S3 EC

NOV 2015

M 27887

Reg. No. : ....

Name : ....

Third Semester B.Tech. Degree (Reg./Sup./Imp. – Including Part Time) Examination, November 2015

(2007 Admn. Onwards)

PT2K6/2K6 CE/ME/EE/EC/AE 1/CS/IT 301 : ENGINEERING MATHEMATICS – II

Time : 3 Hours Max. Marks : 100

PART – A

1. Test the convergence of $\frac{1}{1.2.3}+\frac{3}{2.3.4}+\frac{5}{3.4.5}+\cdots\cdots$

2. Obtain the Maclaurin's series expansion of log (1 + x).

3. Find the rank of the matrix

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

4. Solve x + y + z = 3, x + 2y + 3z = 4, x + 4y + 9z = 6 using Gauss elimination method.

5. Find the work done when a force $\bar{F}=(x^2-y^2+x)\,\bar{i}-(2xy+y)\,\bar{j}$ moves a particle in the xy plane from (0, 0) to (1, 1) along the parabola $y = x^2$.

6. Using Green's theorem evaluate $\oint_C (x^2-y^2)dx+(2y-x)dy$ where C is boundary of the region in the 1st quadrant bounded by $y = x^2$ and $y = x^3$.

7. Show that the set of all ordered pairs of real numbers is a vector space over R.

8. Show that $T : R^2 \to R$ given by T(x, y) = 3x – 5y is a linear transformation from $R^2 \to R$. **(8×5=40)**

PART – B

9. If $y = (\sin^{-1}x)^2$ prove that $(1 - x^2)\, y_{n+2} - x(2n + 1)\, y_{n+1} - n^2 y_n = 0$.

OR

10. Test the convergence of $x - \frac{x^2}{\sqrt{2}} + \frac{x^3}{\sqrt{3}} - \frac{x^4}{\sqrt{4}} + \ldots\ldots\ldots\ldots$ and find the interval of convergence.

11. Find the eigen values and eigen vectors of $\begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$.

OR

12. Investigate the values of λ and μ such that the equations $x + y + z = 6$; $x + 2y + 3z = 10$ and $x + 2y + \lambda z = \mu$ have i) no solution (ii) a unique solution (iii) infinite number of solutions.

13. Verify Green's theorem for the integral $\int_C xy\,dx + x^2 dy$ where C is the boundary of the area enclosed by $y = x^2$ and $y = x$.

OR

14. Verify divergence theorem for $\bar{F} = y\bar{i} + x\bar{j} + z^2\bar{k}$ over the cylindrical region bounded by $x^2 + y^2 = a^2$, $z = 0$ & $z = h$.

15. a) Find a homogeneous system whose solution set w is generated by $\{(1, -2, 0, 3), (1, -1, -1, 4)\ (1, 0, -2, 5)\}$.

b) Check whether $w = \{(a, b, c)/a, b, c \in Q\}$ is a subspace of R^3.

OR

16. a) Find T(a, b) where $T : R^2 \to R^3$ is defined by $T(1, 2) = (3, 2, 1)\ T(3, 4) = (6, 5, 4)$.

b) Let w be generated by the polynomials $v_1 = t^3 - 2t^2 + 4t + 1$; $v_2 = 2t^3 - 3t^2 + 9t - 1$ $v_3 = t^3 + 6t - 5$; $v_4 = 2t^3 - 5t^2 + 7t + 5$. Find the basis and dimension of w.

(15×4=60)
