Tribhuvan University

Faculty of Humanities and Social Sciences

OFFICE OF THE DEAN

2018

BCA First Semester

Subject: Mathematics I **Full Marks:60**

Time: 3hr **Pass Marks: 24**

Group B

Attempt any Six question

11. 32 students play basketball and 25 students play volleyball. It is found that 20 students play b0th the games. Find the number of students playing at least one game. Also, find total number of students if 13 students play none of these games

12. Let f: $\mathbb{N} \longrightarrow \mathbb{N}$ by defined by $f(x)$ - $2x$ for all $x \in \mathbb{N}$ where $\mathbb{N}$ is the set of natural numbers. Show that f is one - one but not onto function.

13. If the three consecutive terms of a geometric series be increased by their middle term, then prove that the resulting terms will be in harmonic progression. (H.S)

14. Find the adjoin of the matrix: $\begin{matrix} \mathbf{1} & \mathbf{2} & \mathbf{-2} \\ \mathbf{-1} & \mathbf{3} & \mathbf{0} \\ \mathbf{0} & \mathbf{-2} & \mathbf{1} \end{matrix}$

15. Prove that $\begin{matrix} \mathbf{1+x} & \mathbf{1} & \mathbf{1} \\ \mathbf{1} & \mathbf{1+y} & \mathbf{1} \\ \mathbf{1} & \mathbf{1} & \mathbf{1+z} \end{matrix}$

16. Find the equation of parabola with focus (-1,2) and directrix x=-5

17. Transform u= $\begin{matrix} \mathbf{1} \\ \mathbf{-1} \end{matrix}$ and v= $\begin{matrix} \mathbf{-2} \\ \mathbf{3} \end{matrix}$ by $\begin{matrix} \mathbf{0} & \mathbf{-1} \\ \mathbf{1} & \mathbf{0} \end{matrix}$ and check whether this transformation is linear.

Group C

Attempt any two questions:

18. Define permutation and combination. Try to establish relationship between them with the help of formula. In how many way can the letter of the word "LOGIC" be arranged so that:

i) Vowel may occupy odd position? ii) No Vowels are together?

19. Define scalar and vector product in three dimensional space with their geometrical interpretation and prove the formula sin(A + B)=sinAcosB + cosAsinB by using vector method.

20. Define the logarithmic function, state its properties and if

$f(x)=\log(\mathbf{1}+\boldsymbol{x})/(\mathbf{1}-\boldsymbol{x})$ (-1 < x < 1), show that $\boldsymbol{f(a)+f(b)=f\left(\frac{a+b}{1+ab}\right)}$ (|a| < 2, |b|< 1)

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Group B

Attempt any Six question

2. In a class of 100 students 40 students failed in Mathematics, 70 failed in English and 20 failed in both subjects. Find a) How many students passed in both subject ? b)How many students passed in Mathematics only? c)How many student failed in mathematics only?

3. Find the domain and range of the function $f(x)=\frac{2x+1}{3-x}$

4. Find the Maclurin series of the function f(x)=sinx

5. Prove that $\begin{vmatrix} 1 & z & x^2 \\ 1 & y & y^2 \\ 1 & z & z^2 \end{vmatrix}$ =x - y)(y - z)(z - x)

6. Find a unit vector perpendicular to the plane containing points p(1,-1,0),Q(2,1,-1) and R(-1,1,2)

7. In how many ways can be letter of words "Sunday" be arraged? How many of these arrangements begin with S? How many begin with S and don't end with y?

8. If $x + iy = \sqrt{\frac{1+i}{1-i}}$ then show that $x^2 + y^2=1$

Group C

Attempt any Two question

9.a) Define conic section. Find the coordinates of vertices, eccentricity and foci of the ellipse $9x^2 + 4y^2 - 18x - 16y - 11=0$

b) If $T: R^2 \longrightarrow R^3$ defined by $T(x_1, x_2)=(x_1 + x_2, x_2, x_1)$ be the linear transformation. then find matrix associated with linear map T.

10. Define irrational number. Prove that $\sqrt{2}$ is an irrational number.

If function $f: R \longrightarrow R$ defined by $f(x)=2x + 1$ and g:R $\longrightarrow$ R defined by $g(x)=x^2 - 2$. Find the formulae for composite function f * g and g * f and also verify that f * g ≠ g* g.

11. a) If arithmetic mean, geometric mean and harmonic mean between two unequal positive numbers are A,G,H respectively, then prove that A > G > H.

b. What is the relation between permutation and combination of *n* objects taken r at a time? A committee of 5 is to be constituted from 6 boys and 5 girls. In how many ways can this be done so as to include at least a boy and a girl?