

DAE/IA-2017/05 SECOND YEAR

(Common with Bio Medical, Computer, Food
Computer Information, Electrical, Electronics,
Food Processing & Preservation, Instrument, Critical Health Care and
Telecommunication Technologies.)

MATH-233 APPLIED MATHEMATICS – II

PAPER 'A' (Subjective)

Time: 2:30 Hours

SECTION – I

Marks: 60

Q.1: Write short answer to any Eighteen (18) of the questions: -

18 × 2 = 36

1. If $f(x) = \frac{x^2 - 3}{x + 4}$, find $f(-3)$.
2. Is the following function even, odd or neither: $f(x) = 4x^3 - 2x + 6$
3. Evaluate: $\lim_{x \rightarrow 3} \sqrt{25 - x^2}$
4. Evaluate: $\lim_{x \rightarrow 0} \frac{\tan x}{x}$.
5. Differentiate $\frac{6}{x} + \frac{4}{x^2} - \frac{3}{x^3}$ w.r.t. 'x'.
6. Find $\frac{dy}{dx}$ if $x^3 + y^3 + 4 = 0$
7. Find $\frac{dy}{dx}$ if $x = \theta^2 - \theta - 1, y = 2\theta^2 + \theta + 1$.
8. Differentiate $\sqrt[3]{x^2 + 9x + 8}$ w.r.t. 'x'.
9. If $y = \frac{x}{1+x}$, Find $\frac{dy}{dx}$
10. Differentiate $\cos^2(ax+b)$ w.r.t. 'x'.
11. Find the derivative of $x^2 \tan x$.
12. Differentiate $x \ln x - x$ w.r.t. 'x'.
13. Find $\frac{dy}{dx}$ of $e^x \ln x$
14. If $y = \tan(p \tan^{-1} x)$, show that: $(1 + x^2) \frac{dy}{dx} = p(1 + y^2)$
15. Differentiate $\sin x$ w.r.t. $\tan x$.
16. Differentiate $\sin^{-1} \sqrt{x}$ w.r.t. 'x'.
17. Find the critical values (or turning points) for x of the function $x^2 - 4x - 1$.
18. Find the extreme values of the function $x^2 - 4x - 6$.
19. Find the mean of the following scores 4, 0, 2, 9, 0.
20. Find standard deviation of the values: 2, 4, 6, 8, 10.
21. Define median.
22. If $f(x) = a^x$, show that $f(-p) = \frac{1}{f(p)}$.
23. Find $\frac{dy}{dx}$ if $y = x \sin^{-1} x$.
24. Differentiate $\ln \sqrt{x}$ w.r.t. 'x'.
25. The velocity V m/S of a point moving in a straight line is given after t second by $V = 3t^2 + 4t$ find the acceleration after 2 second.
26. Find $\frac{dy}{dx}$ if $y = x^3 + x^2 + 2x + 3$.
27. Evaluate $\lim_{x \rightarrow \infty} \left(1 - \frac{1}{x}\right)^x$.

SECTION - II

Note: Attempt any three (03) questions.

3 × 8 = 24

Q.2. (a) Show that $\frac{e^x + 1}{e^x - 1}$ is an odd function of x.

(b) Evaluate $\lim_{\theta \rightarrow 0} \frac{1 - \cos \theta}{\theta \sin \theta}$

Q.3. (a) Differentiate $\sqrt{\frac{a+x}{a-x}}$ w.r.t. 'x'.

(b) Differentiate $\ln\left(\frac{x}{\sqrt{1+x^2}}\right)$ w.r.t. 'x'.

Q.4. (a) If $xy = \cos(x+y)$, show that $\frac{dy}{dx} + \frac{y + \sin(x+y)}{x + \sin(x+y)} = 0$

(b) Find the derivative of $x^2 \sec 4x$.

Q.5. Find the maximum and minimum (extreme) values of the following function:

$$\frac{x^3}{3} - \frac{3x^2}{2} + 2x + 5.$$

Q.6. Find the standard deviation for the following data:

Marks	Frequency
10 – 20	6
20 – 30	12
30 – 40	20
40 – 50	24
50 – 60	10
60 – 70	4
70 – 80	4
