

N28-133

December -2014

Second Year M.B.A. (KS) (Integrated)

Business Mathematics

Time : 3 Hours]

[Max. Marks : 100

- Instructions :**
- (1) **All** questions are compulsory.
 - (2) **Each** question carry equal marks.
 - (3) Scientific Calculator is allowed.

1. (a) (1) In how many ways can the letters of the word STRANGE be arranged so that
- (i) the vowels are never separated
 - (ii) the vowels never come together
 - (iii) the vowels occupy only the odd places. **5**

- (2) In how many ways can 4 white and 3 black balls be selected from a box containing 20 white and 15 black balls ? **5**

- (b) Attempt any **two** of the following : **10**

- (1) From 6 boys and 4 girls, 5 are to be selected for the admission for a particular course. In how many ways can this be done if there must be exactly 2 girls ?
- (2) Find n, if ${}_nC_6 : {}_{n-3}C_3 = 91 : 4$
- (3) Prove that : ${}_{n+1}C_r = {}_nC_r + {}_nC_{r-1}$

2. (a) Prove by the method of induction : $P(n) : 2 + 7 + 12 + \dots + (5n - 3) = \frac{1}{2}n(5n - 1)$. **4**

- (b) Attempt any **two** of the following : **16**

- (1) Prove by the method of induction :

$$1.3 + 2.3^2 + 3.3^3 + \dots + n.3^n = \frac{(2n - 1)3^{n+1} + 3}{4}$$

- (2) Find the value of r if coefficient of $(2r + 4)^{\text{th}}$ term and $(3-2)^{\text{th}}$ term in the expansion of $(1 + X)^{18}$ are equal.
- (3) Find approximate value of 10.01^5 by using Binomial expansion.

3. (a) Explain the following terms : 5

- (1) Probability
- (2) A Baye's theorem

(b) Attempt any **three** of the following : 15

- (i) What is the probability that there are 53 Sundays in a leap year ?
- (ii) Two cards are drawn successively without replacement from a well-shuffled deck of 52 cards. Compute the mean and variance for the number of aces.
- (iii) There are 3 economists, 4 engineers, 2 statisticians and 1 doctor. A committee of 4 members from them is selected. Find the probability that the committee has (i) one of each kind (ii) at least one economist the doctor as a member and three others.
- (iv) There are three urns having the following composition of black and white balls. Urn (i) : 7 white and 3 black balls; Urn (ii) : 4 white and 6 black balls; Urn (iii) : 2 white and 8 black balls. One of these urns is chosen at a random with probabilities 0.2, 0.6 and 0.2 respectively. From the chosen urns, two balls are drawn at random without replacement. Both the balls happen to be white. Calculate the probability that the balls drawn were from urn (iii).

4. (a) Define Geometric Progression. If $a^2 + b^2$, $ab + bc$, $b^2 + c^2$ are in G.P. Prove that a , b , c are also in G.P. 5

(b) Attempt any **three** of the following : 15

- (1) The 4th term of an A.P. is 64 and the 54th term is -61 , show that the 23rd term is $16\frac{1}{2}$.
- (2) If a, b, c are in A.P. and x, y, z are in G.P. prove that $X^{b-c} \cdot Y^{c-a} \cdot Z^{a-b} = 1$.
- (3) Find the sum of n terms of the series whose n^{th} term is : $5n^3 + 7n^2 + 3n + 2$.
- (4) If a, b, c, d are in G.P. Prove that
- (i) $\frac{ab - cd}{b^2 - c^2} = \frac{a + c}{b}$
- (ii) $(ab + bc + cd)^2 = (a^2 + b^2 + c^2)(b^2 + c^2 + d^2)$.

5. (a) The following table gives the census population of a town for the year 1961 to 2001. Estimate the population for the year 1995 by using an appropriate formula. **5**

Year	1961	1971	1981	1991	2001
Population ('000)	46	66	81	93	101

- (b) Attempt any **three** of the following : **15**

- (1) Apply Newton's Divided Difference method to find the number of persons getting ₹ 600 from the following data :

Income per Day (' 00) ₹	3	5	7	8	10
No. of persons	180	154	120	110	90

- (2) Using Lagrange's formula of interpolation, find the polynomial $f(x)$ given that $f(0) = 2$, $f(1) = 3$, $f(2) = 12$ and $f(3) = 35$. Hence find $f(12)$.
- (3) Using Newton's method of interpolation, find from the data given below, the Number of person in the income group between ₹ 20,000 and ₹ 25,000.

Year	0	1	2	3	4	5	6
Production (in ' 000 tonnes)	200	220	260	?	350	?	430

- (4) If p , q , r and s be the successive entries corresponding to equidistant arguments in a table, show that when third differences are taken into account, the entry corresponding to the argument half way between the arguments of q and r is $A + \frac{1}{24}B$, where A is the arithmetic mean of q and r . B is the arithmetic mean of $3q-2p-s$ and $3r-2s-p$.
