I Semester M.B.A. (Day/Evening) Degree Examination, Jan./Feb. 2006
(Updated Scheme)
MANAGEMENT
1.3 : Mathematics and Statistics

Time: 3 Hours | Max. Marks: 75

***Instruction** : Calculators and Statistical Tables are **allowed**.*

SECTION – A

Answer **any six** questions : **(6×2=12)**

1. a) How is statistics useful in managerial decision-making ?
   b) What is correlation ? What is its significance ?
   c) What are the statistical techniques of business forecasting ?
   d) What do you understand by regression analysis ?
   e) What are averages ? How are they useful ?
   f) What do you understand by measures of dispersion ?
   g) Find the sum of the first 20 terms of an AP, 2, 5, 8, ...
   h) Give one example for each of the following :
      i) Linear function
      ii) Geometric progression.
   i) Find the sum of the first 8 terms of a G.P. 4, 8, 16, ...

SECTION – B

Answer **any four** questions : **(4×5=20)**

2. Briefly explain the procedure for sitting up and testing of a hypothesis.

3. In an intelligence test administered to 500 students, the average score was 42 and standard deviation was 24. Find :
   a) The number of students whose score exceeded 50.
   b) The number of students who got a score between 30 and 40.
   c) The number of students who got a score above 60.

4. 2000 families of a city were selected at random to test the belief that familie with higher income bought the sedan-type of car and families with lower incom bought the small car. Given the following results, use the chi square test t find out if the belief is true :

Income	Sedan type of car	Small car	Total
High	594	606	1200
Low	262	538	800
Total	856	1144	2000

5. Fit a straight line trend by the method of least squares to the data given belov and project the probable sales for the next two years : (A graph is not necessary)

Year	1999	2000	2001	2002	2003	2004
Sales (in Thousands of Rupees)	164	180	186	187	190	192

6. Calculate whether there is any correlation between the salaries and the amoun spent on car maintenance. Use Karl Pearson's method for correlation, determin the probable error and comment on the significance of correlation :

Average Salary in Rs.	10,000	12,000	15,000	18,000	20,000
Car Maintenance in Rs.	750	900	1,200	1,500	2,000

7. a) If the opening stock matrix is $\rightarrow \begin{vmatrix} 3 & 5 \\ 4 & 2 \end{vmatrix}$, the closing stock matrix is $\rightarrow \begin{vmatrix} 2 & 3 \\ 3 & 2 \end{vmatrix}$, the sales unit matrix is $\rightarrow \begin{vmatrix} 4 & 3 \\ 3 & 4 \end{vmatrix}$, the sales price per uni is Rs. 2 per unit, find the purchases matrix.

   b) The share prices of share C in a week were 52, 55, 54, 49, 47 and 51, whereа the share prices of share D in that week were. 75, 74, 69, 77, 80, 72 and 76 Find out which share is more stable in price fluctuations.

SECTION – C

Answer **any three** questions : **(3×10=30**

8. What is sampling ? Explain the various methods of sampling.

9. Obtain the regression equations for the following data :

Operator	A	B	C	D	E	F	G	H
Experience in years (X)	17	13	19	5	4	11	6	14
Production in units day (Y)	86	87	88	67	77	79	74	82

10. Calculate fisher's ideal index and test for the factor reversal test and the time reversa test for the following data :

Commodity	**A**	**B**	**C**	**D**	**E**
P_0	30	32	30	31	32
Q_0	95	115	120	125	125
P_1	22	24	25	27	28
Q_1	215	220	219	222	224

11. The cost function is given as $C = 6x^3 + 4x^2 + 2$, find, if x = Rs. 8,
    a) The average cost function and the average cost.
    b) The marginal cost function and the marginal cost.
    c) The revenue function if the price per unit is Rs. 250 and the revenue.
    d) The profit function and the profit.

12. A company has 5 showrooms in 5 cities selling the same model of car. The number of cars sold over 4 months is given below. Using ANOVA, advice the company whether there is a significant difference in the sales among the different showrooms.

Months	Showroom A	Showroom B	Showroom C	Showroom D	Showroom E
September	8	9	7	6	9
October	10	11	8	9	9
November	8	10	9	11	10
December	7	10	8	9	9

SECTION – D

Case Study :

13. An investor has 3 options to invest, but he can invest in only one option at a time. He can invest either in a departmental store, a cold storage or in a car maintenance shop.

If he invests in a departmental store and succeeds, he can invest in the cold storage, and if he succeeds, be can invest in the car maintenance shop.

If he invests in the cold storage and succeeds, he can invest in the car maintenance shop and if he succeeds, he can invest in the departmental store.

If he invests in the car maintenance shop, and succeeds, he can invest in the cold storage and if he succeeds, he can invest in the departmental store. Based on the data given below, draw a decision tree and advice the investor on the best decision to take.

