Mathematics

Internal Exam (2021-24)

Sem - I   Core Paper - I   F.M - 15

Answer any three ques.

Q.1 Separate $\tan^{-1}(\alpha + i\beta)$ into real & imaginary parts.

Q.2 If $y^{1/m} - y^{-1/m} = 2x$, Prove that

$$(x^2+1)y_2 + xy_1 - m^2 y = 0$$

Q.3. Find asymptotes of the curve

$$y^3 - xy^2 - x^2y + x^3 + x^2 - y^2 - 1 = 0$$

Q.4 Find the Reduction formula for

$$\int_0^{\pi/2} \cos^n x\, dx$$

Q.5 Find arc length of the cardioid

$$r = (1-\cos\theta)$$

Q.6. The cardioid $r = a(1+\cos\theta)$ revolves about the initial line $\theta = 0$. Find the volume & surface area of the solid of revolution.

Mathematics

Internal Exam (2021-24)

Sem - I Paper - II F.M - 15

Answer any three ques but Q.N.01 is compulsory.

Q.1 (a) Define a Relation.

(b) Solve $x^4+x^2+1=0$

(c) Define ~~[illegible]~~ vector space.

(d) Define Rank of matrix

(e) Define elementry matrix.

~~Or~~

Q.2 If $i^{\alpha+i\beta} = \alpha+i\beta$, Show that $\alpha^2+\beta^2 = e^{-(4r+1)\pi\beta}$

Q.3 Show that the relation of congruent modulo m on the set Z of integers is an equivalance relation.

Q.4. State & prove Fundamental theorem of Arithmetic.

Q.5 Show that $10^n + 3.4^{n+2} + 5$ is divisible by 9.

Q.6 Show that the matrix ~~A~~ =

$$A = \begin{bmatrix} 2 & 2 & 1 \\ 1 & 3 & 1 \\ 1 & 2 & 2 \end{bmatrix}$$

satisfies its own characteristic equation.

Mathematics

Internal Exam. (2021-24)

Sem - I Paper . GE F.M. - 15

Answer any three ques but Q.N.01 is compulsory.

1. (a) Define ϵ-δ Limit
   (b) Define successive differentiation.
   (c) Define partial differentiation.
   (d) Define singular points.
   (e) Define curl & divergence.

(2) State & prove Leibnitz's theorem.

(3) If $y^{1/m} - y^{-1/m} = 2x$, prove that
$$(x^2+1)y_2 + xy_1 - m^2 y = 0$$

(4) find the Reduction formula $\int_0 \sin^n x \, dx$.

(5) Find the entire length of astroid.
$$x^{2/3} + y^{2/3} = a^{2/3}$$

(6) Find the volume and the surface area of the solid generated by revolving the cycloid $x = a(\theta + \sin\theta)$, $y = a(1+\cos\theta)$ about its base.