Roll No. .....

D–3830

B. C. A. (Part I, II, III) EXAMINATION, 2020

(New + Old Course)

(Only for Non-Mathematical Students)

BRIDGE COURSE

Time : Three Hours] [*Maximum Marks : 50*

[*Minimum Pass Marks : 20*

Note : All questions are compulsory. Attempt any *two* parts from each question. All questions carry equal marks.

Unit—I

1. (a) Show that the sequence 9, 12, 15, 18, ... is an A. P. Find its 16th term and the general term.

   (b) The third term of a G. P. is 4. Find the product of its first five terms.

   (c) If $A = \begin{bmatrix} 1 & -1 & 1 \\ 2 & -1 & 0 \\ 1 & 0 & 0 \end{bmatrix}$, then show that $A^{-1} = A^2$.

Unit—II

2. (a) How many words can be formed from the letters of the word, "TRIANGLE" ? How many of these will begin with T and end with E ?

   (b) If ${}^nP_r = {}^nP_{r+1}$ and ${}^nC_r = {}^nC_{r-1}$, then find the values of n and r.

   (c) Expand $(1 + x + x^2)^3$ by binomial theorem.

Unit—III

3. (a) If $\cos\theta = -\frac{1}{2}$ and $\pi < \theta < \frac{3\pi}{2}$, then find the value of $4\tan^2\theta - 3\,\text{cosec}^2\theta$.

   (b) If $A + B = \frac{\pi}{4}$, then prove that :

   $$(1+\tan A)(1+\tan B) = 2$$

   (c) Show that :

   $$\sqrt{2+\sqrt{2+\sqrt{2+2\cos 8\theta}}} = 2\cos\theta$$

Unit—IV

4. (a) Find the locus of a point, so that the join of (–5, 1) and (3, 2) subtends a right angle at the moving point.

   (b) If a parabolic reflector is 20 cm in diameter and 5 cm deep, then find its focus.

   (c) Find the equation of the ellipse whose axes are along the co-ordinate axes, vertices are (±5, 0) and foci at (±4, 0).

Unit—V

5. (a) Find the mean deviation about the median for the following frequency distribution :

x_i	f_i
3	3
6	4
9	5
12	2
13	4
15	5
21	4
22	3

(b) Calculate the mean and standard deviation of first n natural numbers.

(c) Calculate the mean and standard deviation of the following distribution :

Marks	No. of Students
20–30	3
30–40	6
40–50	13
50–60	15
60–70	14
70–80	5
80–90	4