	Sanjay Ghodawat University, Kolhapur Established as State Private University under Govt. of Maharashtra. Act No XL, 2017	**2020-21** EXM/P/09/00

Year and Program: **S.Y. B. Tech**	**School of Technology**	**Department:** **Aeronautical**
Course Code: AET227	**Course Title:Differential Calculus and Transforms.**	**Semester : III**
Day : **Date:**	**End Semester Examination**	**Time:2 Hrs.** **Max Marks:50**

Instructions: 1) All Questions are compulsory.
2) Use of non-programmable calculator is allowed

		Marks	Bloom's Level	CO
Q.1	**Answer the following (any Two)**			
a)	Solve the following differential equation $\frac{d^2y}{dx^2} + 5\frac{dy}{dx} + 4y = 3 - 2x$	08	L3	CO1
b)	Solve the following differential equation $x^3\frac{d^3y}{dx^3} - x^2\frac{d^2y}{dx^2} + 2x\frac{dy}{dx} - 2y = x^3 + 3x$	08	L3	CO1
c)	Solve the following partial differential equations i) $\sqrt{p} + \sqrt{q} = 1$ ii) $px\tan y = q + 1$	08	L1	CO2
Q.2	**Answer the following (any two)**			
a)	Formulate Fourier series for the function. $f(x) = \begin{cases} x & ;0 \le x \le \pi \\ 2\pi - x & ;\pi \le x \le 2\pi \end{cases}$	08	L4	CO3
b)	Find the Laplace transforms of following functions. i) $\sinh 2t\cos t$ ii) $\frac{e^{-t}\sin t}{t}$	08	L2	CO4
c)	Show that $\int_0^\infty \frac{\cos 6t - \cos 4t}{t}dt = \log\left(\frac{2}{3}\right)$	08	L2	CO4
Q.3	**Answer the following (any two)**			
a)	Find Inverse Laplace transforms of following functions i) $\frac{2s+3}{s^2-2s+2}$	05	L2	CO5
	ii) $\frac{2s^2-4}{(s+1)(s-2)(s-3)}$	04	L2	CO5

b)	i) Find Inverse Laplace transform of $\log\left(\frac{s^2+1}{s^2+4}\right)$	04	L3	CO5
	ii) Show that gradient of $\phi = x^3 + y^3 + z^3 + 3xyz$ is irrotational.	05	L2	CO6
c)	Let $\bar{r} = xi + yj + zk$ and $\bar{a}, \bar{b}$ be constant vectors then, show that	09	L3	CO6
	i) $\nabla r^n = nr^{n-2}\bar{r}$			
	ii) $\nabla . \bar{r} = 3$			
	iii) $\nabla \times \bar{r} = 0$			

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