University Institute of Engineering & Technology
(Recognised Under Section 2(f) and 12B of UGC)
Kurukshetra University, Kurukshetra

52004	**THEORY EXAMINATION – MAY 2019**		**Roll No. -**
	B.TECH – ALL BRANCHES	**SEMESTER - II**	**TIME – 3 Hrs.**
			M.M. - 75

COURSE NO. – AS-104 | **COURSE TITLE –APPLIED MATHEMATICS-II**

Note: All questions in Part-A and Part-B are compulsory. Attempt any four questions from Part-C selecting at least one from each unit.

PART-A

Q 1. Answer the following multiple choice questions: (15×1)

1(i). Form an equation of fourth degree whose roots are $3+i$ and $\sqrt{7}$.

1(ii) The equation whose roots are 10 times those of $x^3-2x-7=0$, is....

1(iii) Evaluate $\Gamma\left(\frac{-3}{2}\right)$

1(iv) Using Leibnitz Rule , $\frac{d}{dx}\left[\int_a^b f(x,\alpha)dx\right]$ =.....where limits a and b are constant.

1(v) Second Shifting property of Laplace transform states that $L^{-1}\left[e^{-as}F(s)\right]$ is.....

1(vi) $L\left[\frac{1-e^t}{t}\right]$ is equal to

1(vii) Value of $L(\sinh at)$ is given by

1(viii) Express the function $f(t)=\begin{cases}8, & 1<t<2\\ 6, & 3>t>2\end{cases}$, in terms of Unit step function.

1(ix) Condition for differential equation Mdx+Ndy to be exact is.....

1(x) Is the differential equation $\frac{dy}{dx}.\frac{d^2y}{dx^2}+\frac{dy}{dx}+xy=x^3$ Linear? (Y/N).

1(xi) In the method of Undetermined coefficients the trail solution to find the particular integral of the differential equation $\frac{dy}{dx}+2xy=x^3$ is ....

1(xii) If $\vec{F}(x,y,z)$ defines the vector point function, then $\nabla\times\vec{F}=0$, means $\vec{F}$ is .....

1(xiii) The value of $\nabla.(xy\hat{i}+yz\hat{j}+zx\hat{k})$ at (1,1,1,) is ....

1(xiv) The geometrical meaning of $|\nabla f|$ is .....

1(xv) The ..... theorem established the relation between Surface and Volume intergral.

PART-B (4×5)

Q 2. Solve the Reciprocal equation $x^5-5x^4+4x^3-4x^2+5x-1=0$.

Q 3. Explain with example the following properties of the Laplace Transform:

(i) First shifting property

(ii) Multiplication property.

Q 4. If the temperature of the body drops from $90\,^{\circ}C$ to $45\,^{\circ}C$ in two minute when the temperature of the surrounding is $25\,^{\circ}C$, what will be the temperature of the body at the end of the third minute?

Q 5. Find the unit vector normal to the surface $x^2y+2xz=4$ at the point (2,-2, 3).

PART-C (4×10)

Unit-1

Q 6. Find the equation whose roots are the roots of $x^5-5x^4+4x^3-4x^2+5x-1=0$ each diminished by 2.

Q 7. Prove that $(a)\ \int_0^2 x^2\sqrt{2x-x^2}\,dx=16\beta\left(\frac{7}{2},\frac{3}{2}\right)$, $(b)\ \int_0^{\pi/2}\sqrt{\cot x}\,dx=\frac{1}{2}\lfloor\frac{1}{4}.\lfloor\frac{3}{4}$

Unit-2

Q 8. Solve (a) $L\left[t^2\cos 4t\right]$, (b) $L^{-1}\left(\frac{s+2}{s(s+1)(s+3)}\right)$.

Q 9. State and prove the Convolution theorem and evaluate $L^{-1}\left(\frac{1}{(s^2+1)(s^2+9)}\right)$.

Unit-3

Q 10. Solve the differential equation $\left(y^3-3xy^2\right)dx+\left(2x^2y-xy^2\right)dy=0$.

Q 11. Solve using method of Variation of parameters $\left(D^2+a^2\right)y=\cos ax$.

Unit-4

Q 12. Evaluate (a) $Curl(Curl\,\vec{A})$, if $\vec{A}=x^2y\hat{i}-2xz\hat{j}+2yz\hat{k}$.

(b) Find the constant a if $\vec{A}=\left(x+3y^2\right)\hat{i}+2(y+z^2)\hat{j}+\left(x^2+az\right)\hat{k}$ is solenoidal.

Q 13. Find work done in moving a particle in the force field $\vec{F}=\left(x^2-yz\right)\hat{i}+\left(y^2-zx\right)\hat{j}+\left(z^2-xy\right)\hat{k}$, along the straight line joining the points (0, 0, 0) to (2, 1, 3).