	Probability of success	Investment	Loss on failure
Departmental Store	0.65	8,00,000	45,000
Cold storage	0.60	7,50,000	40,000
Car maintenance shop	0.70	7,40,000	3,50,000

PD – 612

I Semester M.B.A. (Day/Evening) Degree Examination, January/February 2007
(Updated Scheme)
MANAGEMENT
1.3 : Mathematics and Statistics

Time: 3 Hours Max. Marks: 75

Instruction : *Calculators and Statistical Tables are* ***allowed.***

SECTION – A

Answer **any six** questions : **(6×2=12)**

1. a) Explain types of correlation.

   b) What are the types of classification of data ?

   c) Differentiate primary data and secondary data.

   d) What is classical theory of probability ?

   e) What are the components of time series ?

   f) What is a decision tree ?

   g) Find the sum of first 10 terms in an AP 2, –5, –12, –19.

   h) The sum of the first 8 terms of G.P. with the first term 25 and common ratio of $-\frac{1}{5}$ is ——— . Fill in the blank.

   i) Find the determinant of the matrix $A = \begin{bmatrix} 3 & -2 & 1 \\ 1 & 0 & 1 \\ 2 & 7 & 8 \end{bmatrix}$

P.T.O.

SECTION – B

Answer **any four** questions : (4×5=20

2. Explain various sampling methods.

3. City residents were surveyed recently to determine the readership of newspapers available. 50% of the residents read the morning newspaper, 60% read the evening paper, and 20% read both newspapers. Find the probability that a resident selected reads either the morning or evening paper.

4. Solve the following equations for x_1, x_2, x_3 using inverse method

   $3x_1 - 2x_2 + x_3 = 7$

   $4x_1 + 5x_2 - 3x_3 = 10$

   $11x_1 + 8x_2 - 5x_3 = 27$

5. The following data relate to the age of 10 employees and the number of days on which they reported sick in a month.

Age	20	30	32	35	40	46	52	55	58	62
Sick days	1	2	0	3	4	6	5	7	8	9

   Calculate Karl Pearson's coefficient of correlation and interpret it.

6. Fit a straightline trend to the following data :

Year	1991	1992	1993	1994	1995
Sale of sugar ('000 kgs)	80	90	92	93	94

7. A sample of 200 people with particular disease was selected. Out of these, 100 were given a drug and the others were not given any drug. The results are as follows.

	Number of People	
	Drug	**No drug**
Cured	65	55
Not cured	35	45

   Test whether the drug is effective or not.

SECTION – C

Answer **any three** questions : **(3×10=30)**

8. In a Post Office, three clerks are assigned to process incoming mail. The first clerk process 40%, second 35% and the third 25% of the mail. The first clerk has an error rate of 0.04, the second has 0.06 and the third has 0.03. A mail selected at random from a day's output is found to have an error. The Post Master wishes to know the probability that the mail was processed by the first, second or third clerk respectively.

9. Obtain two regression equations for the following data

X	30	50	20	80	10	20	20	40
Y	50	80	30	110	20	20	40	50

10. Construct Laspeyres, Paasche's and Fisher's ideal index for the following data

	1987		**1988**	
	Price	**Quantity**	**Price**	**Quantity**
A	2	8	4	6
B	5	10	6	5
C	4	14	5	10
D	2	19	2	13

11. a) The market supply function of a commodity is $q = 80 + 4P$ where q denotes the quantity supplied and P denotes the market price. The unit production cost is Rs. 1.50. The Government feels that a total profit of Rs. 240/- is desirable. What is the price that the farmer has to receive so that he can realize this profit.

    b) A firm produces a single product and it can market as many units as it is able to produce at a price of Rs. 1.75. Its plant and equipment can produce as many as 5000 units a day. The total fixed cost is Rs. 2,000 daily. Unit variable cost is Rs. 0.50. How many units per day must be produced in order that the firm breaks even ?

12. The screws produced by a certain machine were checked by examining number of defectives in a sample of 12. The following table shows the distribution of 128 samples according to the number of defective items they contained.

No. of defectives in a sample of 12	0	1	2	3	4	5	6	7	Total
No. of samples	7	6	19	35	30	23	7	1	128

Fit a Binomial distribution and find the expected frequencies if the chance of machine being defective is $\frac{1}{2}$.

SECTION – D **(Compulsory)**

13. The following represent the number of units of production per day turned out by 4 different workers using 5 different types of machines. **13**

Machine Type

Workers	**A**	**B**	**C**	**D**	**E**
1	4	5	3	7	6
2	6	8	6	5	4
3	7	6	7	8	8
4	3	5	4	8	2

On the basis of this information, can it be concluded that

a) The mean productivity is the same for different machines

b) The workers don't differ with regard to productivity ?

I Sem. M.B.A. Examination, January 2008
(2007-08 Scheme)
Paper – 1.5 : BUSINESS ADMINISTRATION
Business Mathematics and Analytics

Time : 3 Hours Max. Marks : 75

Instruction : *Calculators and tables are* ***allowed***

SECTION – A

Answer **any 6** questions. **Each** question carries **2** marks. **(2×6=12)**

1. a) What is dispersion ? What is the purpose of a measure of dispersion ?
   b) What is skewness ? What are the different measures of skewness ?
   c) How will you interpret the sign and magnitude of a correlation coefficient ?
   d) List the chief properties of a normal distribution.
   e) What is a sign test ? When is it used ?
   f) In which context is the Mann Whitney U Test used ?
   g) What is kurtosis ? Explain the three different curves under kurtosis.
   h) What is Binomial distribution ? What are its business applications ?

SECTION – B

Answer **any 3** questions. **Each** question carries **8** marks. **(3×8=24)**

2. a) If $A = \begin{vmatrix} 6 & 1 & 9 \\ 3 & 4 & 2 \\ 7 & 5 & 8 \end{vmatrix}$ and $B = \begin{vmatrix} 3 & 9 & 1 \\ 2 & 6 & 3 \\ 4 & 5 & 7 \end{vmatrix}$

   find $2A + 4B$.

   b) Explain the method of moving averages in calculating the trend. What are the merits and limitations of this method ?

