



22122/A 220

Reg. No.

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I Semester B.C.A.2 Degree Examination, Nov./Dec. 2016  
(Repeaters)  
MATHEMATICS – I

Time : 3 Hours

Max. Marks : 80

- Instructions:** 1) Question paper has **three** Sections. Answer **all** the **three** Sections.  
2) Section – **A** carries **20** marks, Section – **B** carries **30** marks and Section – **C** carries **30** marks.

SECTION – A

Answer **any ten** questions.

(10×2=20)

1. The fourth term of A.P. whose common difference is  $-2$ , is 15. Find eighth term of A.P.
2. If  ${}^n P_3 = 24$  find 'n'.
3. If  $\alpha$  and  $\beta$  are the roots of equation  $2x^2 + 4x - 5 = 0$ , find the value of  $\alpha + \beta$  and  $\alpha\beta$ .
4. Prove that  $\tan \theta \cot \theta = 1$ .
5. Find the value of  $\sin (600^\circ)$ .
6. Evaluate  $\lim_{x \rightarrow 1} (2x^2 - 3x + 4)$ .
7. Evaluate  $\lim_{x \rightarrow -2} \frac{x^7 + 128}{x + 2}$ .
8. Differentiate  $\frac{d}{dx} (x^3 \cos x)$ .

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9. Find  $\frac{d^2y}{dx^2}$  if  $y = \sin 2x$ .
10. Find the distance between the points (5, 2) and (9, 5).
11. Find the equation of straight line given its intercept on axes (4, -7).
12. Show that  $4x - 7y = 2$  and  $7x + 4y - 5 = 0$  are perpendicular.

## SECTION – B

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

13. In a H.P. the seventh term is  $\frac{1}{20}$  and thirteenth term is  $\frac{1}{38}$ . Find the fourteenth term.
14. Resolve into partial fractions  $\frac{3x + 5}{(x - 1)(x + 2)}$ .
15. A person is at the top of a tower 75 feet high. From there, he observes a vertical pole and finds the angles of depressions of the top and the bottom of the pole which are  $30^\circ$  and  $60^\circ$  respectively. Find the height of the pole.
16. Prove that  $\sqrt{\frac{1 + \sin A}{1 - \sin A}} = \sec A + \tan A$ .
17. Evaluate  $\lim_{x \rightarrow 2} \frac{x^2 - 5x + 6}{x^2 + 3x - 10}$ .
18. Differentiate  $\sin x$  w.r.t. 'x' from first principle.
19. Show that the points (2, -3), (-6, 5) and (-8, 7) are collinear.
20. Find the co-ordinates of the point which divides
- Internally
  - Externally, the line joining the points (-3, 6) and (4, -7) in the ratio 5 : 7.



SECTION – C

Answer **any three full** questions :

**(3×10=30)**

21. a) Find the 12<sup>th</sup> term in the expansion of  $\left(x + \frac{1}{x}\right)^{13}$ .
- b) Find the number of permutations of the letters of the word ENGINEERING and how many of these begin with E ? **(5+5)**
22. a) Prove that  $\tan A + \cot A = \sec A \operatorname{cosec} A$ .
- b) Find the value of  $\cos 75^\circ$ . **(5+5)**
23. a) Check whether the function  $f(x) = \begin{cases} x^2, & 0 \leq x \leq 1 \\ x^2 + 2x - 3, & x > 1 \end{cases}$  is continuous at  $x = 1$ .
- b) Solve the triangle ABC, given that  $a = 2$ ,  $c = \sqrt{3} + 1$  and  $B = 60^\circ$ . **(5+5)**
24. a) Differentiate  $ax^3 + bx^2 + cx + d + \frac{e}{x} + \frac{f}{x^2} + \frac{g}{x^3}$  w.r.t. 'x' where a, b, c, d, e, f, g are constants.
- b) Differentiate  $\frac{ax^2 + bx + c}{\sqrt{x}}$  w.r.t. 'x' where a, b, c are constants. **(5+5)**
25. a) Show that the points A(2, -4), B(4, -2), C(7, 1) are collinear.
- b) Find the equation of the line passing through (-3, 2) and making an angle of  $135^\circ$  with positive x-axis. **(5+5)**
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