

Enrollment No.....



Programme: MBA

Branch/Specialisation: Management

Faculty of Management Studies

End Sem (Odd) Examination Dec-2022

MS5CO21 Statistics for Decision Making

**Duration: 3 Hrs.****Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d.

- Q.1 i. The value of the  $\lim_{x \rightarrow 0} \left( \frac{x^2 - 9}{x+2} \right)^n$  is- 1  
 (a) 0      (b) -9/2      (c) 9/2      (d) None of these
- ii. A function of the form  $y = a^x$  a is any constant represents- 1  
 (a) Constant function      (b) Logarithmic function  
 (c) Exponential function      (d) None of these
- iii. Differentiation of  $e^x$  with respect to  $x$ . 1  
 (a)  $a + c$       (b)  $a^x + c$       (c)  $e^x + c$       (d) None of these
- iv. Integration of  $x^3 + 2x + 3$  with respect to  $x = \underline{\hspace{2cm}}$ . 1  
 (a)  $3x^2 + 2 + c$       (b)  $\frac{x^3}{3} + 2x + c$   
 (c)  $\frac{x^3}{3} + x^2 + 3x + c$       (d) None of these
- v. The selection of 400 people from a group of 10000 people is an example of- 1  
 (a) Sample and population      (b) Population only  
 (c) Sample only      (d) None of these
- vi. A numerical value calculated from population is called- 1  
 (a) Sample      (b) Statistic      (c) Parameter      (d) None of these
- vii. Which of the Following can't be Probability of an Event? 1  
 (a) -1      (b) 0.4      (c) 1/2      (d) None of these
- viii. Which of the following is true for the normal curve? 1  
 (a) Unsymmetrical      (b) Straight Line  
 (c) Bell-shaped      (d) None of these
- ix. The Additive time series model is- 1  
 (a)  $Y = T + C + S + I$       (b)  $Y = TCSI$   
 (c)  $Y = a + bX$       (d) None of these

[2]

- x. In moving average method, we cannot find trend values of some  
(a) Starting periods                   (b) End periods  
(c) Starting and end periods   (d) None of these

1

**Q.2**      Attempt any two:

- i. Define the term with an example:

(a) Algebraic function      (b) Transcendental function

ii. A publisher house finds that the production of cost directly attributed to each book is Rs. 50 and that the fixed cost are Rs. 15000. If each book can be sold for Rs. 60 then determine:

(a) The cost function      (b) The revenue function

(c) The break-even point

iii. Evaluate  $\lim_{x \rightarrow 4} \frac{x^4 - 256}{x - 4}$ .

5

**Q.3**      Attempt any two:

- i. Discuss applications of differentiation in Economic and Managerial problems. 5

ii. Find the derivative of  $\frac{1-e^x}{1+e^x}$  with respect to x. 5

iii. Evaluate  $\int \frac{(1-x)^3}{x} dx$ . 5

5

**Q.4**      Attempt any two:

- i. What is the importance and scope of statistics in the area of business. **5**  
ii. Find the standard deviation from the following frequency distribution; **5**

Height	No. of students
58-60	4
61-63	30
64-66	45
66-68	15
69-71	6

5

- iii. What is population and sample? Explain with examples

**Q.5**      Attempt any two:

- i. Write short note on the following:

  - (a) Trial and Event
  - (b) Independent events & dependent events,
  - (c) Random experiment

5

[3]

- ii. If mean of Binomial distribution is 9 and variance is 3 then find value of  $n$ ,  $p$  and  $q$ . 5

iii. Fit a Poisson distribution to the following data. 5

X	0	1	2	3	4
---	---	---	---	---	---

X	0	1	2	3	4
Y	46	38	22	9	1

**Q.6**      Attempt any two:

- i. Find secular trend by using 5 years moving average method for the following data: **5**

Years	Sales (Rs)
1982	110
1983	160
1984	215
1985	290
1986	345
1987	456
1988	546
1989	657
1990	748
1991	879
1992	839
1993	900
1994	945
1995	990

- ii. Explain time series with any one example and write any five applications of time series? **5**

- iii. Find Kelly's quantity index number for the following data: 5

Commodity	(2005)		(2009)	
	Price (Rs)	Quantity	Price (Rs)	Quantity
A	80	5	140	8
B	95	8	160	10
C	120	10	200	12

Taking 2009 as a base year.