3. a) Fit a straight line trend by the method of least squares to the following data and project the production for the next two years : (A graph is not necessary).

Year	2002	2003	2004	2005	2006
Production in metric tonns	45	45	47	48	52

P.T.O.

b) A candidate has to be selected for a managerial post with the following characteristics :

An MBA degree (probability of getting such a candidate is one in hundred).

Excellent communication skills (probability is one in fifty).

Knowledge of a foreign language (probability is one in eighty).

Experience of working as a manager (probability of getting such a candidate is one in 20).

Find the probability of getting the required candidate.

4. KMF wishes to test whether the preference pattern of Bangalore consumers for different kinds of milk is dependent on income levels. A random sample of 1200 consumers gives the following data. Use the chi square test and determine whether the preference patterns are independent of income levels.

Income	Type of milk preferred		
	Low fat	Medium fat	High fat
Low	100	225	25
Medium	125	75	150
High	75	150	275

5. a) Explain the procedure of setting up and testing a hypothesis.

b) An aptitude test for selecting Management Trainees was conducted on 5000 candidates. The average score was 56 and the standard deviation was 24. Assuming normal distribution for the scores, find :

a) The number of candidates whose scores exceeded 85.

b) Candidates who scored between 65 and 70.

c) Candidates who scored less than 50.

d) Candidates who scored 60.

6. Find Karl Pearson's coefficient of correlation, the probable error and comment on the significance of correlation for the following data :

Advertisement expenses in 00,000 Rs.	15	18	19	20	22	24	25
Sales in 00,000 Rs.	24	26	26	27	28	28	30

SECTION – C

Answer **any 2** questions. **Each** question carries **12** marks. **(2×12=24)**

7. What is business forecasting ? Explain the various techniques of forecasting. Explain the major steps in forecasting. What are the limitations of forecasting ?

8. a) What is a decision tree ? What are the steps in decision tree analysis ?

   b) A manufacturer is faced with 2 alternatives about his products :
   A) Modify existing product or
   B) Produce and market a new product.

   The consequences of the above are :

Alternative	Initial demand Probability		Pay off on high demand
	High	Low	
A	0.6	0.4	5 lakhs
B	0.5	0.5	7 lakhs

The first stage choice leads to further choices only when the demand turns out to be low. Details of this second stage are :

I Stage choice	II Stage alternative	Final Demand	Probability	Pay off Rs. in lakhs
A	Reduce price	Low	0.3	0.4
		High	0.7	1.7
	Increase price	Low	0.8	0.6
		High	0.2	2.25
B	Reduce price	Low	0.2	0.50
		High	0.8	1.25
	Increase price	Low	1.0	0.80
		High	0	2.00

Construct a decision tree and a payoff table. Advice the manufacturer on the best course of action.

9. Construct index numbers of price from the following data by applying :
   1) Laspeyres Method
   2) Paasche Method
   3) Bowley's Method
   4) Marshal Edgeworth Method

   Also find Fischer's ideal index and test it for factor reversal and time reversal tests.

Commodity	P_0	Q_0	P_1	Q_1
A	12	18	14	16
B	15	20	16	15
C	14	24	15	20
D	13	29	12	23
E	11	28	13	21

SECTION – D

Case Study

This is a **compulsory** question. **15**

10. Four judges of a soft skills assessment test gave the following marks to six candidates. Using ANOVA test whether there is a significant difference in
    a) the performance of the six candidates
    b) the judgement of the four judges.

Judges	Candidates					
	A	B	C	D	E	F
1	11	12	11	12	13	13
2	13	13	11	13	12	12
3	3	12	12	14	13	12
4	14	15	13	16	14	12

PG – 770

I Semester M.B.A. (Day) Examination, January 2009
(2007-08 Scheme)
MANAGEMENT
1.5 : Business Mathematics and Analytics

Time : 3 Hours Max. Marks : 75

Instruction : *Calculators and tables are* ***allowed.***

SECTION – A

Answer **any 6** questions. **Each** question carries **2** marks. **(2×6=12)**

1. a) Distinguish between 'maxima and minima'.
   b) List out the characteristics of statistics.
   c) What are the limitations of binomial distribution ?
   d) What is decision making under uncertainty ?
   e) What are the advantages of stratified random sampling ?
   f) What is standard error ?
   g) What is index number ?
   h) What is correlation ?
   i) What is regression ?

SECTION – B

Answer **any three** questions. **Each** question carries **8** marks. **(3×8=24)**

2. a) Explain addition, subtraction and multiplication of matrices with examples.
   b) From the following information determine the units to be manufactured in order to earn maximum profit.

   $T_C = 0.000\ 8x^2 + 3.4\ x + 25{,}000$ and $TR = -\ 0.001\ x^2 + 25\ x$.

P.T.O.

3. a) What is a statistical average ? State the properties of a good average.

   b) Five students P, Q, R, S and T are given a problem to solve. The probabilities are $P-\frac{1}{3}$, $Q-\frac{1}{5}$, $R-\frac{1}{6}$, $S-\frac{1}{8}$ and $S-\frac{1}{9}$ of solving the problem. What is the probability that the problem will be solved ?

