

DAE/IA-2019/05 SECOND YEAR

(Common with Bio Medical, Computer, Food
Computer Information, Electrical, Electronics,
Food Processing & Preservation, Instrumental, 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. Find the value of $\lim_{x \rightarrow 2} \frac{x^3 - 8}{x^2 - 3x + 2}$
2. Find the value of $\lim_{x \rightarrow 1} \frac{x^2 + x - 2}{x^2 - x}$.
3. Find: $\lim_{x \rightarrow 0} \frac{\sqrt{1+x} - 1}{x}$.
4. Find the value of $\lim_{x \rightarrow 0} \frac{\sqrt{4+x} - 2}{x}$.
5. Find $\frac{dy}{dx}$ if $x = t + 2$, $y = 2t^2 + 2$.
6. Find $\frac{dy}{dx}$ if $x = \theta^2 - \theta - 1$, $y = 2\theta^2 + \theta + 1$.
7. Find $\frac{dy}{dx}$ if $x = u + \frac{1}{u}$, $y = u - \frac{1}{u}$.
8. Differentiate $\frac{x^3}{1+x^3}$ w.r.t. x^3 .
9. Differentiate $\frac{x^2}{1+x^2}$ w.r.t. x^2 .
10. Show that if $x = a\theta^2$, $y = 2a\theta$, then $y \frac{dy}{dx} - 2a = 0$.
11. Differentiate $\cos^2(ax+b)$ w.r.t. ' x '.
12. Differentiate $\operatorname{cosec}^2 3x$ w.r.t. ' x '.
13. Differentiate $\sec \sqrt{a+bx}$ w.r.t. ' x '.
14. Differentiate $\sin(\tan x)$ w.r.t. ' x '.
15. Differentiate $\cot^3(3x+1)$
16. Differentiate $\sin[\sin(\cos x)]$ w.r.t. ' x '.
17. Find the derivative of $x^2 \tan x$.
18. Find the turning (or critical point of the curve $y = \sin 2x$ between 0 and $\frac{\pi}{2}$).
19. Find the turning points of the curve $y = x^2 - 3x + 3$.
20. Find the turning points of the curve $y = 2x^3 - 15x^2 + 36x + 10$
21. Find the extreme values of the function $x^2 - 4x - 6$.
22. Calculate the median for 88.03, 94.50, 94.90, 95.05, 84.50.
23. Write the formula to find median for grouped frequency distribution.
24. Define standard deviation.
25. If a dice is rolled. What is the probability that an even no divisible by 3 appears?
26. If two dice are rolled, find the probability that the sum is 7.
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) If $f(x) = \log\left(\frac{1-x}{1+x}\right)$, Prove that : $f(x) + f(y) = f\left(\frac{x+y}{1+xy}\right)$.

(b) Evaluate: $\lim_{\theta \rightarrow 0} \frac{\tan \theta - \sin \theta}{\sin^3 \theta}$.

Q.3. (a) If $\frac{1-t^2}{1+t^2}$, $y = \frac{2t}{1+t^2}$ prove that $y \frac{dy}{dx} + x = 0$.

(b) Find $\frac{dy}{dx}$ if $x = a\left(\frac{t^2}{2} - t\right)$, $y = b\left(\frac{t^3}{3} - \frac{t^2}{2}\right)$.

Q.4. (a) Find $\frac{dy}{dx}$ when $x = a(\cos t + \sin t)$, $y = a(\sin t - t \cos t)$.

(b) Find the derivative of $x^x + x^{\sin x}$.

Q.5. Find the maximum and minimum (extreme) values of the function $(x-2)^3(x-3)^2$.

Q.6. Calculate A.M. and median from the following data.

Marks	15	17	18	19	20	25	26	27	28	29	30	31
Boys	30	34	9	38	15	50	52	81	56	58	15	62

(b) A die is thrown, find the probability that the dots on the top are prime numbers or odd numbers.