\* \* \* \*

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# Faculty of Management Studies

End Sem (Odd) Exam Dec-2022

Marks

No.

MS5 (021) Statistics for Decision making

MCQ.

- |     |        |   |   |
|-----|--------|---|---|
| Q1. | (i)    | (a) None of these                         | 1 |
|     | (ii)   | (c) Exponential function                  | 1 |
|     | (iii)  | (d) $e^x + \dots$ (None of these)         | 1 |
|     | (iv)   | (d) $2x^2 + x^2 + 3x + c$ (None of these) | 1 |
|     | (v)    | (a) Sample and Population                 | 1 |
|     | (vi)   | (c) Parameter                             | 1 |
|     | (vii)  | (a) -1                                    | 1 |
|     | (viii) | (c) Bell - Shaped                         | 1 |
|     | (ix)   | (a) $y = T + C + S + I$                   | 1 |
|     | (x)    | (c) Starting and end points               | 1 |

Q2

(i) (a) Algebraic functions:

The functions which are made upon power of the variables and constants connected together by the mathematical operation (+, -, x, ÷)

$$\text{E.g. } f(x) = x^4 + 5x^2 + 2, \quad f(x) = x + \frac{1}{x^2} \text{ etc.}$$

(b) Transcendental :- which are not Algebraic  
i.e. contains log, tan, exponential terms.

$$f(x) = \tan x + \sin^2 x$$

$$\text{fns } \sin x, \quad \text{fns } -\log x + e^{2x}.$$

(ii) Let  $x$  be the number of books.  
and given fixed cost  $F(x) = 15000$ .

Selling price per unit = 60 rupees.

Variable cost per unit = 50 rupees.

P.T.O

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Q2.(ii) Continue . . .

✓ fixed

variable

No.	(a)	The cost function $C(x) = F(x) + V(x)$	Marks
		$C(x) = 15000 + 50x$	f2
	(b)	$R(x) = 60x$	
	(c)	BEP. $P(x) = 0$ or $R(x) = C(x)$	+1

$$60x = 15000 + 50x$$

$$10x = 15000 \quad | \underline{x \Rightarrow 1500} \text{ unit}$$

+2

B.E.P.

$$(15000, 90,000)$$

BEP in super

$$60x \times 1500 = 90,000.$$

$$(iii) \lim_{x \rightarrow 4} \frac{x^4 - 256}{x - 4} \Rightarrow \lim_{x \rightarrow 4} \frac{x^3 - 4^3}{1 - 4} = 4^3 \quad i.e. 4(4) = 4 \cdot 4^3 = 256 \quad 4+ +2 \\ 3. \quad +3$$

(Q) (i) Application of differentiation in Economic and Managerial problem.

The differentiation is a technique to find out the average rate of change in the dependent variable with respect to change in independent variable

$$i.e. y = f(x) \quad \frac{dy}{dx} = f'(x)$$

(1) It helps to find the maximum and minimum values of given function which makes it useful in Economics and management.

(2) We use diff. to estimate the rate, which Demand, Supply, cost, price, charge relative to each other.

(R)

(3) Some of the problems like, what changes happened in revenue with respect to change in price, change of cost with respect to output, Level at which cost is minimum or profit is maximum can be answered through this technique.

