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 strea
2. 3a) 'tangent vector' to be 'tangent' in 22MATS11
3. —

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

Dr.Varsha D.Joshi

IQAC Co-ordinator

Dr.Jenifer J.Karnel

Chairman IQAC

Department of Mathematics

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SDM COLLEGE OF ENGINEERING & TECHNOLOGY, DHARWAD

Department of Mathematics

Internal Assessment Test - I

Semester: I (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 $\lim_{x\to 0}\left[\frac{1}{x^2} - \frac{1}{\sin^2 x}\right]$	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

IQAC

1.

2. Jenifer

3.

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SDM COLLEGE OF ENGINEERING & TECHNOLOGY, DHARWAD

Department of Mathematics

Internal Assessment Test - I

Semester:I(AIML/CSE/ISE) Date: 18/01/2023

CourseTitle:Mathematics-I for CSE stream Time: 9-10am

Course Code : 22MATS11

Course Teacher(s):Dr.D.P.Basti, Dr.S.S.Shirkol, Prof. P.B. Jinagouda Max Marks: 20

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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 $\lim_{x\to 0}\left[\frac{1}{x^2} - \frac{1}{\sin^2 x}\right]$	05M/CO2
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

College of Engineering & Technology, Dhanwad.
Dept. of Mathematics
I A - I Scheme and Solution
Branch: AIML/CSE/ISE
Max. Marks: 20
Date: 18/01/23

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

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

$\rho_2 = -\frac{1}{4a^3}[x^2 + 2x\rho_1 y]$, $\rho_{2(2a,0)} = -1/a$ ---------- (1M)

$\rho = \frac{(1+\rho_1^2)^{3/2}}{\rho_2} = -a$, $|\rho| = a$ ---------- (2M)

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

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

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

Formula ---------- 2M

$\rho = \frac{(r^2 + r_1^2)^{3/2}}{r^2 + 2r_1^2 - rr_2} = \frac{r}{1+n}\sec n\theta$ ---------- (1M)

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

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

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

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

a $r^2 \cos 2\theta = a^2$

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

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

$\cot\phi = \cot(\pi/2 - 2\theta)$

$\phi = \pi/2 - 2\theta$ ---------- (1M)

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

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

$p = r\sin\phi$

$p = r\cos(\theta/2)$ ---------- (1M)

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

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

$\Rightarrow r^3 = 2ap^2$ is pedal equation. ---------- (2M)