F.Y. B. SC. (Computer Science) SEM – I (CBCS 2018 COURSE) :
SUMMER - 2019
SUBJECT: MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE

Day: Friday **Time:** 03.00 PM To 06.00 PM
Date: 12/04/2019 **S-2019-1053** **Max. Marks: 60**

N.B:

1) All questions are **COMPULSORY.**
2) Figures to the right indicate **FULL** marks.

Q.1 Attempt **ANY TWO** of the following: **(12)**

a) State and prove inclusion exclusion principle for two sets.

b) Find Disjunctive Normal Form (DNF) of the following boolean function:
$f(x,y,z)=x(y+z)$.

c) Solve $a_r - 7a_{r-1} + 10a_{r-2} = 6+8r;\ a_o = 1,\ a_1 = 2$.

Q.2 Attempt **ANY TWO** of the following: **(12)**

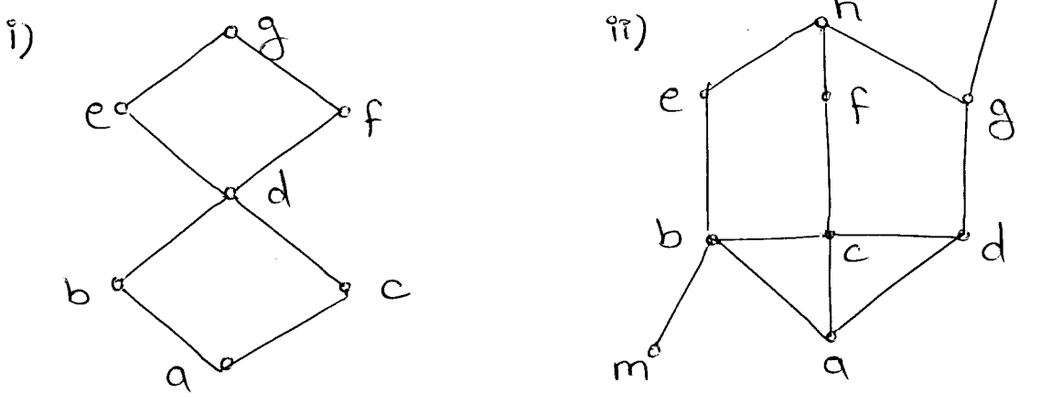
a) By giving a proof of contradiction, prove that $\sqrt{2}$ is an irrational number.

b) Test the validity of the following argument:
$p \rightarrow \sim q,\ p \vee r,\ r \mapsto q$.

c) In a survey, 2000 people were asked whether they read India Today or Business Times. It was found that 1200 read India Today, 900 read Business Times and 400 read both. Find how many read at least one magazine and how many read neither?

Q.3 Attempt **ANY TWO** of the following: **(12)**

a) State with justification which of the following diagrams are lattices:



b) In a certain city, all telephone numbers have six digits, the first two digits always being 41 or 42 or 46 or 62 or 64. How many telephone numbers have all six digits distinct?

c) How many 5-card hands can be formed from the standard 52 card deck? And what is the probability of obtaining 3, but not 4 aces?

P.T.O.

Q.4 Attempt **ANY THREE** of the following: **(12)**

a) Solve the recurrence relation
$a_r = 7a_{r-1} - 10a_{r-2}$ *with* $a_0 = 4,\ a_1 = 17.$

b) Explain the terms:

i) Homogenous solution of a recurrence relation.
ii) Particular solution of a recurrence relation.

c) In a boolean algebra find the values of x and y, for which $x + y' = x'y'$.

d) Write converse, inverse and contrapositive of the following conditional statement:
' If it rains, then I wear a raincoat.'

Q.5 Attempt **ANY FOUR** of the following: **(12)**

a) Write negation of the following statements:
i) There is an honest politician
ii) All children like 'Chota Bheem'?

b) Prove by indirect method: $\sim p \vee q,\ s \vee p,\ \sim q \mapsto s.$

c) Draw a Hasse Diagram of $(D_{30}, |)$.

d) Find first six terms of the sequence defined by;
$a_n = 2a_{n-1} + 3a_{n-2}$; $a_0 = 2,\ a_1 = 3.$

e) How many ways are there to arrange the seven letters in the word 'SOCIOLOGICAL'?

f) How many 4 digit numbers (with repetition) can be formed with no digit less than 4?

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