+2

(ii)

$$f(x) = \frac{1 - e^x}{1 + e^x}$$

0.	Marks
$f'(x) = \frac{(1+e^x)(-e^x) - (1-e^x)(e^x)}{(1+e^x)^2}$	+2
$= \frac{e^x[-1-e^x-1+e^x]}{(1+e^x)^2} = -\frac{2e^x}{(1+e^x)^2}$	+3
$(iii) \int \frac{(1-x^3)}{x} dx$	+1½
$(1-x)^3 = 1-x^3-3x(1-x)$	+1½
$= \int \frac{1}{x} - x^2 - 3 + 3x$	+1
$= \log(x) - \frac{x^3}{3} - 3x + \frac{3x^2}{2} + C$	+1
<p>Q. 1 (i) Importance in Business.          (any five with explanation)</p> <ol style="list-style-type: none"> <li>1) Planning or organisation</li> <li>2) Location decision</li> <li>3) Size of unit</li> <li>4) Market Analysis</li> <li>5) Production Planning &amp; Control</li> <li>6) Pricing policies.</li> <li>7) Consumption or Production.</li> <li>8) Public finance</li> <li>9) Input Output Analysis</li> </ol>	+2

(9)

Q.(ii)

C.I.	x	f	fx.	fx <sup>2</sup>	Marks
58-60	59	4	236	13924	
61-63	62	30	1860	115320	+3
64-66	65	45	2925	190125	
66-68	67	15	1005	67335	
69-71	70	6	420	29400	
		100	6426	416104	

$$\bar{x} = \frac{6426}{100} = 64.26$$

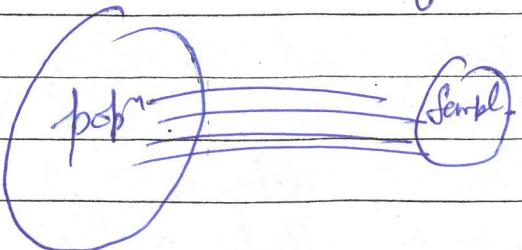
$$\begin{aligned}
 \sigma &= \sqrt{\frac{\sum f_i x_i^2}{N} - (\bar{x})^2} \\
 &= \sqrt{4161.04 - (64.26)^2} \\
 &= \sqrt{31.6524} = 5.626
 \end{aligned}$$

Q.(iii)

population:- A set of observation relating to a phenomenon under statistical investigation. It is ~~study~~

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Q. or A group of object living / Non-living under study  
 Sample :- Part of population. Marks +2



+ 1/2

The characteristics of popn and Sample should be same

- popn
  - 1) whole study
  - 2) finite/ infinite
  - 3) real / hypothetical.
  - 4) constant called parameters
- Ex.  $\mu, \sigma^2$

- | Sample                        | $\mu$ , $\sigma^2$  | + 2 1/2 |
|-------------------------------|---------------------|---------|
| part of popn                  | $\bar{x}, \sigma^2$ |         |
| finite                        |                     |         |
| 3) real.                      |                     |         |
| 4) constant called Statistics |                     |         |
| Ex. $\bar{x}, \sigma^2$ .     |                     |         |

### Q5(i) (a) Trial and Event

Consider an Experiment, which though repeated under essentially identical conditions, does not give unique results but may result in any one of several possible outcomes. The experiment is known as a trial and the outcome are as events.

+2

Q. (i) Throwing a dice is a trial and getting 1, 2, 3, 4, 5, 6 is an event

! tossing coin trial head/tail events.

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(6)

0. (b) Independent and dependent event. Marks

Two or more events are said to be independent when the outcome of one does not affect by another.

Ex. tossing an unbiased coin event of getting head in first toss is independent of another toss. +2

The events which are not independent i.e. happening of one event affects another. problem on without replacement of cards/balls.

(c) Random Experiment:-

An Experiment in which all.

possibilities are known in advance.

but None of them can be said surely.  
(what will come in result after trial).

Ex. Tossing a coin  
not sure head or tail

(i) mean of Binomial N.P.

