M 8875

Reg. No. : ....

Name : ....

II Semester B.C.A. Degree (CCSS – 2014 Admn. – Regular) Examination, May 2015
COMPLEMENTARY COURSE IN MATHEMATICS
2C02 MAT – BCA : Mathematics for BCA – II

Time: 3 Hours Max. Marks : 40

SECTION – A

All the **first 4** questions are **compulsory**. They carry **1** mark **each**.

1. Give an example of a non-zero 3×3 skew symmetric matrix.

2. Find the algebraic multiplicity of the eigen-value of the matrix $\begin{bmatrix} 3 & 2 \\ 0 & 3 \end{bmatrix}$.

3. State the Cayley Hamilton Theorem.

4. What is the maximum degree of any vertex in a graph with n vertices ? **(4×1=4)**

SECTION – B

Answer **any 7** questions from among the questions **5** to **13**. They carry **2** marks **each**.

5. Find the area bounded by the ellipse $x^2/a^2 + y^2/b^2 = 1$.

6. Find the whole length of the astroid $x^{2/3} + y^{2/3} = a^{2/3}$.

P.T.O.

7. Find the rank and a basis for the column space of the matrix $\begin{bmatrix} 1 & -2 \\ 0 & 0 \\ -3 & 6 \end{bmatrix}$.

8. Give any two elementary row operations for matrices.

9. Show by example that rank A = rank B does not imply rank A^2 = rank B^2.

10. Show that the transpose of a square matrix A has the same eigenvalue as A.

11. Show that the number of vertices of odd degree in any graph is even.

12. Find two non-isomorphic graphs with degree sequence (2, 2, 2, 1, 1).

13. If δ and Δ denote the minimum and maximum vertex degrees in a (p, q) graph, show that $\delta \le \frac{2q}{p} \le \Delta$.

(7×2=14)

SECTION – C

Answer **any 4** questions from among the questions **14** to **19**. They carry **3** marks **each**.

14. Evaluate $\iint xy(x+y)\,dxdy$ over the area between $y = x^2$ and $y = x$.

15. Obtain the intrinsic equation of the catenary $y = a \cosh (x/a)$ taking the vertex (0, a) as the fixed point.

16. Solve by Gauss elimination method :

$$x_1 - x_2 + x_3 = 0$$
$$-x_1 + x_2 - x_3 = 0$$
$$10x_2 + 25x_3 = 90$$
$$20x_1 + 10x_2 = 80$$

17. Find the eigen vectors of $\begin{bmatrix} -2 & 2 & -3 \\ 2 & 1 & -6 \\ -1 & -2 & 0 \end{bmatrix}$.

18. Show that every square matrix can be expressed as the sum of two matrices of which one is symmetric and the other skew symmetric.

19. Show that in any graph, a closed walk of odd length contains a cycle. **(4×3=12)**

SECTION – D

Answer **any 2** questions from among the questions **20** to **23**. They carry **5** marks **each.**

20. Evaluate $\iiint_V (2x + y)\, dxdydz$ where V is the closed region bounded by the cylinder $z = 4 - x^2$ and the planes x = 0, y = 0, y = 2 and z = 0.

21. Solve by Cramer's rule :

$3y + 4z = 14.8$

$4x + 2y - z = -6.3$

$x - y + 5z = 13.5.$

22. Find an eigen basis and diagonalize.

$$\begin{bmatrix} 1 & 0 & 1 \\ 0 & 3 & 2 \\ 0 & 0 & 2 \end{bmatrix}$$

23. Show that the maximum number of lines among all p point graphs with no triangles is $\left[\frac{p^2}{4}\right]$. **(2×5=10)**

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