BHARATIYA VIDYA BHAVAN'S

SARDAR PATEL INSTITUTE OF TECHNOLOGY

MUNSHI NAGAR, ANDHERI (WEST), MUMBAI – 400 058, India

(Autonomous College Affiliated to University of Mumbai)

Mid Semester Examination

Max. Marks: 20 | Duration: 1Hr.

Class: FYBTECH | Semester: I

Course Code: BS11 | Date: 23/09/19

Subject: Linear Algebra & Differential Calculus | Time: 4.00PM-5.00PM

Instructions: (1) All questions are compulsory.
(2) Use of scientific calculator is allowed.
(3) Assume any necessary data but justify the same.

Q. No.	Questions	Max Marks	CO	BL
Q. 1	Find the value of n such that $v = r^n(3cos^2\theta - 1)$ satisfies the equation $\frac{\partial}{\partial r}\left(r^2\frac{\partial v}{\partial r}\right) + \frac{1}{\sin\theta}\frac{\partial}{\partial\theta}\left(sin\theta\frac{\partial v}{\partial\theta}\right)=0$	5	CO 1	L1
Q. 2	Find the rank of A by reducing it to normal form where $A = \begin{bmatrix} 1 & 2 & -1 & 0 \\ 2 & 4 & 4 & -6 \\ 0 & 0 & 5 & -2 \\ 3 & 6 & 8 & -1 \end{bmatrix}$ **OR** Determine the condition for which the following system $x + y + z = 1$, $x + 2y - z = b$, $5x + 7y + az = b^2$ has (i) Only one solution (ii) No solution (iii) Infinite solutions	5	CO 3	L2
Q. 3	Prove that if A is a skew symmetric matrix then $(I - A)(I + A)^{-1}$ is orthogonal, where I is an identity matrix of the order of A	5	CO 3	L2
Q. 4	Solve the system of equations using Gauss-Seidel method(up to 3 iterations and answer till 4 decimal places) $3x + 20y - z = -18$, $2x - 3y + 20z = 25$, $20x + y - 2z = 17$	5	CO4	L3

☺ ALL THE BEST ☺