

	Subject Code: KAS203'						03T						
Roll No:													

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## BTECH (SEM II) THEORY EXAMINATION 2021-22 ENGINEERING MATHEMATICS-II

Time:3 Hours Total Marks:100 Notes-

- Attempt all sections and assume any missing data.
- Appropriate marks are allotted to each question, answer accordingly.

SECTION -A		Attempt all of following question in brief	Marks (10×2=20)	CO	
Q.1(a)	Find the difforigins?	ferential equation which represents the family of straight li	nes passing through the	1	
Q.1(b)	State the cri differential	terion for linearly independent solutions of the homogeneous	ous linear nth order	1	
Q.1(c)	Evaluate: $\int_0^1$	$\frac{dx}{\sqrt{-logx}}$ .		2	
Q.1(d)	Find the vol	ume of the solid obtained by rotating the ellipse $x^2 + 9y^2$	= 9 about the <i>x</i> -axis.	2	
Q.1(e)	Test the seri	$\operatorname{les} \sum_{n=1}^{\infty} \frac{1}{n} \sin \frac{1}{n}.$		3	
Q.1(f)	Find the constant term when $f(x) = 1 +  x $ is expanded in Fourier series in the interval (-3, 3).				
Q.1(g)	Show that <i>f</i>	$\overline{z}(z) = z + 2\overline{z}$ is not analytic anywhere in the complex plan	ne.	4	
Q.1(h)		age of $ z - 2i  = 2$ under the mapping $w = \frac{1}{z}$ .	16.7×	4	
Q.1(i)	Expand $f(z) = e^{z/(z-2)}$ in a Laurent series about the point $z = 2$ .				
Q.1(j)	Discuss the	nature of singularity of $\frac{\cot \pi z}{(z-a)^2}$ at $z = a$ and $z = \infty$ .	1	5	

SEC	ΓΙΟΝ -B	Attempt any three of the following questions	Marks (3×10=30)	CO
Q.2(a)	Solve: $\frac{d^2x}{dt^2}$ +	$-\frac{dy}{dt} + 3x = e^{-t}$ , $\frac{d^2y}{dt^2} - 4\frac{dx}{dt} + 3y = \sin 2t$ .		1
Q.2(b)	Assuming Γ	$n \Gamma(1-n) = \pi \operatorname{cosec} n\pi, \ 0 < n < 1, \text{ show that } \int_0^\infty \frac{x^{p-1}}{1+x} dx = 0$	$\frac{\pi}{\sin n\pi}$ ; $0 .$	2
Q.2(c)		es $\frac{x}{1.2} + \frac{x^2}{3.4} + \frac{x^3}{5.6} + \frac{x^4}{7.8} + \cdots$		3
Q.2(d)	If $f(z) = u$ $f\left(\frac{\pi}{2}\right) = \frac{3-\pi}{2}$	$+iv$ is an analytic function, find $f(z)$ in term of $z$ if $u-v=\frac{c}{z}$ .	$\frac{y-\cos x + \sin x}{\cosh y - \cos x}$ when	4
Q.2(e)	Evaluate by	contour integration: $\int_0^{2\pi} e^{-\cos\theta} \cos(n\theta + \sin\theta) d\theta$ ; $n \in I$ .		5



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SECTION -C		Attempt any one of the following questions	Marks (1×10=10)	CO
Q.3(a)	Use the vari	ation of parameter method to solve the differential equation		1
		$(D^2 - 1)y = 2(1 - e^{-2x})^{-1/2}$		
Q.3(b)	Solve: (1 +	$(x)^{2} \frac{d^{2}y}{dx^{2}} + (1+x)\frac{dy}{dx} + y = 4\cos\log(1+x).$		1

SECTION -C		Attempt any one of the following questions	Marks (1×10=10)	CO
Q.4(a)	The arc of the cardioid $r = a(1 + \cos \theta)$ included between $-\frac{\pi}{2} \le \theta \le \frac{\pi}{2}$ is rotated about the			2
	line $=\frac{\pi}{2}$ . Find the area of surface generated.			
	Evaluate $\iiint xyz \sin(x+y+z)dx dy dz$ , the integral being extended to all positive values of			2
	the variables	s subject to the condition $+y + z \le \frac{\pi}{2}$ .		

SECTION -C		Attempt any one of the following questions	Marks (1×10=10)	CO
Q.5(a)	Test for con	vergence of the series $\frac{a+x}{1!} + \frac{(a+2x)^2}{2!} + \frac{(a+3x)^3}{3!} + \cdots$	ζ.	3
Q.5(b)		The series for the function $f(x) = \begin{cases} 1 + \frac{2x}{\pi}, & -\pi < x < 0 \\ 1 - \frac{2x}{\pi}, & 0 < x < \pi \end{cases}$ $\text{ce that } \frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \dots = \frac{\pi^2}{8}.$	155.775.	3

SECTION -C		Attempt any one of the following questions	Marks (1×10=10)	CO
Q.6(a)	Prove that $w = \frac{z}{1-z}$ maps the upper half of the z-plane onto upper half of the w-plane. What is			
	the image of the circle $ z  = 1$ under this transformation?			
Q.6(b)	Find a bilinear transformation which maps the points $i$ , $-i$ , 1 of the $z$ —plane into 0, 1, $\infty$ of the			4
	w – plane	respectively.		

	ΓΙΟΝ -C		Marks (1×10=10)	CO
Q.7(a)	Evaluate $\oint_c$	$\frac{e^{z}}{z(1-z)^{3}}dz$ , where c is (i) $ z  = \frac{1}{2}$ (ii) $ z-1  = \frac{1}{2}$ (iii) $ z $	= 2.	5
Q.7(b)		ylor's and Laurent's series which represent the function $\frac{z^2-1}{(z+2)(z+3)}$ $< 3$ (iii) $ z  > 3$ .	when $(i)  z  < 2$	5