Reg. No. ☐☐☐☐☐☐☐☐

I Semester B.C.A.2 Examination, November/December 2017
(Repeater)
MATHEMATICS – I

Time : 3 Hours

Max. Marks : 80

Instruction : *All* Parts are **compulsory**.

PART – I

Answer **any ten** questions.

(10×2=20)

1. Define Arithmetic mean.

2. If $n = 10$ and $r = 4$, find ^nC_r.

3. Find the sum and product of roots of a_n equation $4x^2 + 9x - 3 = 0$.

4. Prove that $\sin\theta \cdot \mathrm{cosec}\,\theta = 1$.

5. Prove that $\sin 60° \cdot \sin 30° + \cos 60° \cdot \cos 30° = \sin 60°$.

6. Solve $\lim\limits_{x\to 0} (2x^2 + 8x - 2)$.

7. Evaluate $\lim\limits_{x\to 3} \dfrac{x^3 - 4}{x^2 + 2}$.

8. Differentiate $\dfrac{d}{dx}\left(xe^x\right)$.

9. Differentiate x^n w.r.t. x from first principle.

10. Find the distance between the points $A(a, -4a)$ and $B(3a, -a)$.

11. Find the equation of straight line given its intercept on axis $(-4, 5)$.

12. Show that $2x - 4y + 5 = 0$ and $6y = 8x - 3$ are parallel.

P.T.O.

PART – II

Answer **any six** questions :   (6×5=30)

13. The sum of n terms of progression is $\frac{8}{3}\left(1 - \frac{1}{3^n}\right)$, show that it is a G.P.

14. Resolve $\frac{5}{1 - 4x + 8x^2}$ into partial fractions.

15. Prove $1.3 + 2.4 + 3.5 + ... + n = \frac{n(n+1)(2n+7)}{6}$ by Mathematical Induction.

16. Prove that $\frac{\sin A + \sin 3A + \sin 5A + \sin 7A}{\cos A + \cos 3A + \cos 5A + \cos 7A} = \tan 4A$.

17. Differentiate $\sin^3 \cos^2 x$ w.r.t. x.

18. Differentiate $\cos ax$ w.r.t. x from first principle.

19. If $\cot\left(\frac{A}{2}\right) = \frac{b + c}{a}$ then show that the triangle ABC is right angled.

20. Find the equation of straight line making intercept x and y axis as a and b.

PART – III

Answer **any three full** questions.   (3×10=30)

21. a) Find 6th term in expansion $\left[3x^3 - \frac{4}{x}\right]^{10}$.

    b) Find the number of permutations of the word "KARNATAK" also when '2K's are together.   (5+5)

22. a) In any triangle ABC prove that $a(b \cdot \cos c = c \cdot \cos B) = b^2 - c^2$.

    b) The horizontal distance between two towers is 50 meters and the angle of depression of the top of the first tower as seen from the top of the second tower which is 150 meters high is 30°. Find the height of the first tower.   (5+5)

23. a) Define $f(x) = \begin{cases} -2, & x < 0 \\ 0, & x = 0 \\ 2, & x > 0 \end{cases}$ show that $\lim_{x \to 0} f(x)$ does not exist.

b) Solve the triangle ABC in which a = $\sqrt{4}$, b = 2 and c = $\sqrt{5}$ − 1. **(5+5)**

24. a) Differentiate $x \cdot e^x \cdot \cos x$ w.r.t. x.

b) Differentiate $\dfrac{x^2 \log x}{x - 2}$ w.r.t. x. **(5+5)**

25. a) Find the co-ordinates of the points of trisection of the line joining the points (5, − 6) and (− 3, 4).

b) Find the tangent of the angle between the lines x + 4y − 1 = 0, 4x + y + 8 = 0.

(5+5)

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