4. a) With an example of your own, discuss the research design of a proposed survey.

   b) For a group of 20 items, $\sum X = 1452$, $\sum X^2 = 144280$ and mode = 63.7. Find the Pearsonian coefficient of skewness.

5. The mean and standard deviation of marks obtained by the candidates in a competitive examination are 50 and 15 respectively. If 1200 candidates appear for the examination, find :

   a) The number of candidates who are expected to score more than 70.

   b) The expected number of candidates who score between 60 and 75 marks.

   c) The number of candidate who may score less than 40 marks.

   d) The number of candidates who may score between 35 and 55 marks.

6. Using the following data, show that Fisher's index satisfies time reversal test and factor reversal test.

Item	2005		2007	
	Price	Quantity	Price	Quantity
P	5	6	6	7
Q	7	12	6	13
R	6	15	8	15
S	8	10	8	12

SECTION – C

Answer **any two** questions. **Each** question carries **12** marks. **(2×12=24)**

7. a) Explain the applications of statistics in managerial decision-making. Also discuss the limitations of statistics.

   b) What is sampling ? Why is it important ? Discuss the methods of sampling.

8. A businessman has two independent investments A and B available to him, but he lacks the capital to undertake both of them simultaneously. He can choose to take A first and then stop or if A is successful, then take B or vice-versa. The probability of success on A is 0.7, while for B, it is 0.4. Both investments require an initial capital outlay of Rs. 20,000 and both return nothing if the venture is unsuccessful. Successful completion of A will return Rs. 30,000 (over cost), whereas successful completion of B will return Rs. 50,000 (over cost). Draw the decision tree and determine the best strategy.

9. a) ABC Ltd. gives the following information relating to the sales of refrigerators in the past ten years :

Years	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Refrigerators sold in thousands:	8	10	11	11	18	15	19	19	22	24

   Fit a straight line trend by the method of least squares and estimate the sales for 2009.

   b) Calculate the coefficient of correlation and the probable error and comment on the significance of correlation for the following data :

X	6	7	7	9	10	12
Y	18	16	17	19	19	21

SECTION – D
(Case Study)

This is a **compulsory** question. 15

10. A study was carried out on the advertising methods of a brand of product. The unit sales achieved by five stores were recorded as under :

	Store A	Store B	Store C	Store D	Store E
Method – I	78	85	82	88	79
Method – II	93	87	85	85	85
Method – III	81	92	77	83	81
Method – IV	79	83	71	78	78

Calculate the F-ratio, using ANOVA and 5% level of significance. Establish whether a) four methods of advertisement produce different effects on the sales volumes and b) there is a significant difference between the sales in the different stores.

PG – 693

I Semester M.B.A. (Day) Examination, March 2011
(2007-08 Scheme)
MANAGEMENT
Paper – 1.5 : Business Mathematics and Analytics

Time : 3 Hours

Max. Marks : 75

SECTION – A

Answer **any six** questions. **Each** question carries **two** marks. **(2×6=12)**

1. a) List the uses of statistics.
   b) What is the sign test ?
   c) What are Index Numbers ?
   d) What is a null hypothesis ?
   e) Define Integration.
   f) What is Binomial distribution ?
   g) What is meant by level of confidence ?
   h) What is cluster sampling ?

SECTION – B

Answer **any three** questions. **Each** question carries **eight** marks. **(3×8=24)**

2. a) Why is statistics called imposing mathematics ?
   b) Following are the marks obtained by two students 'A' and 'B' in 10 tests of 100 marks each.

Tests	1	2	3	4	5	6	7	8	9	10
A	44	80	76	48	52	72	72	51	60	54
B	48	75	54	60	63	69	72	51	57	66

Find who is better in studies and if consistency is the criterion for awarding a prize, who should get the prize ?

P.T.O.

3. Using the chi square test, analyse the following data to determine whether the preference pattern of consumers for cell phones is dependent on income levels.

Cell phones	Low	Medium	High	Total
Nokia	65	90	100	255
Motorola	35	40	80	155
Ericcson	50	60	220	330
Total	150	190	400	740

4. a) In an AP of 3, 9, 15, ... find the (i) sum of the first 14 terms and (ii) the twelth term ?

   b) P and Q play for a prize of Rs. 1,00,000. P is to throw a dice first and is to win if he throws 1. If he fails, Q is to throw and is to win if he throws 1 or 2. If he fails, P is to throw again and is to win if he throws 1, 2 or 3. Find their respective expectations.

5. The average monthly sales of 5000 firms are normally distributed. It mean and standard deviation are Rs. 36,000 and Rs. 10,000 respectively. Find :

   i) The number of firms the sales of which are over Rs. 40,000.

   ii) Percentage of firms the sale of whill will be between Rs. 38,500 and 41,000.

   iii) The number of firms the sales of which will be between Rs. 30,000 and Rs. 40,000.

   iv) The number of firms the sales of which are less than Rs. 30,000.

6. Determine the regression equation X on Y and Y on X for the following data :

X	12	14	16	20	32
Y	34	40	38	42	50

SECTION -- C

Answer **any two** questions. **Each** question carries **twelve** marks. **(2×12=24)**

7. a) What do you mean by sampling errors ? Explain the types of sampling errors.

   b) Illustrate skewness with diagram given $Q_1 = 18$, $Q_3 = 35$, Mode = 21, Mean = 18, find the coefficient of skewness.

