K16U 1225

Reg. No. : .....

Name : .....

II Semester B.Sc. Degree (CCSS – Reg./Supple./Improv.) Examination, May 2016

COMPLEMENTARY COURSE IN MATHEMATICS

2C02 MAT-CS : Mathematics for Computer Science – II

(2014 Admn. Onwards)

Time : 3 Hours Max. Marks : 40

SECTION – A

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

1. Give the reduction formula for $\int \cos^n x dx$.
2. Give an example of a non zero 3×3 Skew symmetric matrix.
3. Give a basis for the vector space $\mathbb{R}^3$.
4. State the Cayley Hamilton theorem. **(4×1=4)**

SECTION – B

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

5. Find the value of $\int_0^{\pi/2} \cos^3 x \cos 2x dx$.
6. Find the area enclosed between one arc of the cycloid $x = a(\theta - \sin\theta)$, $y = a(1 - \cos\theta)$.

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7. Find the length of the arc of the equi – angular spiral $r = ae^{\theta \cot \alpha}$ between the points for which the radii vectors are r_1 and r_2.

8. Find the volume of the solid obtained by revolving the ellipse $x^2/a^2 + y^2/b^2 = 1$ about the axis of x.

9. Evaluate $\int_0^1 dx \int_0^{\sqrt{(1-x^2)}} \frac{dy}{\sqrt{(1-x^2-y^2)}}$.

10. For the matrix $\begin{bmatrix} 1 & -2 \\ 0 & 0 \\ -3 & 6 \end{bmatrix}$ find the rank and a basis for the row space.

11. Find the eigenvectors of $\begin{bmatrix} 0 & 1 \\ -1 & 0 \end{bmatrix}$.

12. Find the eigen values of $\begin{bmatrix} -5 & 2 \\ 2 & -2 \end{bmatrix}$.

13. Show that the transpose of a square matrix A has the same eigenvalues as A.

(7×2=14)

SECTION – C

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

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

15. Find the surface of the solid formed by revolving the cardioid $r = a(1 + \cos\theta)$ about the initial line.

16. Evaluate $\iint_A xy \, dxdy$ over the positive quadrant of the circle $x^2 + y^2 = a^2$.

17. Evaluate the following determinants by reducing it to triangular form

$$\begin{vmatrix} 2 & 0 & -4 & 6 \\ 4 & 5 & 1 & 0 \\ 0 & 2 & 6 & -1 \\ -3 & 8 & 9 & 1 \end{vmatrix}.$$

18. Find the inverse of the matrix $\begin{bmatrix} -1 & 1 & 2 \\ 3 & -1 & 1 \\ -1 & 3 & 4 \end{bmatrix}$.

19. Using Cayley-Hamilton theorem find A^3 if $A = \begin{bmatrix} 1 & 2 \\ -1 & 3 \end{bmatrix}$. **(4×3=12)**

SECTION – D

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

20. Find the area of the region lying above the x – axis and included between the circle $x^2 + y^2 = 2ax$ and the parabola $y^2 = ax$.

21. 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 $z = 0$.

22. Solve by Gauss elimination method

$0.8x + 1.2y - 0.6z = -7.8$

$2.6x + 1.7z = 15.3$

$4.0x - 7.3y - 1.5z = 1.1$

23. Find an eigenbasis and diagonalize $\begin{bmatrix} 1 & 0 & 1 \\ 0 & 3 & 2 \\ 0 & 0 & 2 \end{bmatrix}$. **(2×5=10)**
