[B19 BS 1202]

I B. Tech II Semester (R19) Regular Examinations
MATHEMATICS – III
(Common to CE,CSE,ECE,EEE & IT)
MODEL QUESTION PAPER

TIME : 3 Hrs. **Max. Marks : 75 M**

Answer **ONE Question** from **EACH UNIT**
All questions carry equal marks
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	UNIT-I	**CO**	**KL**	**Marks**
1.a)	Find the Frier series for the function $f(t)=\begin{cases}-1, & -\pi<t<-\pi/2\\ 0, & -\pi/2<t<\pi/2\\ 1, & \pi/2<t<\pi\end{cases}$	CO1	K2	7
b)	Obtain Frier series of the function f(x) = 2x – x^2 in (0, 3) and hence deduce that $\frac{1}{1^2}-\frac{1}{2^2}+\frac{1}{3^2}-\frac{1}{4^2}+\cdots=\frac{\pi}{12}$	CO1	K2	8
(OR)				
2. a)	Obtain a Frier series for the function f(x) given by $f(x)=\begin{cases}1+\frac{2x}{\pi}, & \text{if } -\pi\le x\le 0\\ 1-\frac{2x}{\pi}, & \text{if } 0\le x\le \pi\end{cases}$ and deduce that $\frac{1}{1^2}+\frac{1}{3^2}+\frac{1}{5^2}+\cdots=\frac{\pi^2}{8}$	CO1	K2	8
b)	Find the Half – Range cosine series for the function f(x) = x^2 in the range $0\le x\le\pi$	CO1	K3	7
	UNIT-II			
3.a)	Using the Frier Sine Transform of e^{-ax} (a > 0), evaluate $\int_0^\infty \frac{x\sin kx}{a^2+x^2}\,dx$	CO2	K3	7
b)	Using Frier integral representation, show that $\int_0^\infty \frac{\omega\sin\omega x}{1+\omega^2}\,d\omega=\frac{\pi}{2}e^{-x},\ x>0$	CO2	K3	8
(OR)				
4. a)	Find the inverse Frier sine transform f(x) of $F_s(p)=\frac{p}{1+p^2}$	CO2	K2	8
b)	Using Parseval's Identity, prove that $\int_0^\infty \frac{x^2}{(1+x^2)^2}\,dx=\frac{\pi}{4}$	CO2	K3	7
	UNIT-III			
5.a)	Express $\int_0^\infty \sqrt{x}\,e^{-x^3}\,dx$ in terms of gamma function.	CO3	K2	7
b)	Express $\int_0^1 x^m(1-x^n)^p\,dx$ in terms of Gamma functions and hence evaluate $\int_0^1 x^7(1-x^5)^8\,dx$	CO3	K2	8

(OR)				
6. a)	Apply change the order of integration and evaluate $\int_0^\infty \int_x^\infty \frac{e^{-y}}{y} dy\,dx.$	CO3	K3	8
b)	Obtain the volume of the tetrahedron bnded by x = 0, y = 0, z = 0, x+y+z = 1.	CO3	K3	7
	UNIT-IV			
7.a)	Obtain the directional derivative of $\varphi = xy + yz + zx$ at A in the direction of AB where A= (1,2,-1) , B=(5,6,8) .	CO4	K2	8
b)	Determine curl (curl F) where $\bar{F} = x^2y\,\bar{I} - 2\,xz\,\bar{J} + 2\,yz\,\bar{K}$	CO4	K2	7
(OR)				
8. a)	Show that the vector$(x^2 - yz)\bar{\imath} + (y^2 - zx)\bar{\jmath} + (z^2 - xy)\bar{k}$ Is irrotational and find its scalar potential.	CO4	K2	8
b)	Determine the values of a and b such that the surface $a\,x^2 - b\,y\,z = (a+2)x$ and $4\,x^2y + z^3 = 4$ cut orthogonally at (1,-1, 2).	CO4	K2	7
	UNIT-V			
9.a)	Determine the work done in moving a particle once rnd the circle $x^2+y^2=9$ in the xy- plane by the force $\vec{F} = (2x - y - z)\bar{\imath} + (x + y - z^2)\bar{\jmath} + (3x - 2y + 4z)\bar{k}.$	CO5	K2	7
b)	Evaluate the line integral by Stokes's theorem for the vector function $\vec{F} = y^2\bar{\imath} + x^2\bar{\jmath} + (z + x)\bar{k}$and C is the triangle with vertices (0,0,0),(1,0,0) and (1,1,0).	CO6	K3	8
(OR)				
10	Verify Green's theorem in the plane $\int_C[(3x^2 - 8y^2)dx + (4y - 6xy)dy]$, where C is bndary of the region defined by y = $\sqrt{x}$, y = x^2	CO6	K3	15