

S.D.E.
M.C.A. SEM -II : WINTER - 2017
SUBJECT : PROBABILITY AND COMBINATORIES

Day : **Monday**
Date : **18/12/2017**

W-2017-4421

Time **02.00 P.M. TO 05.00 P.M.**
Max. Marks : 80

N.B.

- 1) Attempt any **FIVE** questions from Section – I and any **TWO** questions from Section – II.
- 2) Figures to the right indicate **FULL** marks.
- 3) Use of non-programmable **CALCULATOR** is allowed.
- 4) Answers to both the sections should be written in **SEPARATE** answer book.

SECTION – I

- Q.1** 4 Americans, 3 Frenchmen and 3 Englishmen are to be seated for dinner. (10)
They have two seating options. They can sit either on a long table or on a circular table. In how many ways,
a) can they sit on long table with
i) no restriction on seating positions?
ii) same nationality person must sit next to each other?
b) can they sit on circular table with
i) no restriction on seating positions?
ii) same nationality must sit next to each other?
- Q.2** Explain the following terms with suitable examples (10)
a) Sample Space b) Random Experiment
c) Permutations d) Pigeonhole Principle
- Q.3** Tickets are numbered from 1 to 100. A ticket is drawn randomly. What (10)
is the probability that the drawn ticket shows :
a) an even number ? b) a number multiple of 5?
c) a number which is greater than 75? d) a perfect square number?
- Q.4** Solve the following recurrence relation (10)
 $a_n = a_{n-1} + 2a_{n-2}$ for $n \geq 2$ with initial conditions $a_0 = 2$ and $a_1 = 7$.
- Q.5** 6 fair coins are tossed simultaneously. Find the probability of getting (10)
a) at least 5 heads b) at most two tails
- Q.6** The time X (in years) required to complete a software project has a p.d.f. (10)
given by,
$$f(x) = \begin{cases} kx(1-x) & 0 \leq x \leq 1 \\ 0 & \text{otherwise} \end{cases}$$

a) Find k .
b) Compute the probability that the project will be completed in less than four months.
- Q.7** Write short notes on **ANY TWO** of the following: (10)
a) Moment generating functions
b) Normal distribution
c) Conditional probability and independence of events

P.T.O.

SECTION – II

Q.8 a) State and prove total probability theorem. **(07)**

b) A random variable X has the following p.m.f. **(08)**

$X = x_i$	0	1	2	3	4	5	6
$P(X = x_i)$	k	3k	5k	7k	9k	11k	13k

Find:

i) k **ii)** $P(X \geq 2)$ **iii)** $P(0 < X < 5)$

Q.9 a) In a college, 4% boys have work experience and 1% girls have work experience. Out of total students, 60% are girls. **(07)**

i) If a student is selected randomly and found to be experienced, what is the probability that the student is a girl?

ii) If a student is selected randomly, what is the probability that the student has work experience?

b) If a town has three doctors A, B and C operating independently. The probabilities that the doctors A, B and C would be available are 0.9, 0.6 and 0.7 respectively. What is the probability that at least one doctor is available when needed? **(08)**

Q.10 A confectioner sells confectionary items. Past data of demand per week in hundred kilograms with frequency is given below: **(15)**

Demand Per week	0	5	10	15	20	25
Frequency	2	11	8	21	5	3

Use the following sequence of random numbers, generate the demand for the next 10 weeks. Also find out the average demand per week.

Random numbers : 35, 52, 90, 13, 23, 73, 34, 57, 35, 83

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