G 2363 (Pages : 3) Reg. No.....

Name.....

M.Sc. DEGREE (C.S.S.) EXAMINATION, JUNE 2015

Fourth Semester

Faculty of Science

Branch I (A)—Mathematics

MT 04 E14—CODING THEORY

(2012 Admission onwards—Regular/Supplementary)

Time : Three Hours Maximum Weight : 30

Part A

Answer any **five** *questions.*
Each question has weight 1.

1. Define complete and incomplete decoding.
2. Define weight of a vector u. Show that $d(u, w) \leq d(u, v) + d(v, w)$ for any u, v and w in a space V.
3. Define a self dual code. Give an example.
4. Compute $(1000)^{1/4}$ in GF (16).
5. Which elements of GF (16) are primitive.
6. If $f(x)$ is a polynomial with coefficients in GF (P^r), show that $f(xP^r) = (f(x))P^r$.
7. Find all binary cyclic codes in R_5.
8. Which length 7 binary cyclic codes contain the vector (0, 1, 0, 0, 1, 1, 1) ?

$(5 \times 1 = 5)$

Part B

Answer any **five** *questions.*
Each question has weight 2.

9. Using Hamming decoding, decode the message (0, 1, 1, 1, 0, 0, 1).
10. Prove that if d is even,

    $A(n - 1, d - 1) = A(n, d)$.

11. Compute the coset weight distribution of C_3.
12. Using the double-error-correcting BCH code, decode the following received vector $x = (1, 1, 0, 1, 1, 1, 1, 0, 1, 0, 1, 1, 0, 0, 1)$.

Turn over

22. (a) Give a generator polynomial of a triple-error-correcting binary BCH code of length 15.

(b) What is the dimension of this code ?

(c) Give a generator matrix for this code.

(d) Describe a Reed-Solomon [7, 3] code over GF(8) by giving its generator polynomial. How many errors will it correct.

(3 × 5 = 15)

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