Variance =  $n p q$

$$N.P.q = 3 \quad N.P = 9 \quad +1$$

$$\frac{N.P.q}{N.P} = \frac{3}{9} \quad q = \frac{1}{3} \quad p+q=1 \quad +2$$

$$p = 1 - \frac{1}{3} = \frac{2}{3} \quad +1$$

$$n \times \frac{2}{3} = 9 \quad n = \frac{9 \times 3}{2} \quad -13.5 \quad +1$$

OR  $n$  must be integer (taken as inconsistent data)  $\approx 13.02/4$ .



Q5.

(iii) Poisson dist<sup>n</sup>

Marks

$$\text{Mean} = \frac{\sum fx}{\sum f} = \frac{113}{116} = 0.974.$$

+  $\frac{1}{2}$

$$\text{Poisson mean} = \lambda = 0.974$$

$$x \quad f_0 \quad fx \quad f_e(x) = N \cdot P(x)$$

$$0 \quad 46 \quad 46 \quad \frac{116 \times e^{-0.974} (0.974)^0}{1! \quad 43.8} =$$

$$1 \quad 38 \quad 38 \quad \frac{116 \times e^{-0.974} (0.974)^1}{1! \quad 42.66} =$$

$$2 \quad 22 \quad 44 \quad \frac{116 \times e^{-0.974} (0.974)^2}{2! \quad 20.78} =$$

+ 3

$$3 \quad 9 \quad 27 \quad \frac{116 \times e^{-0.974} (0.974)^3}{3! \quad 6.74} =$$

$$4 \quad 1 \quad 4 \quad \frac{116 \times e^{-0.974} (0.974)^4}{4! \quad 1.64} =$$

$$\overline{116} \quad \overline{113}$$

$$\text{here } P(x) = \frac{e^{-\lambda} \lambda^x}{x!}$$

+  $\frac{1}{2}$

put  $x=0, 1, 2, 3, 4$ . get  $P(0)$

$P(1), P(2), P(3), P(4)$ .

A.  $43.8, 42.66, 20.78, 6.74, 1.64$ .

(8)

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Q6)

Years	Sales	5-yearly moving total	5-yearly moving average	Marks
1982	110			
1983	160			
1984	215	110 + 160 + 215 + 290 + 345	$\frac{1120}{5} = 224$	
1985	290	160 + 215 + 290 + 345 + 456	$\frac{1466}{5} = 293.2$	
1986	345	215 + 290 + 345 + 456 + 546	$\frac{1852}{5} = 370.4$	+ 2
1987	456	290 + 345 + 456 + 546 + 657	$\frac{2294}{5} = 458.8$	
1988	546	345 + 456 + 546 + 657 + 748	$\frac{2752}{5} = 550.4$	
1989	657	456 + 546 + 657 + 748 + 879	$\frac{3286}{5} = 657.2$	+ 2
1990	748	546 + 657 + 748 + 879 + 829	$\frac{3669}{5} = 733.8$	
1991	879	657 + 748 + 879 + 839 + 900	$\frac{4023}{5} = 804.6$	
1992	839	748 + 879 + 839 + 900 + 945	$\frac{4311}{5} = 862.2$	
1993	900	879 + 839 + 900 + 945 + 990	$\frac{4553}{5} = 910.6$	+ 1
1994	945			
1995	990			

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### Q6 (ii) Time series :

Marks

Time series is the study of statistical data with reference of time. or A time series is a set of statistical data in chronological order.

Some examples are The population of a town in different years, Deposits received by bank in a year, The monthly sales of mobiles for last 6 months, The annual production of some crop in India over the last ten years.

+2

#### Utility / application

1) It enables us to predict or forecast the behavior of phenomenon in future which is very important in planning of business.

2) It helps in making comparative studies in the values of different phenomenon at diff time or place.

3) It provides evaluation of current achievement by review and evaluation of progress.

4) It helps in the analysis of past behavior of some criteria under study.

5) On the basis of the past performance of the various sectors of economy, one can determine future requirements and a suitable policy can be formulated to get desired objectives.

+1

+2