

F.Y. B. SC. (COMPUTER SCIENCE) SEM – I (2014 COURSE) :
WINTER - 2017
SUBJECT: ALGEBRA –I

Day: Wednesday
 Date: 01/11/2017

W-2017-0731

Time: 12.00 NOON TO 02.00 PM
 Max. Marks: 40

N.B.:

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

Q.1 Attempt any **TWO** of the following: **(10)**

- a) Prove that any two equivalence classes are either disjoint or identical if \sim be an equivalence relation on a set A.
- b) Show that f is bijective and hence find f^{-1} , if $f : R \rightarrow R$ is a function defined by $f(x) = 3x - 2$.
- c) Find g.c.d of 2210 and 357 and express it in the form $2210m + 357n = \text{g.c.d}$.

Q.2 Attempt any **TWO** of the following: **(10)**

- a) Prove that if $a|ab$ and $(b, c) = 1$ then $c|a$
- b) Find all the code words of the code determined by the parity check matrix.

$$H = \begin{bmatrix} 1 & 0 & 1 & 1 \\ 0 & 1 & 1 & 0 \end{bmatrix}$$

- c) Draw the diagram of machine whose transition table is shown below:

	0	1	2
S ₀	S ₁	S ₀	S ₂
S ₁	S ₀	S ₀	S ₁
S ₂	S ₂	S ₀	S ₂

Q.3 Attempt any **TWO** of the following: **(10)**

- a) Obtain the remainder when 8^{401} is divisible by 13.
- b) Show that $|Z_1 + Z_2|^2 + |Z_1 - Z_2|^2 = 2|Z_1|^2 + 2|Z_2|^2$, if Z_1 and Z_2 are complex numbers.
- c) State De- Moivre's theorem and discuss any two cases.

Q.4 Attempt any **FIVE** of the following: **(10)**

- a) What is the remainder of 12^{12} when divided by 13 justify?
- b) Define: i) Equivalence class
 ii) Equivalence Relation
- c) State first principle of mathematical induction.
- d) Find modulus and argument of $Z = 1 + i$
- e) Find real and imaginary part of $\frac{1}{1 - 2i}$
- f) Find the Hamming distance between $x = 110110$ and $y = 000101$
- g) Prove that $\delta(x, y) = 0$ iff $x = y$.

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