योगः कर्मसु कौशलम्

Darshan University – School of Engineering

Bachelor of Technology – Semester I

Mid Semester Examination

Course Code	: 21HS01102	**Exam Date**	: 15/12/2021
Course Name	: Mathematics – 1	**Total Marks**	: 30
Time	: 11:30 am to 01:00 pm	**Enrollment No.**	:_____

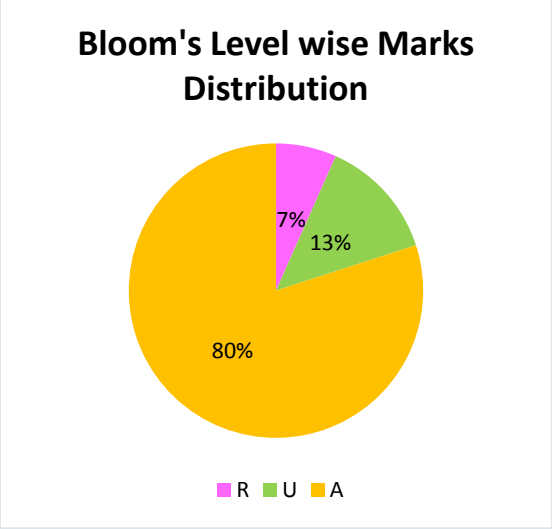
Instructions

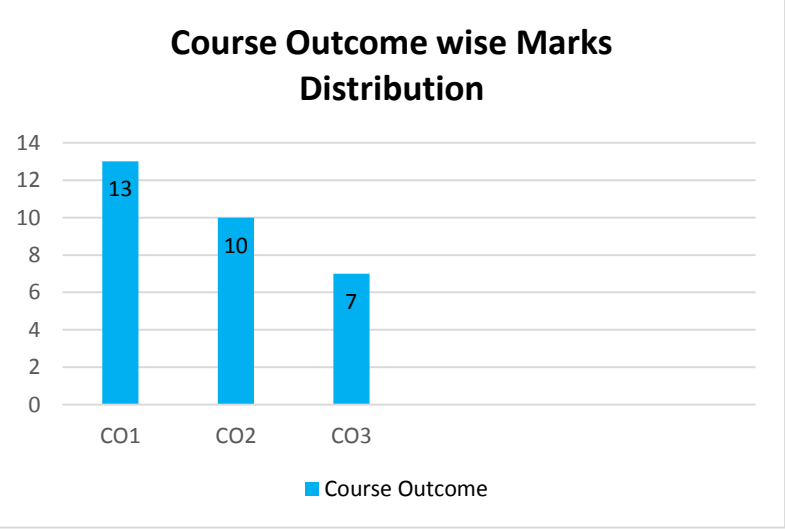
1. Attempt **all** the questions.
2. Figure to the right indicate maximum **marks**.
3. Don't do any kind of **rough** work or **calculation** in Question Paper.
4. **Make** suitable assumptions whenever necessary.
5. The text to the right-side of the marks indicates the Bloom's Level **(BL*)** of the question followed by the Course Outcome **(CO).**
   i.e. R: Remembrance, **U:** Understanding, **A:** Application, **N:** Analyze, **E:** Evaluate, **C:** Create.

Course Outcomes (COs)	At the end of this course, students will be able to: CO1: **solve** the examples based on matrix theory. CO2: **carry** out the limit of indeterminate forms and local extreme values CO3: **determine** improper and multiple integrals.

Q. No.		Question	Marks	BL*	CO
Q. 1	**(A)**	Define: Rank of a matrix & Eigen Value.	**02**	**R**	**CO1**
	(B)	Evaluate $\lim_{x \to 0} \{ \cos 3x \}^{\left(\frac{2}{x^2}\right)}$.	**04**	**A**	**CO2**
	(C)	Solve the following system of linear equations by using Gauss elimination method: $x + y + z = 1, \quad 2x - 3y + z = -1, \quad 3x - 5y - z = 0.$	**04**	**A**	**CO1**
Q. 2	**(A)**	Using Maclaurin's series expand $f(x) = \sin 2x$.	**03**	**A**	**CO2**
	(B)	Find the eigen values, eigen vectors, algebraic and geometric multiplicity of the following matrix: $A = \begin{bmatrix} 1 & -3 & 3 \\ 3 & -5 & 3 \\ 6 & -6 & 4 \end{bmatrix}$.	**07**	**A**	**CO1**
		OR			
Q. 2	**(A)**	If $u = \frac{x^2 + y^2}{\sqrt{x + y}}$, prove that $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} - \frac{3}{2}u = 0$.	**03**	**A**	**CO2**
	(B)	(1) Find the rank of the matrix $\begin{bmatrix} 0 & 1 & 2 \\ -5 & 0 & 3 \\ 1 & 2 & 3 \end{bmatrix}$ by using row echelon form. (2) Using Gauss-Jordan method find A^{-1}, if $A = \begin{bmatrix} 0 & 1 & -1 \\ 3 & 1 & 1 \\ 1 & 2 & -1 \end{bmatrix}$.	**07**	**A**	**CO1**

Q. 3	**(A)**	Solve $\int_0^1 \int_{x^2}^{x} (x^2 - y^2)\, dy\, dx$.	**03**	**A**	**CO3**
	(B)	If $u = x^2 + y^2 + z^2$, where $x = e^t, y = e^t \sin t, z = e^t \cos t$, find $\frac{du}{dt}$.	**03**	**A**	**CO2**
	(C)	Find the volume of solid generated by revolving the region between the parabola $x = y^2$ and the line $x = 1$ about the line $x = 1$.	**04**	**A**	**CO3**
		OR			
Q. 3	**(A)**	Solve $\int_1^3 \int_{\frac{1}{x}}^{1} \int_0^{\sqrt{xy}} xyz\ dz\, dy\, dx$.	**03**	**A**	**CO3**
	(B)	If $u = e^{x^y}$, find $\frac{\partial^2 u}{\partial y\, \partial x}$.	**03**	**A**	**CO2**
	(C)	The region bounded by $y = x^2$ and $y = 2x$ in the first quadrant is revolved about the y–axis to generate a solid. Find the volume of the solid.	**04**	**A**	**CO3**





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