

SDM College of Engineering & Technology, Dharwad-02

Department of Mathematics




Academic Year: 2022-2023.


Minutes of meeting

IQAC was held on 13.1.2023 in the department of Mathematics, SDMCET, Dharwad to discuss the Internal Assessment question paper I / II / III of I semester UG in the Course Mathematics-I with Course Code 22MATS11/ 22MATC11/22MATE11/22MATM11.

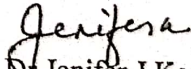
The following were observed / discussed

1. Course title of 22MATM11 to be Mathematics -I for MES stream
2. 3a) 'tangent vector' to be 'tangent' in 22MATS11
3. —

Sl.No	Member's present	Signature
1	Dr. JENIFER	
2	Dr. SHALLAJA	
3	Dr. VARSHA	
4		


Dr. Varsha D. Joshi

IQAC Co-ordinator


Dr. Jenifer J. Karmel

Chairman IQAC

Department of Mathematics

SDM COLLEGE OF ENGINEERING & TECHNOLOGY, DHARWAD

Department of Mathematics

Internal Assessment Test - I

Semester: 1 (AIML/CSE/ISE)

Date: 18/01/2023

Course Title : Mathematics-I for CSE stream

Time: 9-10am

Course Code : 22MATS11

Course Teacher(s): Dr.D.P.Basti,

Max Marks: 20

Dr.S.S.Shirkol,

Prof. P.B. Jinagouda

Note: Question 3 is compulsory. Also answer any one full question from Q1 and Q2.

- | | Marks/COs |
|---|-----------|
| Q1a Find the Radius of curvature for the curve $y^2 = \frac{4a^2(2a-x)}{x}$, where the curve meets the x-axis. | 05M/CO1 |
| b Expand $e^{\sin x}$ as Maclaurin's series up to the terms containing x^4 . | 05M/CO2 |
| Q2a Prove that the radius of curvature for the curve $r^n = a^n \cos n\theta$ varies inversely as r^{n-1} . | 05M/CO1 |
| b Evaluate $\lim_{x \rightarrow 0} \left[\frac{1}{x^2} - \frac{1}{\sin^2 x} \right]$ | 05M/CO2 |
| Q3a Find the angle between the radius vector and tangent (vector) to the curve $r^2 \cos 2\theta = a^2$ | 05M/CO1 |
| b Find the pedal equation of the polar curve $r = a(1 + \cos\theta)$. | 05M/CO1 |

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| Q3a | Find the angle between the radius vector and tangent to the curve $r^2 \cos 2\theta = a^2$. | 05M/CO1 |
| b | Find the pedal equation of the polar curve $r = a(1 + \cos \theta)$. | 05M/CO1 |

Point of intersection $(2a, 0)$ --- (1M)

$$x_1 = -\frac{x^2 y}{4a^3}, x_1(2a, 0) = 0 \quad \text{--- (1M)}$$

$$x_2 = -\frac{1}{4a^3} [x^2 + 2x x_1 y], x_2(2a, 0) = -\frac{1}{4} a \quad \text{--- (1M)}$$

$$\rho = \frac{(1+x_1^2)^{3/2}}{x_2} = -a, |\rho| = a \quad \text{--- (2M)}$$

b $y = e^{\sin x}, y(0) = 1, y_1(0) = 1, y_2(0) = 1, y_3(0) = 0, y_4(0) = -3$

$$e^{\sin x} = 1 + x + \frac{x^2}{2} - \frac{x^4}{8} \quad \text{up to third --- (3M)}$$

a $r^n = a^n \cos n\theta, r_1 = -r \tan n\theta, r_2 = -r_1 \tan n\theta = nr \sec^2 n\theta$

$$\rho = \frac{(r^2 + r_1^2)^{3/2}}{r^2 + 2r_1^2 - r r_2} = \frac{r}{1+n} \sec n\theta \quad \text{Formula --- (1M)}$$

$$= \left(\frac{a^n}{1+n}\right) \frac{1}{r^{n-1}} \therefore \rho \propto \frac{1}{r^{n-1}} \quad \text{--- (2M)}$$

$$\lim_{x \rightarrow 0} \left[\frac{1}{x^2} - \frac{1}{\sin^2 x} \right] = \lim_{x \rightarrow 0} \frac{\sin^2 x - x^2}{x^4} \cdot \lim_{x \rightarrow 0} \left(\frac{x}{\sin x} \right)^2 \quad \text{--- (2M)}$$

$$(0, -\infty) = \lim_{x \rightarrow 0} \frac{\cos 2x - 1}{6x^2} \quad \text{--- (2M)}$$

$$= -\frac{1}{3} \quad \text{--- (1M)}$$

a $r^2 \cos 2\theta = a^2$
 $2 \log r + \log(\cos 2\theta) = 2 \log a$

$$\frac{1}{r} \frac{dr}{d\theta} = \tan 2\theta \quad \text{--- (4M)}$$

$$\cot \phi = \cot(\pi/2 - 2\theta) \quad \text{--- (1M)}$$

$$\phi = \pi/2 - 2\theta$$

b $r = a(1 + \cos \theta)$

$$\cot \phi = -\tan(\theta/2) = \cot(\pi/2 + \theta/2), \phi = \pi/2 + \theta/2 \quad \text{--- (2M)}$$

$$\rho = r \sin \phi \quad \text{--- (1M)}$$

$$\rho = r \cos(\theta/2)$$

$$\frac{\rho^2}{r^2} = \cos^2(\theta/2) \quad (r = 2a \cos^2(\theta/2))$$

$$\frac{\rho^2}{r^2} = \frac{r}{2a}$$

$$\Rightarrow r^3 = 2a\rho^2 \text{ is pedal equation. --- (2M)}$$