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Important Note : 1. On completing your answers, compulsot..., draw diagonal 2. Any revealing of identification, appeal to evaluator and /or

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CBCS SCHEME

**15MAT11** 

## First Semester B.E. Degree Examination, June/July 2019 **Engineering Mathematics - I**

Time	: 3 hrs. Max. M	arks: 80
Ν	Note: Answer any FIVE full questions, choosing ONE full question from each mo	dule.
	Module-1	
1 a.	Find the n <sup>th</sup> derivative of $\frac{7x+6}{2x^2+7x+6}$	(05 Marks)
h	Find the angle between the radius vector and the tangent for the curve	
0	r'' = a' (cosm0 + sinm0).	(05  Marks)
U	$y = a(1 - \cos \theta)$ is $4 a\cos(\theta/2)$	(06  Marks)
	OR	
2 a	. If $x = sint$ and $y = cosmt$ , prove that $(1 - x^2)y_{,,,2}$ -	(05 Marks)
b	Find the pedal equation of the curve $r = a^{-1} \sec 20$ .	(05 Marks)
с	. Prove with usual notation tan 4) - $\frac{rd0}{dr}$ .	(06 Marks)
	Module-2	
a_	Expand $e^{\dagger}$ using Maclaurin's series upto third degree term.	(05 Marks)
b	. Evaluate $\begin{array}{c c} \lim_{X \to 0} & \begin{bmatrix} I & I \\ X & \sin^2 x \end{bmatrix}$	(05 Marks)
C	<b>If</b> $u = e^{(\mathbf{u} \div b_{\mathbf{y}})}$ flax - by), prove that $b \frac{Ai}{ax} + a \frac{au}{ay} = 2abu$	(06 Marks)
	OR	
<b>4</b> a	. Expand sin x in ascending power on $\sqrt{2}$ upto the term containing x .	(05 Marks)
b	b. If u tan' show that $x u_x + y u_y = \sin 2u$ .	(05 Marks)
с	If $u = {YZ \over w}$ , $w = {XY \over w}$ . Find ${a(u, v, w) \over a(x,y,z)}$	(06 Marks)
	Module-3	
5 a	Find the angle between the surfaces $x^2 + y^2 + z^2 = 9$ and $x^2 + y^2 z = 3$ at $(2, -1, 2)$ .	the point (05 Marks)
b	<b>5.</b> Show that $\mathbf{F} = (\mathbf{y} + \mathbf{z})\mathbf{i} + (\mathbf{x} + \mathbf{z})\mathbf{j} + (\mathbf{x} + \mathbf{y})\mathbf{k}$ is irrotational. Also find a scalar function	ion 4) such
	that $P = V4$ ).	(05 Marks)
С	2. Prove that $V - (4)X$ (I) $(V \cdot A) + V4 \cdot A$ .	(06 Marks)
	OR	
<b>6</b> a	. Prove that $Curl(4) A = 4(Curl A) + grad4 x X.$	(05 Marks)
b	A particle moves along the curve C ; $x = t^3 - 4t$ , $y = t^2 + 4t$ , $z = 8t^2 - 3t^3$ where	`e denotes
	the time. Find the component of acceleration at t = 2 along the tangent. www.FirstRanker.com	(05 Marks)

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c. Show that  $F = (2xy^2 + yz)i + (2x^2y + xz + 2yz^2)j + (2y^2z + xy)k$  is a conservative force

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## 15MAT11

field. Find its scalar potential. Module-4	(06 Marks)		
<sup>7</sup> a. Obtain the reduction formula for $j sing' x dx$	(05 Marks)		
b Solve $(y^2 ex'' + 4x^3)dx + (2xye''' - 3y^2)dy = 0$ .	(05 Marks)		
c. Find the orthogonal trajectories of $r = a$ (l+sin0).	(06 Marks)		
OR			
8 a. Evaluate $x-si2x - x^2 dx$	(05 Marks)		
$\int_{J} \int_{J} \int_{J$			
b. Solve $(y - 3x - 3x - 3xy) dx = 0$ . c. A bottle of mineral water at a room temperature of 72°F is kept in a refrigera	(05 Marks) ator where the		
temperature is 44°F. After half an hour, water cooled to 61°F			
i) What is the temperature of the mineral water in another half an hour?			
ii) How long will it take to cool to 50 F?	(06 Marks)		
Module-5			
9 a. Find the rank of the matrix			
$\mathbf{A} = \begin{bmatrix} 1 & 2 & 3 & -1 \\ 1 & 2 & 1 & -1 \end{bmatrix}$	(05 Marks)		
$\begin{bmatrix} 0 & 1 & 1 & -1 \end{bmatrix}$ b Find the largest eigen value and corresponding eigenvector of the matrix			
6 - 2.2			
$A = -23 - 1$ by power method taking $X^{(n)} = [1, 1]$	(05 Marks)		
2 - 3			
<b>D</b> be the matrix $A = \begin{bmatrix} -1 & 3 \end{bmatrix}$ to the diagonal form			
c. Reduce the matrix $A = \begin{bmatrix} -2 & 4 \end{bmatrix}$ to the diagonal form.	(UO MIARKS)		
10 a. Use Gauss elimination method to solve			
2x+y+4z=12			
4x+11y-z=33 8x $3y+2z=20$	(05 Marks)		
b. Find the inverse transformation of the following lin ear transformation.	(US Warks)		
$y_{1} = x_{1} + 2x_{2} + 5x_{3}$			
$y_2 = 2x, +4x, +1 lx_3$			
$y_3 = - x_1 + 2x_2$	(05 Marks)		
c. Reduce the quadratic form $2x$ ; $+ 2x + 2x + 2x_{i}x$ . to the Cannonical form.	(06 Marks)		

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