Sanjay Ghodawat University, Kolhapur

2020-21

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EXM/P/09/00

Year and Program: F.Y. B. Tech.	**School of Technology**	**Department: FY B. Tech.**
Course Code: FYT101R2	**Course Title: Engineering Mathematics-I**	**Semester : I**
Day and Date:	**End Semester Examination**	**Time : 2 Hrs.**
		Max Marks : 50

Instructions: 1) All Questions are compulsory.

2) Use of non-programmable calculator is allowed.

3) Assume suitable data wherever necessary.

		Marks	Bloom's Level	CO
Q.1	**Solve the following**			
a)	Examine for consistency of the following equations and if consistent find the solution $x+2y-z=3;\quad 3x-y+2z=1;\quad 2x-2y+3z=2;\quad x-y+z=-1.$	8	L4	CO1
b)	Find the Eigen values and Eigen vectors of the following matrix $A=\begin{bmatrix}4 & 6 & 6\\ 1 & 3 & 2\\ -1 & -4 & -3\end{bmatrix}.$	8	L3	CO2
	OR			
b)	Find A^{-1} and A^4 for the matrix $A=\begin{bmatrix}2 & -1 & 1\\ -1 & 2 & -1\\ 1 & -1 & 2\end{bmatrix}$, by using Cayley-Hamilton theorem.	8	L3	CO2
Q.2	**Solve the following (any two)**			
a)	Obtain n^{th} derivative of $y=\dfrac{x^2+x+1}{x^3-6x^2+11x-6}$.	8	L1	CO3
b)	Use Maclaurian's theorem to find expansion of the following functions in powers of x i) $\sin x$, ii) $\log(1-x)$.	8	L1	CO4
c)	Expand e^x in powers of $(x-1)$.	8	L1	CO4

Q.3 **Solve the following (any two)**

a) Compute $\frac{\partial^2 z}{\partial x^2}$ and $\frac{\partial^2 z}{\partial y^2}$, where $z = \frac{x}{x^2+y^2}$. 9 L2 CO5

b) If $u = \log\left(\frac{x^3+y^3}{x^2-y^2}\right)$ then find i) $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y}$, 9 L2 CO5

ii) $x^2\frac{\partial^2 u}{\partial x^2} + 2xy\frac{\partial^2 u}{\partial x \partial y} + y^2\frac{\partial^2 u}{\partial y^2}$.

c) Discuss the maxima and minima of the following function 9 L2 CO6
$x^3 + 3xy^2 - 3x^2 - 3y^2 + 4$.

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