8. a) Is it important for the chosen samples to be representative of the population. Using the various methods of sampling, explain how representativeness can be achieved.

   b) Elaborate on how a decision tree and the payoff-EMV concepts are useful in managerial decision making.

9. a) The following are the annual profits, in thousand of rupees, in a certain business :

Year	2001	2002	2003	2004	2005	2006	2007
Profits (Rs. 000)	60	72	75	65	80	85	95

   i) Use the method of Least Squares to fit a straight line to the above data.

   ii) Also make an estimate of the profits for the year 2009.

   b) Find the coefficient of correlation with the help of Karl Pearson's Method.

X	43	44	46	40	44	42	45	42	38	40	42	57
Y	29	31	19	18	19	27	27	29	41	30	26	10

SECTION – D

This is a **compulsory** question. **(1×15=15)**

10. Calculate the consumer price index by the method of (a) Aggregate expenditure and (b) Family budget for the given data :

Commodity	Quantity in 2009	Price in 2009	Price in 2010
A	100	8	12.00
B	25	6	7.50
C	10	5	5.25
D	20	48	52.00
E	25	15	16.50
F	30	9	27.00

PG – 123

I Semester M.B.A. (Day) Degree Examination, February 2012
(2007-08 Scheme)
MANAGEMENT
Paper – 1.5 : Bumastics

Time : 3 Hours Max. Marks : 75

SECTION – A

Answer **any six** of the following. **Each** question carries **two** marks. **(2×6=12)**

1. a) What are transposed determinants ?
   b) What do you mean by uncertainty risk in decision tree ?
   c) Define snow ball sampling.
   d) What is difference between colinear and cojoint variable ?
   e) What do you mean by lag correlation ?
   f) Define Bay's Theorem.
   g) Differentiate between level of significance and confidence intervals.
   h) Define Anova.

SECTION – B

Answer **any three** of the following. **Each** question carries **eight** marks. **(3×8=24)**

2. Differentiate between parametric and non parametric test.

3. Urn – 1 contains, 5 red and 5 black balls, urn – 2 contains 4 red and 8 black balls and urn – 3 contains 3 red and 6 black balls. One urn is chosen at random and a ball is drawn. The colour of the ball is black. What is the probability that it has been drawn from urn – 3.

4. For the matrix $P = \frac{1}{3}\begin{pmatrix} 1 & 2 & 2 \\ 2 & 1 & -2 \\ -2 & 2 & -1 \end{pmatrix}$ verify that $pp' = 1 = p'p$. Where p' is transpose of P and I is the unit matrix of order 3. Hence write down the inverse of P.

5. Explain the basic assumptions on which the decision tree analysis is based. What are the critical factors the appraiser will have to take into consideration while adopting this method.

P.T.O.

6. Write short notes on the following concepts :
   a) Rules of addition and multiplication in theory of probability.
   b) Distinction between correlation and regression.
   c) Explain Skewness and kurtosis with a suitable diagram.
   d) Meaning of any two non-parametric tests and their uses.

SECTION – C

Answer **any two** of the following. **Each** question carries **12** marks. **(2×12=24)**

7. Compute the two regression equations from the data :

x	27	30	42	19	25	30
y	31	27	47	12	19	33

   If x = 28, what is the value of y.

8. Describe various probability and non probability sampling techniques used.

9. Calculate a set of moving averages of period :
   a) 3 b) 5 for the following time series data :
   8, 11, 10, 21, 4, 9, 12, 10, 23, 5, 10, 13, 11, 26, 6 which set of moving averages is the correct one to use for obtaining a trend for the series.

SECTION – D **(1×15=15)**

10. The following is the information pertaining to the sample psychological health ratings of corporate executives in the field of Banking, Manufacturing and Fashion retailing.

Banking	41	53	54	55	43
Manufacturing	45	51	48	43	39
Fashion Retailing	34	44	46	45	51

    Can we consider the psychological health of corporate executives in the given three fields to be equal at 1% and 5% level of significance.
    Draw the necessary hypothesis to prove your argument.

PG – 681

I Semester M.B.A. (Day) Degree Examination, February/March 2013
(2007-2008 Scheme)
MANAGEMENT
Paper – 1.5 : Business Mathematics and Analytics

Time : 3 Hours Max. Marks : 75

SECTION – A

Answer **any six** questions. **Each** sub question carries **two** marks. **(2×6=12)**

1. a) What are matrices ?
   b) Define statistics.
   c) What is Baye's theorem.
   d) What is Poisson distribution ?
   e) What is decision making under risk ?
   f) What is Mann Whitney test ?
   g) What is meant by the secular trend ?
   h) What is kurtosis ?

SECTION – B

Answer **any three** questions. **Each** question carries **eight** marks. **(3×8=24)**

2. a) What is a measure of dispersion ? Discuss four important measures of spread indicating their uses.
   b) Following are the records of two players regarding their performance in cricket matches.

Score of Player A	48	52	55	60	65	45	63	70
Score of Player B	33	35	80	70	100	15	41	25

   i) Which player has scored more on an average ?
   ii) Which player is more consistent in his performance ?

P.T.O.

3. The owner of a solar heater is examining the number of solar homes started in the region in each of the last seven months. Develop the linear equation of trend by the method of least squares and find out the number of homes with solar heaters in April, May, June and July.

