

Bachelor of Rural Studies (BRS) (Honours) Examination, 2018
Semester-II (CBCS)
Rural Studies
Course-CC-4
(Quantitative Techniques-I)

Time: Three Hours

Full Marks: 60

Questions are of value as indicated in the margin

Group-A

Answer *any five* questions

1. 5×3=15
- (a) If the n th term of an A. P. is $2n - 4$, then find its common difference.
- (b) If $\frac{3+2\sqrt{2}}{3-\sqrt{2}} = a + b\sqrt{2}$, where a, b are rational, find the value of a, b .
- (c) Show that the function $f: \mathbb{Z} \rightarrow \mathbb{Z}$ be define by $f(x) = 2x + 1$ is injective but not subjective.
- (d) Find the equation of the st. line perpendicular to $3x - 2y + 3 = 0$ and passing through origin.
- (e) If α & β be the roots of the equation $3x^2 - 6x + 4 = 0$, find the value of $\left(\frac{\alpha}{\beta} + \frac{\beta}{\alpha}\right) + 3\alpha\beta$.
- (f) If $A = \begin{pmatrix} 5 & 0 & 1 \\ 0 & -2 & 0 \\ 1 & 0 & 5 \end{pmatrix}$ and $B = \begin{pmatrix} 0 & 1 & 1 \\ 1 & 0 & 0 \\ 0 & -1 & 1 \end{pmatrix}$
- Then find the value of $2A + 3B$.
- (g) Find the value of $\lim_{x \rightarrow 0} \frac{\sin 3x}{\sin 2x}$.

Group-B

Answer *any five* questions

5×5=25

- 2.
- (a) If $x, 2x + 2, 3x + 3, \dots$ are in G.P., then find its 4th term.
- (b) If a, b, c are in G.P., then show that $\frac{a-b}{b-c} = \frac{a}{b}$.
3. Show that the points $(0, -2), (2, 4)$ and $(-1, -5)$ are collinear.
4. If $A = \begin{pmatrix} 1 & -2 & 3 \\ 0 & 2 & -1 \\ -4 & 5 & 2 \end{pmatrix}$, find A^{-1} .

P.T.O.

(2)

5. Using cross multiplication method find the solution of the system of equations

$$\left. \begin{array}{l} 2x + 3y = 5 \\ 3x + y = 6 \end{array} \right\}$$

6. If $3^x = 4^y = 12^z$, then show that $z = \frac{xy}{x+y}$.

7. If A is a square matrix, then show that $A+A^T$ is symmetric and $A-A^T$ is skew-symmetric.

8. A Function $f: \mathbb{R} \rightarrow \mathbb{R}$ is defined as follows:

$$f(x) = \begin{cases} \frac{2x^2 - 8}{x-2}, & x \neq 2 \\ k, & x = 2 \end{cases}$$

If f is continuous at the point $x = 2$, then find the value of k .

Group-C

Answer *any two* questions

2×10=20

9. (a) Solve by Cramer's rule the following system of equations:

7+3

$$\begin{array}{l} 3x + y + z = 4 \\ x - y + 2z = 6 \\ x + 2y - z = -3 \end{array}$$

(b) The sum of three numbers in A.P. is 15 and the sum of their cubes is 645. Find the numbers.

10.

(a) If $\frac{\log x}{y-z} = \frac{\log y}{z-x} = \frac{\log z}{x-y}$, then prove that

(i) $xyz = 1$

(ii) $x^{y+z} y^{z+x} z^{x+y} = 1$

(b) Find the square roots of $5 + 2\sqrt{6}$.

8+2

11.

(a) Find the adjoint of the matrix

7+3

$$A = \begin{pmatrix} 2 & -1 & 3 \\ 1 & 1 & 1 \\ 1 & -1 & 1 \end{pmatrix}$$

(b) If a point divides externally the line segment joining the points $(-2, 3)$ and $(4, 5)$ in the ratio 2:1, then find the coordinates of the point.