Form No. Ex- 8 *Sl. No.....*

Particulars about the candidate
and the subject are **checked thoroughly**
and corrected where necessary.

EXAM CENTRE CODE :.....

Invigilator

Signature of Officer-in-Charge

KRISHNA KANTA HANDIQUI STATE OPEN UNIVERSITY

BCA 2nd Semester Examination, 2015

Discrete Mathematics [BCA(S2)06]

Time : 3 Hrs. Full Marks : 80

Enrolment Number | | | | | | | | | | |

Medium of Answer : |

INSTRUCTIONS TO CANDIDATES

1. This booklet contains.....24.... Pages numbering...23..Please verify number of pages in the booklet before answering.
2. An Examinee is allowed to bring only Admission Card and Identity Card to the Examination Hall. Any Examinee found in possession of loose papers, books etc. is liable to be Expelled.
3. Enrolment No. and Medium of answer must be written legibly at the specified places. Examinee's name and any other identifying mark which reveals examinees identity shall not be written anywhere in the script.
4. For making calculations, only the last page provided for rough work shall be used.
5. No pages of the script be torn out .
6. Calculators will not be allowed for making calculations in the examination hall. ***MOBILE PHONES are strictly prohibited in the examination Centre***.
7. No candidate will be allowed to leave or go out of the hall during the First hour of the Examination.
8. A candidate having completed his/her answer, the script must be handed over, to an invigilator before leaving the hall.
9. Contravention of any of the instructions mentioned above shall render a candidate liable for disciplinary action as per regulations of the University.

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Mandatory

Examiner's Signature : _____

Examiner's Full Name : _____

Scrutiniser's Signature : _____

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Que. No.	Marks
1.	
2.	
3. a	
3. b	
3. c	
3. d	
3. e	
3. f	
3. g	
4. a	
4. b	
4. c	
5. a	
5. b	
5. c	
Total	

Head Examiner's Signature : _____

1. Answer any eight questions from the following: $1 \times 8 = 8$

   (a) Define proper subset with a suitable example.

   (b) What do you mean by Into and Onto function?

   (c) What is the condition for disjoint set?

   (d) Define transitive relation with a suitable example.

   (e) Define semi group.

   (f) Give an example to show that every ID (Integral Domain) is not a field.

   (g) How many triangles can be formed by joining the vertices of a hexagon.

   (h) How many permutations of the letters of the word 'KKHSOU' are possible?

   (i) Write the following statement in symbolic form:
   Rahul is poor but happy.

   (j) Give examples of:
   (i) A non-commutative ring with unity
   (ii) A commutative ring without unity.

2. Answer any eight questions from the following $2 \times 8 = 16$

(a) Give an example of a commutative ring with unity having 2 elements.

(b) Define integral domain. What are the basic properties of integral domian and field?

(c) Consider the following sets:
A={a}, B={a,c,b}, C={c,a}, D={c,b,a}, E={b}, Ø. Which of them are subsets of X={a, b, c}? Which are proper subsets of X?

(d) Evaluate 4! - 3!

(e) What is Pigeonhole principle?

(f) Let A={-2,-1,0,1,2}. A function $f : A \rightarrow R$ is defined as $f(x) = x^2+1$. Find the range of f.

(g) What is equivalence relation? Give example of a relation which is symmetric and transitive but not reflexive.

(h) Define set, relation and function.

(i) What is Abelian group? Write any two properties of group.

3. Answer any five questions from the following: $4 \times 5 = 20$

(a) Prove that the inverse of a matrix is unique.

(b) Construct the truth table for the following: (P^Q) $\rightarrow$ ~P

(c) Determine the minimum number of elements to be selected from the set S={1,2,3,4,5,6,7,8,9} so that the sum of two of those elements is 10.

(d) What is De Morgan's law? Prove that $A \cap (A' \cup B) = A \cap B$

(e) Prove that cancellation laws hold in a group.

(f) Define Ring. Show that $R = \{a+ib : a,b \in Z\}$ is a ring with unity under usual addition and multiplication of complex numbers.

(g) Show that $A = \begin{bmatrix} 2 & 5 \\ 1 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 3 & -5 \\ -1 & 2 \end{bmatrix}$ are inverses of each other.

4. Answer any two questions from the following: $8 \times 2 = 16$

(a) Solve by Cramer's rule:

$x+y-2z = 1$

$2x-7z = 3$

$x+y-z = 5$

(b) FInd the rank of the following matrix A:

$$A = \begin{bmatrix} 1 & 2 & 3 & 2 \\ 2 & 3 & 5 & 1 \\ 1 & 3 & 4 & 5 \end{bmatrix}$$

(c) What do you mean by tautology and contradiction? Verify the following statements for either tautology or contradiction:

(i) $(P \wedge Q) \wedge \sim (P \vee Q)$

(ii) $Q \vee (P \sim Q) \vee (\sim P \wedge \sim Q)$

5. Answer any two questions from the following : 2×10 = 20

(a) What is minor and cofactor of matrices? Find the adjoint and inverse of the following matrix. 3+7 = 10

$$\begin{bmatrix} \cos\alpha & -\sin\alpha & 0 \\ \sin\alpha & \cos\alpha & 1 \\ 0 & 0 & 1 \end{bmatrix}$$

(b) If $A = \begin{bmatrix} 1 & -2 & 3 \\ -4 & 2 & 5 \end{bmatrix}$ then find A^2 and A^3. What is the order of matrix A? 10

(c) Answer the following - 5+5 = 10

(i) If P = {Red, Green, Blue}, and Q = {Flower, Fruit}, then find PXQ and PXP.

(ii) Is the function f : R - {0} $\rightarrow$ {-1,1} defined by $f(x) = \frac{x}{|x|}$ bijective?