2007 INDIRA GANDHI NATIONAL OPEN UNIVERSITY (IGNOU) M.C.A

DISCRETE MATHEMATICS

MCS-013

Time : 2hour

Marks : 50

Note r Qu estion number 1 is compulsory. Attempt any three questions from the rest.

l. (a) In the following statement, identify the simple propositions p, Q, r etc. that are combined to make it.
'lf Sun rises in the West or 15 is a prime, 1997 is a leap year.'
:il: ll:,:'lffiJ:iiH:o:*
giv'efh 'efr u'lh

(b)
:HTr::
o::""".":I:iH::,; o'?;,"'i;
'
example.
.,

(c) Draw the logic circuit for the boolean expression
(xr n (xz v *s)) v (*:z A * i)
: MCS-0103 P.T.O.

(d) Let A : {1, 2,3, 4,5}. Let R be a relationo n A such that xRy if x
matrix. Check for symmetry, reflexivity and transitivity.

Under the IPv4 protocol, the 32-bit Class A IP address of a computer in a network has the following specifications:
(i) Leftmost bit is 0.
(ii) The next 7 bits is the net-id and this cannot be 11111 1 1 .
(iii) The next 24 bits form the host-id and host-ids consisting of all l's and all 0's are not allowed.
What is the maximum number of Class A addresses possible under the IPv4 protocol ?

Write all partitions of 7 . Also find Pl and Pl .

There are20 studentsin a classa nd 5 differentg rades are available. In how many ways can these grades be awarded ?

(p'A a) <-rp@q isatautology

(e)

(f)

(g)

2- (a)

(b)
Check if (p A q') v
using a truth table.
L e t f : B -) R b e
that f is a bijective
defined by f(x) : 2x + 1. Check
function. Find f-1.
Mcs-01@3

3. (a) Prove by induction that 2n
(b) Anita collects stamps. In a box she has 4 stamps of
England, 3 stamps of France and 3 stamps of
Germany. In how many ways can she take out
7 stamps from the box if
(i) the order is not important.
(ii) the order is important. 6

4. (a) Make a table of values for the function
(xt n *zl v (x; n *3)'. Find a boolean expression
in CNF or DNF, whichever is simpler.
(b) Two players A and B roll a dice with player A rolling
..t,h e dice first. What is the proQabilityt hat A gets at
least 2 more than the number B gets ?
(c) Define pigeonhole principle with example.

5. (a) Give direct proof to prou" 9 = Ji i, not a rational
number.

q

s

(b) Among the candidates who applied for the job of
interpreter, 15 knew French, 72 knew German, 8
knew Mandarin, 7 knew both French and German, 5
knew both French and Mandarin, 6 knew both
German and Mandarin and 3 knew all the three
languages.
(i) How many candidates applied foi the job ?
(ii) How many candidates knew at least two
langtnges ? 5

2

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