Month	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	March
Number of Homes	15	15	26	27	33	41	51

4. For the following contingency table :

   a) Construct a table of observed and expected frequencies.

   b) Calculate the Chi square statistic.

   c) State the Null and alternative hypothesis.

   d) Using 0.05 level of significance, derive the analysis.

   The data given below is regarding in favour of, against and indifferent to a National Policy on FDI.

Occupation	Favour of	Against	Indifferent	Total
Social Workers	80	30	10	120
Lawyers	70	60	20	150
University Students	50	50	30	130
Total	200	140	60	400

5. a) A can solve 90 per cent of the problems given in a book and B can solve 70 per cent. What is the probability that at least one of them will solve a problem selected at random ?

b) If the height of 300 students is normally distributed with mean 68 inches and standard deviation 2 inches, how many students have height.

a) Greater than 72 inches

b) Between 65 and 71 inches inclusive.

6. A manufacturing company produces four products A, B, C and D. Each product is made from raw materials P, Q and R. One unit of A requires 2 units of P, 1 unit of Q and 4 units of R. One unit of B requires 5 units of P and 3 units of R. One unit of C requires 4, 3 and 2 units of P, Q and R respectively and one unit of D requires 4, 1 and 2 units of P, Q and R respectively.

Find in matrix form :

a) The total cost of materials consumed

b) The total production cost

c) Total sales and

d) Total contribution.

SECTION – C

Answer **any two** questions. **Each** question carries **twelve** marks. **(2x12=24)**

7. Construct the cost of living index, calculate Fisher's ideal index and prove the time reversal and factor reversal tests for the following data :

Commodity	2010 Price	2010 Quantity	2011 Price	2011 Quantity
A	16	40	30	40
B	20	60	25	50
C	8	120	15	120
D	4	100	5	100
E	12	50	10	60

8. Perform ANOVA and decide whether the mean productivity is the same or differs among workers.

Workers	Machine Type			
	A	B	C	D
1	40	36	48	38
2	52	44	52	42
3	35	38	45	36
4	48	32	45	34
5	40	40	50	40

Test at significance levels of 5% and 1%.

9. Write short notes on the following :
   a) Process of testing a hypothesis.
   b) Non Parametric tests
   c) Decision Tree analysis
   d) Importance of interpretation of statistical data in research.

SECTION – D

Compulsory case study. **(1×15=15)**

10. A financial manager speculates the relationship between family incomes and their allocation for investment. You are required to calculate the coefficient of correlation for the given data and advise him regarding the significance of the calculated correlation.

    Further calculate the estimating equations so that you can advise him on :

    a) The per cent allocation of investment that a family earning 25 lakhs annually would decide on and.

    b) What would be the probable annual income of a family allocating 18 percent for investment.

Annual Income in '00,000 Rs.	8	12	10	24	14	13	38	11	16
Per cent allocation for Investment	36	25	34	15	28	30	19	21	22

PG – 806

I Semester M.B.A. (Day) Examination, February/March 2014
(2007-08 Scheme)
MANAGEMENT
Paper – 1.5 : Business Mathematics and Statistics

Time : 3 Hours Max. Marks : 75

Instructions : * *Calculators and appropriate statistical tables are* ***allowed.***
* *Provide the graph sheets.*

SECTION – A

Answer **any six** of the following. **Each** sub-question carries **two** marks. **(6×2=12)**

1. a) Define "diagonal matrix".
   b) What do you mean by the term ratio ?
   c) What is dispersion ? Why is it important ?
   d) State the classical theory of probability.
   e) What is lag and lead in correlation ?
   f) Distinguish between point estimation and interval estimation.
   g) What is meant by ANOVA ?
   h) What are the business uses of index numbers ?

SECTION – B

Answer **any three** questions. **Each** question carries **eight** marks. **(3×8=24)**

2. Explain the role of Statistics in managerial decision-making. Illustrate with examples.

3. What is sampling ? Explain the different methods of sampling.

P.T.O.

4. The total cost and total revenue functions for a product are :

   $TC_{(x)} = 300 + 20x + 0.1x^2$ and $TR_{(x)} = 60x$.

   Using the marginal approach, determine the profit maximizing level of output. What is the maximum profit ?

5. From the following data, find the straight line trend and forecast the production figures for the next two years of a certain company

Year	2006	2007	2008	2009	2010	2011	2012	2013
Production in '000 Kgs	64	70	82	68	75	88	90	94

   A graph is necessary.

6. In a certain company training was provided to employees in interpersonal skills to avoid conflicts. From the following data determine whether the training was effective. You may use a 5 percent significance level :

Details	**Involved in Conflicts**	**Not involved in Conflicts**
Trained	884	425
Not trained	266	198

SECTION – C

Answer **any two** questions. **Each** question carries **12** marks. **(2×12=24)**

7. Explain addition, subtraction, division and multiplication of matrices with examples.

8. Find the correlation coefficient and the regression equations for the following data :

X	12	24	30	45	56	70	83
Y	29	31	44	56	72	88	90

9. Construct Laspeyres, Paasche's and Fisher's ideal index for the following data and prove that Fisher's ideal index satisfies the time reversal and factor reversal tests.

	2012		2013	
Commodity	**Price**	**Quantity**	**Price**	**Quantity**
A	2	8	4	6
B	5	10	6	5
C	4	14	5	10
D	2	19	2	13

SECTION – D
(Compulsory) **(1×15=15)**

10. The following represent the number of units of production per day turned out by four different workers using five different types of machines.

