

DAE/IA-2018/05 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. Is the following function even, odd or neither: $f(x) = 4x^3 - 2x + 6$.
2. Evaluate: $\lim_{x \rightarrow a} \frac{\sqrt{x} - \sqrt{a}}{x - a}$
3. Evaluate: $\lim_{x \rightarrow 0} \frac{\tan x}{x}$
4. Find $\lim_{x \rightarrow 0} \left(1 + \frac{x}{3}\right)^{\frac{1}{x}}$.
5. Differentiate x^3 w.r.t. x by ab-initio.
6. Find the derivative of $(3 - x^2)(x^3 - x + 1)$ w.r.t. ' x '.
7. Find $\frac{dy}{dx}$ if $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$
8. If $y = 5x^3 - 7x^2 + 9 - \frac{8}{x} + \frac{7}{x^4}$, find $\frac{dy}{dx}$.
9. If $y = \frac{x^2 + 1}{x - 1}$, find $\frac{dy}{dx}$ at $x = 2$.
10. Differentiate $\sin(\tan x)$ w.r.t. ' x '.
11. Find the derivative of $\sin^{-1}\left(\frac{x}{a}\right)$.
12. Find the value of $\frac{d}{dx}(x^x)$.
13. Differentiate $\frac{x}{\ln x}$ w.r.t. ' x '.
14. Find $\frac{dy}{dx}$ for $e^{\sqrt{x+1}}$.
15. Differentiate $\sin^{-1} x$ w.r.t. $\cos^{-1} x$.
16. Find $\frac{dy}{dx}$ if $x = a\theta^3$, $y = b\left(\theta - \frac{1}{\theta}\right)$.
17. Find the derivative w.r.t. ' x ' of $x\sqrt{x+1}$.
18. Calculate the limit $\lim_{x \rightarrow \infty} \frac{x^2 + 1}{2x^3 - x}$.
19. Find the slope of the tangent to the curve $y = \sin 2x$ at $x = \frac{\pi}{6}$.
20. Find the turning points of the curve $y = 2x^3 - 15x^2 + 36x + 10$.
21. If $s = \log t$, find the velocity and acceleration at $t = 3$ sec.
22. If mode = 15, Median = 12 find mean.
23. Find standard deviation of the values: 2, 4, 6, 8, 10.
24. Write formula to find the mode of a grouped frequency distribution.
25. A fair coin is tossed twice what is the probability that we get at least on head.
26. If a die is rolled once, what is the probability of getting a 4?
27. Write down the formula to find the probability of two not mutually exclusive events.

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 $\lim_{x \rightarrow 0} \frac{\operatorname{cosec} x - \cot x}{x}$.

Q.3. (a) Differentiate $\frac{x}{(a^2 + x^2)^{3/2}}$ w.r.t. 'x'.

(b) Find $\frac{dy}{dx}$ if $x = \frac{1-t^2}{1+t^2}$, $y = \frac{2t}{1+t^2}$.

Q.4. (a) Find the derivative w.r.t. 'x': $\sqrt{\frac{1-\cos x}{1+\cos x}}$

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

Q.5. (a) If $y = \cos x + \ln \tan \frac{x}{2}$, find $\frac{dy}{dx}$.

(b) Discuss for the relative maxima and minima $y = x + \frac{1}{x}$.

Q.6. (a) Calculate the standard deviation from the following data:

Size Item	Frequency
2	9
3	6
4	2
5	2
6	2
7	4
8	3
9	3
10	2
11	3

(b) Two fair dice are rolled. Find the probability that the sum is 6 or 8.
