CIVIL/MECH/ATUO/EE/EEE/METAL/ECE

II SEMESTER DIPLOMA SPECIAL EXAM 2015

Subject – Engg. Mathematics **F. M. - 100**
Sub. Code – EMS12013 (A) **P. M. - 40**
Time - 3 Hrs.

This question paper is divided into TWO parts.
Part-I is compulsory containing 10 objective questions each of 2 marks.
Answer any FIVE questions from Part-II each of 16 marks.

PART-I

1. Choose the correct option of the following:

(i) $\lim_{x \to a} \frac{x^n - a^n}{x-a}$, $a > 0$ is equal to

(a) $n.x^{n-1}$ (b) $a\,x^{n-1}$ (c) $n\,a^{n-1}$ (d) None

(ii) The function $f(x) = |cosx|$ is

(a) odd function (b) even function (c) odd & even both (d) None

(iii) If $y = a^x$, then $\frac{dy}{dx} =$ _____

(a) $a^x loga$ (b) $loga^x$ (c) $a^x logx$ (d) None

(iv) If $y = \cos x^3$, then $\frac{dy}{dx} =$ _____

(a) $-3\sin x^3$ (b) $-3x\sin x^3$ (c) $-3x^2\sin x^3$ (d) None

(v) The tangent to a curve $y = f(x)$ at a point is parallel to the $x - axis$ if and only if

(a) $\frac{dx}{dy} = 0$ (b) $\frac{dy}{dx} = 0$ (c) $\frac{dx}{dy} = 1$ (d) $\frac{dy}{dx} = 1$

(vi) Radius of curvature for the curve whose equation is given is terms of S & φ

(a) $S = \frac{ds}{d\varphi}$ (b) $\rho = \frac{d\psi}{ds}$ (c) $d\psi\, ds$ (d) None

(vii)Value of ω^{16} is

(a) ω (b) ω^r (c) 1 (d) 0

(viii) Co-efficient of Standard deviation is _____.

(a) $\frac{\sigma}{A}$ (b) $\frac{A}{\sigma}$ (c) σA (d) None

(ix) If n be $a + ve\ or - ve$ integer then

(a) $(Cos\theta + isin\theta)^n = cosn\theta + isinn\theta$ (b) $(Cos\theta - isin\theta)^n = n(cosn\theta + isinn\theta)$

(c) $(Cos\theta + isin\theta)^n = n(cos\theta + isin\theta)$ (d) None

(x) The value of $Cosh^2\theta - Sinh^2\theta =$ _____

(a) -1 (b) 0 (c) 1 (d) 2

P.T.O

Total = 42
KICP - 16
KKEP 26
42

PART-II

2. (a) Evaluate $\lim_{x \to 0} \frac{(Cosec\theta - cot\theta)}{x}$

(b) Find the differential coefficient of sinax w.r.to x by 1st Principle.

3. Answer any TWO:

(i) Find $\frac{dy}{dx}$, if $y = \sqrt{cot\sqrt{x}}$

(ii) If $x\sqrt{1+y} + y\sqrt{1+x} = 0$ Prove that $\frac{dy}{dx} = \frac{1}{1+x^2}$

(iii) If $x^a y^b = (x+y)^{a+b}$ Prove that $\frac{dy}{dx} = \frac{y}{x}$

4. (a) If $y = (tan^{-1}x)^2$, Prove that $(1+x^2)^2 \frac{d^2y}{dx^2} + 2x(1+x^2)\frac{dy}{dx} = 2$

(b) Find $\frac{dy}{dx}$, when $x = \frac{3at}{1+t^2}$, $y = \frac{3at^2}{1+t^2}$, $y = \frac{3at^2}{1+t^2}$

5. (a) Show that the tangents to the cume $y = 2x^3 - 4$ at the points $x = 2$ and $x = -2$ are parallel.

(b) Find the maximum value of $\frac{logx}{x}$.

6. (a) Find the mean deviation of the following data:

Class	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50
Frequency	5	7	4	3	2

(b). Find the S.D of the following distribution:

Marks	0 – 4	5 – 9	10 – 14	15 – 19	20 – 24
No. of Students	2	5	7	13	21

7. Find the mode of the following distribution by Graphical represtation:

Size	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50
Frequency	20	30	50	40	10

8. (a) Prove that $\left(\frac{1+cos\theta+isin\theta}{1+cos\theta-isin\theta}\right)^n = cosn\theta + i\, sinn\theta$

(b) Find the three values of $(1+i)^{1/3}$

9. (a) Prove that $cosh^2\theta - sinh^2\theta = 1$.

(b) Prove that $Sinh2\theta = 2sinh\theta cosh\theta$.

10.(a) If $f(x) = log\left(\frac{1+x}{1-x}\right)$, show that $f\left(\frac{2x}{1+x^2}\right) = 2f(x)$.

(b) Simplify $\frac{(cos2\theta - isin2\theta)^7 \ (cos3\theta + isin3\theta)^{-5}}{(cos4\theta + isin4\theta)^{12} \ (cos5\theta - isin5\theta)^{-6}}$.

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