Tribhuvan University, Institute of Science and Technology
Central Department of Computer Science and Information Technology
Model Question Paper, B.Sc. Computer Science and Information Technology

Subject: MATHEMATICS **Full Marks: 50** **Time: 30**

Put correct answer on the answer sheet given. Attempt all question

GROUP A : 15 X 2 = 30

1. If A = [-3,3] and B = [-2, 4), then A − B is
   a. [-3,-2) b. [-3,-2] c. (-3,-2) d. (-3,-2]
2. If f(x) = x and g(x)=1/x, then (g 0 f)(x) is
   a. X b. 1/x c. 1 d. none.
3. The line pair x/a + y/b = 1 and x/b + y/a = 1 intersect at
   a. (ab/a+b, ab/a+b) b. (a+b/ab, a+b/ab) c. both d. none.
4. The line pair represented by $ax^2 + 2hxy - by^2 = 0$ will be at right angle if
   a. $h^2 = ab$ b. $h^2 + ab = 0$ c. a + b = 0 d. $h^2 = a - b$
5. The value of the determinant $\begin{vmatrix} 2 & 1 & 0 \\ 4 & 2 & 0 \\ 6 & 3 & -8 \end{vmatrix}$
   a. -32 b. 0 c. 8 d. -8
6. The transpose of the matrix $\begin{pmatrix} 2 & 4 \\ 3 & 5 \end{pmatrix}$ is:
   a. $\begin{pmatrix} 2 & 4 \\ 3 & 5 \end{pmatrix}$ b. $\begin{pmatrix} 2 & 3 \\ 4 & 5 \end{pmatrix}$ c. $\begin{pmatrix} 5 & 4 \\ 3 & 2 \end{pmatrix}$ d. $\begin{pmatrix} 2 & 3 \\ 4 & 5 \end{pmatrix}$
7. Direction cosines of a line having its direction ratios -1, 2, 2 are
   a. (2/3, 2/3,-1/3) b. (2/3, -1/3,2/3) c. (1/3, 2/3,2/3) d. (-1/3, 2/3,2/3)
8. The system of equations 3x − y = 5 and x − y = 7 intersect at points
   a. unique b. finitely many c. infinitely many d. does not intersect
9. Linear programming deals with
   a. Linear objective function and nonlinear constraints b. nonlinear objective
   c. Nonlinear objective function and nonlinear constraints
   d. Linear objective function and linear constraints
10. If 1, (-1+√3i)/2 and w are cube roots of unity, the value of w is
    a. 1 b. (-1+√3i)/2 c. (1-√3i)/2 d. (-1-√3i)/2
11. If $b^2 - 4ac < 0$ in $ax^2 + bx + c = 0$ with real coefficient, then its roots are
    a. real & unequal b. real & equal c. imaginary & unequal d. imaginary & equal
12. The derivative of $Sin^{-1}x$ is
    a. $-1/\sqrt{(1-x^2)}$ b. $1/\sqrt{(1-x^2)}$ c. $1/1-x^2$ d. $-1/1-x^2$
13. The value of $\int_0^a dx/a^2 + x^2$ is
    a. π/2a b. π/4a c. 1 d. 0
14. The domain of $y = Sin^{-1}x$ is
    a. $-1 \le x \le 1$ b. $-\pi/2 \le y \le \pi/2$ c. $-\infty < x < \infty$ d. none
15. If a,b,c in a triangle are in AP then $1/r_1$, $1/r_2$, $1/r_3$ are in
    a. G.P. b. H.P. c. A.P. d. none

GROUP B: (15 X 3 = 45)

16. In a college in BCScIT, all students study physics or Biology or both. If 60% study physics and 50% study Biology, the percentage of students study both,
    a. 50 b. 60 c. 100 d. 10
17. Let f:Q → Q be defined by f(x)= 3x + 5 for x belonging to Q and Q being the set of all rational numbers. Then the function f is
    a. one-to-one but not onto b. onto but not one-to-one
    c. one-to-one and onto d. neither one-to-one nor onto.
18. If $Cos^2x - 5Cosx + 2 = 0$ $(0 \le x \le 360)$, then the value of x can have in degrees
    a. 60 b. 300 c. both d. none
19. The area of a triangle whose sides are 3 ft, 5ft and 4ft is
    a. 6 sqft b. 3 sqft. c. 5 sqft d. 4 sqft
20. The equation of the straight line passing through the intersection of the line 4y-10=0 and 5x + 3y − 7 = 0 and making angle 135% with positive x-axis is
    a. x + y = 1 b. x − y = 1 c. x + y + 1 = 0 d. x − y − 1 = 0
21. The inverse of the matrix $\begin{pmatrix} 3 & 2 \\ -1 & 6 \end{pmatrix}$ is
    a. $\begin{pmatrix} 6 & 1 \\ -2 & 3 \end{pmatrix}$ b. $\begin{pmatrix} 6 & -2 \\ 1 & 3 \end{pmatrix}$ c. $1/20\begin{pmatrix} 6 & -2 \\ 1 & 3 \end{pmatrix}$ d. $1/20\begin{pmatrix} 6 & 1 \\ -2 & 3 \end{pmatrix}$

22. The system of equations $x - y = 2$ and $5x - 5y = 10$ is

a. inconsistent & independent b. consistent and dependent
c. consistent and independent d. neither

23. The quadratic equation whose roots are $2 + \sqrt{3}$ and $2 - \sqrt{3}$ is

a. $x^2 + 4x + 1 = 0$ b. $x^2 - 4x - 1 = 0$ c. $x^2 - 4x + 1 = 0$ d. $x^2 + 4x - 1 = 0$

24. The function $f(x) = 3x-1/(x^3 -5x^2 + 6x)$ is discontinuous at

a. $x = 0$ b. $x = 2$ c. $x = 3$ d. above all

25. The derivative of $y = a^x$ with respect to x is

a. log a b. a^x loga c. a^x d. xa^{x-1}

26. The function $f(x) = x^3 - 3x^2 + 6x + 4$ has local

a. maxima b. minima c. neither d. both

27. The value of $\int \log(ax+b)/ ax + b$ is

a. $1/2a [\log(ax+b)]^2$ b. $1/2a [\log(ax+b)]^2 + C$ c. $[\log(ax+b)]^2$ d. $[\log(ax+b)]^2 + C$

28. The area bounded by the curve $y^2 = 4ax$, the x-axis and the ordinate which cuts the curve at (a,2a) is

a. $4a^2$ b. $1/3\ a^2$ c. $4/3\ a^2$ d. a^2

29. If α,β,γ are the angles which a line makes with the coordinate axes then $\sin^2\alpha+\sin^2\beta+\sin^2\gamma$ equals

a. 1 b. 0 c. 3 d. 2

30. The value of the determinant $\begin{vmatrix} 1 & w & w^2 \\ w & w^2 & 1 \\ w^2 & 1 & w \end{vmatrix}$, w an imaginary cube root of unity is

a. 1 b. 0 c. w d. w^2