Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–III(OLD) • EXAMINATION – WINTER 2016

Subject Code:130002 **Date:31/12/2016**

Subject Name:Advanced Engineering Mathematics (New)

Time:10:30 AM to 01:30 PM **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1	**(a)**	Attempt the following	
	(i)	Solve $(x-y^2x)dx=(y-x^2y)dy$	**04**
	(ii)	Solve $\frac{dy}{dx}+y\tan x=\sin 2x$	**03**
	(b)	Find power series solution of the equation $y'=2xy$	**07**
Q.2	**(a)**	Solve the p.d.e. $u_{xx}=16u_y$	**07**
	(b)	Attempt the following	
	(i)	Solve $(D^2+D-6)y=e^{2x}$	**04**
	(ii)	Solve $(D^3+D)y=\cos x$	**03**
		OR	
	(b)	Attempt the following	
	(i)	Solve $(D^2-5D+6)y=xe^{4x}$	**04**
	(ii)	Solve $(D^3+8)y=x^4+2x+1$	**03**
Q.3	**(a)**	Find Fourier series for $f(x)=x+x^2.-\pi<x<\pi$	**07**
	(b)	Find Fourier series for $f(x)=x^2,-1<x<1$	**07**
		OR	
Q.3	**(a)**	If $f(x)=\begin{cases}-1+x,-\pi<x<0\\ 1+x,0<x<\pi\end{cases}$. Find the Fourier series for *f(x)*.	**07**
	(b)	Find a Fourier sine series for $f(x)=\pi x-x^2,0<x<\pi$	**07**
Q.4	**(a)**	Solve $\frac{d^2y}{dt^2}-4y=24\cos 2t$ given that at $t=0.y=3$ and $\frac{dy}{dt}=4.$	**07**
	(b)	Using convolution theorem find $L^{-1}\left\{\frac{a}{s^2(s^2+a^2)}\right\}$	**07**
		OR	
Q.4	**(a)**	Attempt the following	
	(i)	Find $L\{u(t-4)(t-4)^2\}$	**04**
	(ii)	Find $L\{4te^{-t}\}$	**03**
	(b)	Attempt the following	
	(i)	Find $L^{-1}\left\{\frac{e^{-2s}}{s-3}\right\}$	**04**
	(ii)	Find $L^{-1}\left\{\frac{s+2}{s^2-2s+5}\right\}$	**03**
Q.5	**(a)**	Attempt the following	

	(i)	Define (1) Gamma Function and find $\sqrt{5/2}$ (2) Sawtooth wave function.	**04**
	(ii)	Form partial differential equation for $z=(x+a)(y+b)$	**03**
	(b)	Express the function $f(x)=\begin{cases}2, \lvert x\rvert<2\\ 0, \lvert x\rvert>2\end{cases}$ as a Fourier Integral.	**07**

OR

Q.5	**(a)**	Attempt the following	
	(i)	Solve the p.d.e. $u_{xy}=-u_x$	**04**
	(ii)	Find the complete integral of $(p+q)(z-px-qy)=1$	**03**
	(b)	Attempt the following	
	(i)	Solve $x^2p+y^2q=z^2$	**04**
	(ii)	Solve $p^2+q^2=4$	**03**

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