	Machine Type				
Workers	**A**	**B**	**C**	**D**	**E**
1	4	5	3	7	6
2	6	8	6	5	4
3	7	6	7	8	8
4	3	5	4	8	2

On the basis of this information, can it be concluded that

a) The mean productivity is the same for different machines ? and

b) The workers do not differ with regard to their productivity ?

You may use a 5 per cent significance level.

PG – 1124

I Semester M.B.A. Degree Examination, February 2016
(2007-2008 Scheme)
MANAGEMENT
Paper – 1.5 : Business Mathematics and Analytics

Time : 3 Hours Max. Marks : 75

***Instruction** : Calculators and appropriate statistical tables are **allowed**.*

SECTION – A

Answer **any six** sub questions. **Each** sub question carries **two** marks. **(6×2=12)**

1. a) What are measures of central tendency ?
   b) What is kurtosis ?
   c) What is Poisson's distribution ?
   d) What is Baye's theorem ?
   e) What is uncertainty and risk ?
   f) What is meant by confidence level ?
   g) What is lag and lead in correlation ?
   h) What is the linear trend ?

SECTION – B

Answer **any three** questions. **Each** question carries **eight** marks. **(3×8=24)**

2. What are non parametric tests ? Explain in detail with their managerial applications.

3. a) If $A = \begin{vmatrix} 6 & -3 & 2 \\ 8 & 3 & -1 \\ 1 & -4 & 2 \end{vmatrix}$, $B = \begin{vmatrix} 3 & 2 & 4 \\ 1 & 6 & 9 \\ 8 & 3 & 2 \end{vmatrix}$ and $C = \begin{vmatrix} -1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{vmatrix}$. Find $3A + 2B - C$.

   b) In a class of 150 students appearing for a test, the mean marks they got were 60. If the variance was 36, find how many students got,
      a) Between 70 and 75 marks ?
      b) Between 55 and 58 marks ?
      c) Above 72 marks ?
      d) Less than 53 marks ?

P.T.O.

4. A training school imparted disaster management skills to local citizens in a certain city. A survey was undertaken to find whether citizens found these skills useful and helped during a local fire. Based on the data collected and given below and using chi square analysis with a significance level of 5 per cent, determine whether the said training schools attempts at training were effective or not.

Details	Helped in crisis	Did not help in crisis	Total
Trained	850	760	1610
Not trained	630	542	1172
Total	**1480**	**1302**	**2782**

5. Find the straight line trend from the following data and forecast the sales figures for the next two years of a certain corporation.

Year	2006	2007	2008	2009	2010	2011	2012	2013
Sales in 00,000 Rs.	167	189	210	194	186	220	225	238

A graph is necessary.

6. What is meant by a null hypothesis ? How is it set up ? Explain the procedure for setting up a hypothesis, by explaining with necessary illustrations, the concepts of one tailed and two tailed tests, significance levels of 1 per cent and five per cent and the Type I and Type II errors.

SECTION – C

Answer **any two** questions. **Each** question carries **twelve** marks. **(2x12=24)**

7. Construct index numbers of price and quantity through the following methods :
   a) Laspeyer's
   b) Paasche
   c) Fischer
   d) Marshall Edgeworth
   e) Kelly.

   Prove that the Fischer's ideal index satisfies the time reversal and factor reversal tests, with the below given data :

Commodity	p_0	p_1	q_0	q_1
A	6	9	8	9
B	19	20	10	10
C	24	25	12	14
D	16	22	15	15
E	30	32	20	22
F	25	26	20	21

8. a) For the data given below, find the coefficient of correlation. Find the probable error and determine the significance of the correlation. Also find the range within which the correlation coefficient may lie.

Age	18	24	30	45	50	60	75
Motor Neuro Skills in digits	142	144	150	140	140	130	120

b) Find the two regression equations for the following data. Also find the name of Y when X = 25 and 30. Find the value of X when Y = 124 and 118.

X	27	29	34	32	36	38	42
Y	110	115	112	110	120	125	130

9. a) What is sampling ? Explain the different sampling methods with their managerial applications.

b) A team leader needs to be selected from among the members of a team. The members of the team consist of ten people with the following profits

1) Lady aged 40 years.
2) Man, aged 35 years.
3) Man, aged 25 years.
4) Man, aged 50 years.
5) Lady aged 30 years.
6) Lady, aged 38 years.
7) Man, aged 28 years.
8) Man, aged 45 years.

What is the probability that the team leader will be

a) a lady, aged above 35 years ?

b) a man, aged above 40 years ?

c) a man aged less than 38 years ?

SECTION – D

This Section is **compulsory**. **(1×15=15)**

10. Mr. A has three investment options, but he can undertake only one at a time :

Option A : He can open a departmental store with an investment of Rs. 10 lakhs. The cash inflow will be Rs. 25 lakhs with a probability of success of 85 per cent. If he fails, he can still salvage Rs. 5 lakhs. Upon succeeding he can invest in a bakery with an investment of Rs. 8 lakhs. His chances of success are 80 per cent with a cash inflow of Rs. 9 lakhs. If he fails he can still save Rs. 4 lakhs.

