

Q1. Suppose A is a 5×2 matrix, B is a 2 × 4 matrix and C is a 4×3 matrix. If A × B × C is defined, then the size of B is:

a) 5 × 3
b) 2 × 5
c) 2 × 4
d) d)4 × 2

Q2. The formula for calculating the inverse of A is given by :

a) $A^{-1} = \frac{Adj.A}{|A|}$
b) $A^{-1} = \frac{A.AdjA}{|A|}$
c) $A^{-1} = \frac{|A|.AdjA}{A}$
d) $A^{-1} = \frac{AdjA}{A}$

Q3. What is the probability of drawing king ace from well shuffled cards?

a) 1
b) 0
c) 1/2
d) ¼

Q4. Two lines of regression intersect at the point:

a) (0, 0)
b) (1, 1)
c) (X, Y)
d) $(\overline{X}, \overline{Y})$

Q5. The correct value of determinant $\begin{vmatrix} d & b \\ c & a \end{vmatrix}$ is :

a) ad + bc
b) bc – ad
c) ad – bc
d) ad.bc

Q6. The addition of matrices $\begin{bmatrix} 3 & 7 & 2 \\ 1 & 0 & 0 \\ 5 & 3 & 4 \end{bmatrix}$ & $\begin{bmatrix} 2 & 4 \\ 1 & 3 \end{bmatrix}$ gives a matrix of size :

a) 3 × 2
b) 2 × 2
c) 1 × 2
d) None of the above

Q7. When you multiply a matrix by identity matrix, you obtain:

a) Inverse matrix
b) Cofactor of matrix
c) Original matrix
d) Adjoint of matrix

Q8. An inverse as defined by $A.A^{-1} = A^{-1}A = I$ exists for all matrices.

a) True
b) False
c) Nothing can be said
d) Noneof the above

Q9. The _____ is the transpose of the matrix of the cofactors.

a) Adjoint
b) Cofactors
c) Inverse
d) Identity

Q10. ..... is what remains after the removal of row and column of matrix.

a) Inverse
b) Cofactor
c) Identity
d) Adjoint

Q11. Degree of freedom for t – test is .....

a) n – 1
b) n + 1
c) (n – 1)(n+1)
d) none

Q12. The correlation coefficient lies in between :

a) -1 to 1
b) $-\infty$ to ∞
c) 0 to 1
d) none

Q13. The derivative of 10 with respect to x is equal to :

a) zero
b) $\frac{1}{10}$
c) 10
d) 10^2

Q14. The correlation coefficient (r) is the geometric mean between:

a) rank correlation coefficient
b) regression coefficient
c) partial correlation coefficient.
d) None of the above

Q15. 5% level of significance for right tailed test is.....

a) 1.645
b) -1.645
c) 1.96
d) 1.28

Q16. Large sample test is also known as:

a) Z- test
b) T- test
c) χ^2 test
d) None

Q17. Small sample test is also known as :

a) T- test
b) Z- test
c) χ^2 test
d) None

Q18. $\frac{1+r^2}{\sqrt{n}}$ is the ..... of simple correlation coefficient r based on n paired values.

a) Standard error
b) probable error
c) both (i) and (ii)
d) none

Q19. Two tailed test depends upon:

a) Alternative hypothesis
b) Composite hypothesis
c) Null hypothesis
d) Simple hypothesis

Q20. Rank correlation is the ..... between dependent and independent variable(s).

a) functional relationship
b) rank relationship
c) correlation
d) regression

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You are required to answer in your own words as far as applicable. The figures in the margin indicate full marks.

SECTION B: SHORT ANSWER QUESTIONS (5X6 = 30 MARKS)

Answer any FIVE questions:

Q1. What do you mean by mutually exclusive event? A bag contains 4 white, 8 black, 6 red and 2 green balls. Find the probability of getting either a white or a black or a green ball in a single draw. [2+ 4]

Q2. A random sample of size 25 from a finite population consisting of 150 units. If the population standard deviation is 10, find the standard error of sample mean when the sample is drawn.
a. with replacement b. without replacement [3 + 3]

Q3. A sample of 100 light bulbs from a manufacturing lot had average life of 1416 hours with standard deviation of 30 hours.
a. Calculate the standard error of the mean. [3]
b. Set up 90% and 95%, confidence limits for the true population mean. [3]

Q4. A manufacturer finds that the production cost of items is Rs. 20 per item and fixed cost is Rs. 60,000 per month. If each item is sold at Rs.32, find
a. The break-even point [2]
b. The number of items that must be produced and sold each month so as to make a profit of Rs.18000. [2]
c. The loss to be borne if only 4800 items are produced and sold each month. [2]

Q5. The demand function for a certain commodity is $P=\frac{1}{3}Q^2 - 10Q + 75$. Find the value of Q and the corresponding value of P that maximizes the revenue.

Q6. (a) If $f(x) = x^2 - \frac{1}{x^2}$, then show that $f(x) + f\left(\frac{1}{x}\right) = 0$ [3]
(b) If $f(x) = e^{bx}$, prove that $f(x).f(y) = f(x+y)$ [3]

Q7. What do you mean by derivative of a function, $y = f(x)$? Find the derivatives of $y = x^5 (2x^2 + 1)$. [3+3]

SECTION C: LONG ANSWER QUESTIONS (2X15 = 30 MARKS)

Answer any TWO questions:

Q8. State Bayes's theorem for three mutually exclusive and exhaustive events. A manufacturing firm produces steel pipes in three plants with daily production volume of 500, 1000 and 2000 units respectively. According to past experience, it is known that the fractions of defective outputs produced by the three plants are respectively 0.005, 0.008 and 0.010. If a pipe is selected from a day's total production and found to be defective. From which plant the defective pipe is expected to have been produced? [15]

Q9. A company claims that the mean life time of its electric light bulbs is 28 months. A random sample of 10 bulbs has the following life in months: 24, 26, 32, 28, 20, 20, 23, 34, 30 and 43. Test the claim of the company at 5% level of significance. [15]

Q10. A contractor has obtained orders for 9 houses of type A, 7 houses of type B and 5 houses of type C. The matrix below shows the amount of raw materials needed for each type of houses.

House	Materials needed in convenient units			
	Brick	Wood	Cement	Paint
A	20	15	16	8
B	30	20	12	10
C	15	8	10	6

a. Find how much of each material the contractor should purchase. [5]
b. If the costs per unit of brick, wood, cement and paint are Rs. 3000, Rs. 4000, Rs. 2000 and Rs. 500 respectively, find by using matrix algebra the cost for a house of each type. [5]
c. What is the cost of materials for all houses? [5]

SECTION D: CASE STUDY (20 MARKS)

Q11. *Read a case given below and answer the following questions:*

A consumer products company wants to measure the effectiveness of different types of advertising media in the promotion of its product. Specifically, the company is interested in the effectiveness of newspaper advertising. A sample of 69 cities with approximately equal population is selected for study during a test period of one month. The data of sales of the product and newspaper advertising media expenditure is given below.

Advertising expenditure	Sales of the product				
	0-500	500-1000	1000-1500	1500-2000	2000-2500
0-200	12	6	-	-	-
200-400	2	18	4	2	1
400-600	-	4	7	3	-
600-800	-	1	-	2	1
800-1000	-	-	1	2	3

Required:

a. Coefficient of variations [5]

b. Correlation coefficient [5]

c. Two regression equations [5]

d. Estimate the total sales of product when the advertising expenditure is Rs. 1200. [5]

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