

DAE/IA-2016/08 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 $f(x) = 3x^2 - 5x + 7$, find $f(4)$
2. Is the function even, odd or neither? $f(x) = x\sqrt{x^2 - 1}$
3. Evaluate $\lim_{x \rightarrow 1} \frac{x^2 - 1}{x - 1}$
4. Evaluate: $\lim_{x \rightarrow 0} \frac{1 - \cos x}{\sin^2 x}$.
5. Differentiate w.r.t. 'x': $-5 + 3x - \frac{3}{2}x^2 - 7x^3$
6. Find $\frac{dy}{dx}$ if $x^{2/3} + y^{2/3} = a^{2/3}$
7. Find $\frac{dy}{dx}$ when $x = at^2$, $y = 2at$.
8. Differentiate $\frac{x}{x^2 + 1}$ w.r.t. 'x'
9. Differentiate $\sin(\tan x)$ w.r.t. 'x'.
10. Find the derivative of $x^2 \sec 4x$.
11. Differentiate $\sin^{-1} x^2$ w.r.t. 'x'.
12. Differentiate $\frac{x}{\ln x}$ w.r.t. 'x'.
13. Find $\frac{dy}{dx}$ for $e^{\sqrt{x+1}}$..
14. Find the derivative of $x \cot x$ w.r.t. 'x'.
15. Differentiate $x \ln 3x$ w.r.t. 'x'.
16. Differentiate $\cos x$ w.r.t. $\tan x$.
17. Find the critical values (a turning point) for x of the function $2x^4 - x^2$
18. Find the maximum and minimum (extreme) values of the function $x^2(x - 3)$.
19. Find the mean of the scores 0, 1, 4, 5, 9, 9.
20. Define median.
21. Find standard deviation of the values: 2, 4, 6, 8, 10.
22. If a die is rolled once, what is the probability of getting a 4?
23. If $f(x) = 3x^3 + 2x^2 - x + 4$, prove that: $2f(3) = 25f(1)$
24. If $y = \sqrt{\tan x + \sqrt{\tan x + \sqrt{\tan x + \dots \infty}}}$, prove that: $(2y - 1) \frac{dy}{dx} = \sec^2 x$
25. Differentiate $(x^2 + 3x + 9)^{3/2}$ w.r.t. 'x'.
26. Find $\frac{dy}{dx}$ of $e^x \ln x$.
27. The distance x meters moved by a point in t seconds is given by $x = t^3 + 3t^2 + 4$. Find the velocity and acceleration after 3 seconds.

SECTION - II

Note: Attempt any three (03) questions.

3 × 8 = 24

Q.2: (a) Prove that: $f[f(x)] = x$, for the function $f(x) = \frac{x+1}{x-1}$

(b) Evaluate: $\lim_{x \rightarrow 0} \frac{\sqrt{4+x} - 2}{x}$

Q.3: (a) Differentiate $\left(\frac{x+1}{x-1}\right)^2$ w.r.t. 'x'.

(b) Find $\frac{dy}{dx}$ for $e^{ax} \sin bx$.

Q.4: (a) If $\sin y = x \sin(a+y)$, prove that: $\frac{dy}{dx} = \frac{\sin^2(a+y)}{\sin a}$

(b) Differentiate $\tan^{-1}(\sec x + \tan x)$ w.r.t. 'x'.

Q.5: Find the maximum and minimum (extreme) values of the following function. $(x-2)^2(x-1)$.

Q.6: Compute mean from the data given:

Class Interval	Frequency
0 – 5	4
5 – 10	6
10 – 15	10
15 – 20	16
20 – 25	12
25 – 30	8
30 – 35	4