Option B : He can open a gift shop with an investment of Rs. 5 lakhs. His chances of success are 75 per cent with a cash inflow of Rs. 8 lakhs. If he fails he can still save Rs. 4 lakhs. If he succeeds he can open a second gift shop with an investment of Rs. 6 lakhs. His chances of success are 60 per cent with a cash inflow of Rs. 7 lakhs. If he fails, he recovers nothing.

Option C : He can open a shoe shop with an investment of Rs. 9 lakhs. His chances of success are high with 70 per cent and cash inflow of Rs. 13 lakhs ; Medium with 25 per cent and cash inflow of Rs. 11 lakhs and save with cash inflow of Rs. 10 lakhs. With high success, he can open another shoe shop with an investment of Rs. 6 lakhs. The chances of success are 90 per cent with a cash inflow of Rs. 8 lakhs. If he fails, he still salvages Rs. 3 lakhs. Draw up a decision tree, the Pay off Table and advice Mr. A on his actions.

PG – 961

I Semester M.B.A. Degree Examination, February 2017
(2007-08 Scheme)
MANAGEMENT
Paper – 1.5 : Business Mathematics and Analytics

Time : 3 Hours Max. Marks : 75

SECTION – A

Answer **any six** questions ; **each** question carries **two** marks : **(6×2=12)**

1. a) Define linear equation.
   b) What do you mean by 'adjoint' of a matrix ?
   c) What is multi-stage sampling ?
   d) What is conditional probability ?
   e) What is null hypothesis ?
   f) What do you mean by cluster sampling ?
   g) What is Poisson distribution ?
   h) What is judgemental sampling ?

SECTION – B

Answer **any three** questions, **each** question carries **eight** marks : **(3×8=24)**

2. a) Explain any five properties of determinants.
   b) Using matrix inversion method, solve the following system of equations

$$2x - y + 2z = 6$$
$$x - 2y + 3z = 6$$
$$3x - 3y - z = -6.$$

P.T.O.

3. a) A firm produces x tonnes of an item at the total cost

$$c(x) = ₹ \left(\frac{1}{10}x^3 - 9x^2 + 85x + 17\right)$$

Find :

i) The average cost.

ii) The average variable cost.

iii) The average fixed cost.

b) What are various methods of collecting statistical data ? Which of these is more reliable and why ?

4. a) Below are given the figures of production (million tonnes) of a sugar factory :

Year	2003	2004	2005	2006	2007	2008	2009
Production (in tonnes)	80	90	92	83	94	99	92

i) Fit a straight line trend to these figures.

ii) Plot these figures on a graph and show the trend line.

b) Calculate Pearson's coefficient of skewness :

x :	12.5	17.5	22.5	27.5	32.5	37.5	42.5	47.5
f :	28	42	54	108	129	61	45	33

5. a) Calculate the coefficient of correlation between x and y from the following data and calculate probable error. Assume 69 and 112 as the mean value for x and y respectively.

x :	78	89	99	60	59	79	68	61
y :	125	137	156	112	107	136	123	108

b) Explain addition and multiplication rule of probability with an example.

6. a) From the following data obtain the two regression equations and calculate the correlation coefficient :

x :	1	2	3	4	5	6	7	8	9
y :	9	8	10	12	11	13	14	16	15

Estimate the value of y which should correspond on an average to x = 6.2.

b) What is chi-square test ? Explain its properties.

SECTION – C

Answer **any two** questions, **each** question carries **twelve** marks : **(2×12=24)**

7. In 1999 for working class people wheat was selling at an average price of ₹ 120 per 20 kg, cloth ₹ 20 per metre, house rent ₹ 300 per house and other items ₹ 100 per unit. By 2009 cost of wheat rose by ₹ 180 per 20 kg, house rent by ₹ 450 and other items double in price. The working class cost of living index for the year 2009 with 1999 as base was 160. By how much the cloth rose in price during the period ?

8. Calculate the cost of living index, Fisher's ideal index and prove the tests of consistency for the following data :

Commodity	Price in 2009	Quantity in 2009	Price in 2010	Quantity in 2010
A	16	8	18	8
B	14	6	15	7
C	12	5	10	6
D	8	9	9	9
E	16	10	20	12

9. What is sampling ? Discuss the various methods of sampling and comment on their appropriateness and usefulness.

SECTION – D

This Section is **compulsory** : **(1×15=15)**

10. A restaurateur has 3 projects in hand. He can only take up one project at a time. The first project is to take up a fast food corner at an investment of ₹ 5,00,000 where the chances of success will be 0.70 with a cash inflow of ₹ 10,00,000. Failure means cash inflow of ₹ 1,00,000 in salvage furniture and utensils.

    The second project is to open an expression coffee shop with an investment of ₹ 7,00,000 where there will be a chances of success will be 0.5 with an inflow of ₹ 4,50,000, failure means an inflow of ₹ 50,000 in salvage material.

    The third project is to start a Apoorva with an investment of ₹ 12,00,000 the chances of success are 0.6 with an inflow of ₹ 14,00,000. Failure means an inflow of ₹ 5,00,000 in salvage material.

    If there is a success, the restaurateur will decide to start a Apoorva with an investment of ₹ 9,00,000, where by he can expect high demand with 0.9 probability and ₹ 11,00,000 inflow, medium demand with 0.2 probability and cashflow of ₹ 10,00,000, low demand with a cash inflow of ₹ 2,00,000.

    All the amounts have been adjusted to current value are expected to draw a decision tree and a pay off table and thereby advise the restaurateur about the best course of action.
