BRAINWARE UNIVERSITY

Term End Examination 2021 - 22
Programme – Bachelor of Computer Applications
Course Name – Algebra and Calculus
Course Code - BCA203C
(Semester II)

Time allotted : 1 Hrs.25 Min. **Full Marks : 70**

[The figure in the margin indicates full marks.]

Group-A

(Multiple Choice Type Question) 1 x 70=70

Choose the correct alternative from the following :

(1) The greatest common divisor (gcd) of 7649 and 2464 is

a) 2
b) 11
c) 1
d) None of these

(2) If x/y^3 and x/z^3, then x/w where w=

a) $y^3 + 3z^3$
b) $3y^3 + z^2$
c) $3^2 + z^3$
d) None of these

(3) If k is a positive integer , gcd (ka,kb)

a) k.gcd(ka,b)
b) k.gcd(ka,b)
c) k.gcd(a.kb)
d) None of these

(4) If gcd(a,b)=c , then a/c, b/c are

a) prime
b) composite
c) Relatively prime
d) None of these

(5) The number of elements of z_{10} is

a) 10
b) 10!
c) 10^2
d) 9

(6) gcd(-361,-665)=

a) -19
b) 19

c) 9

d) None of these

(7) If a and b not both zero are relatively prime , then for integers u and v au+bv=

a) -1

b) 1

c) a-b

d) a+b

(8) When two integers m and n are relatively prime then g.c.d(m,n)=

a) n

b) 1

c) mn

d) m

(9) If a, b $\in$ N such that $a^2 - b^2$ is a prime , then

a) $a^2 + b^2 = 0$

b) $a^2 - b^2 = 1$

c) $a^2 - b^2 = a + b$

d) None of these

(10) Let d=g.c.d.(a,b) then the linear Diophantine equation ax+by=c has a solution iff

a) d divides a

b) d divides b

c) d divides c

d) None of these

(11) The linear equation 51x+6y=8 has no integral solution because gcd(51,6)=3 and

a) 3 does not divide 8

b) 3 divides 51

c) 3 divides 6

d) None of these

(12) For every integer x, gcd(x,x+2)=

a) 0

b) 2

c) 1

d) 2 and 1

(13) The inverse of [1] in Z_5 is

a) [1]

b) [2]

c) [4]

d) does not exists

(14) For Z_6, [3] [5] =

a) [8]

b) [2]

c) [3]

d) [15]

(15) The remainder when 12^{36} is divided by 7 is

a) 0

b) 6

c) 8

d) 1

(16) For Z_5, [1] + [4] =

a) [0]

b) [1]

c) [2]

d) [3]

(17) Let a, b, c denote integers. Then $a \equiv b (\text{mod } m)$ implies

a) $a^3 \equiv b^3 (\text{mod } m)$

b) $a^{\frac{1}{3}} \equiv b^{\frac{1}{3}} (\text{mod } m)$

c) $ac \equiv bc (\text{mod } m)$

d) $Both\ a^3 \equiv b^3\ (\text{mod } m)\ and\ ac \equiv bc (\text{mod m}$

(18) If G is a tree with n vertices, then the number of edges of G are

a) n

b) (n - 1)

c) n(n + 1)

d) n (n - 1)

(19) Every vertex of a null graph is

a) Pendant

b) Isolated

c) Odd

d) none of these

(20) A vertex whose degree 1 is called

a) isolated vertex

b) even vertex

c) pendant vertex

d) none

(21) The degree of an isolated vertex is

a) 0

b) 1

c) 2

d) None

(22) The maximum number of edges of a simple graph with 5 vertices and 2 components is

a) 2

b) 7

c) 5

d) 6

(23) If the origin and terminus of a walk coincide then it is a

a) path

b) open walk

c) circuit

d) closed walk

(24) The degree of the common vertex of two edges in series is

a) 0

b) 1

c) 2

d) may be more than 2

(25) A simple graph has

a) no parallel edges

b) no loops

c) no isolated vertex

d) no parallel edges and no loops

(26) A tree is a

a) any connected graph

b) Euler graph

c) minimally connected graph

d) None

(27) A binary tree has exactly

a) two vertices of degree 2

b) one vertex of degree 1

c) one vertex of degree 3

d) one vertices of degree 2

(28) Sum of the degrees of all vertices of a binary tree is even if the tree has

a) even no of vertices

b) four vertices

c) odd no of vertices

d) none of these

(29) A tree always is a

a) self complement graph

b) Euler graph

c) Hamiltonian graph

d) simple graph

(30) Dijkstra's algorithm is used to

a) find maximum flow in a network

b) to scan all vertices of a graph

c) find the shortest path from a specified vertex t o another

d) none of these

(31) The minimum number of pendant vertices in a tree with five vertices is

a) 1

b) 2

c) 3

d) 4

(32) Which of the following statement is true?

a) A spanning tree is a super graph of G

b) A spanning tree may not be a tree at all

c) A spanning tree is a subgraph of G

d) G may not have a spanning tree

(33) Minimal spanning tree is found by

a) Dijkstra's algorithm

b) Floyd algorithm

c) Ford-Fukerson's algorithm

d) Kruskal's algorithm

(34) A graph with no circuit and no parallel edges is called

a) Multi graph

b) Pseudo graph

c) Simple graph

d) None of these

(35) Sum of the degree of a graph is always

a) even

b) odd

c) prime

d) none of these

(36) If a graph has 6 vertices and 15 edges then the size of its adjacency matrix is

a) 6X6

b) 6X15

c) 15X15

d) 15X15

(37) A minimally connected graph is a

a) Binary tree

b) Hamiltonian graph

c) Tree

d) Regular graph

(38) What is vertex coloring of a graph?

a) A condition where any two vertices having a c ommon edge should not have same color

b) A condition where any two vertices having a c ommon edge should always have same color

c) A condition where all vertices should have a d ifferent color

d) A condition where all vertices should have sa me color

(39) How many unique colors will be required for proper vertex coloring of an empty graph ha ving n vertices?

a) 0

b) 1

c) 2

d) n

(40) How many unique colors will be required for proper vertex coloring of a bipartite graph h aving n vertices?

a) 0

b) 1

c) 2

d) n

(41) If $f(x,y)$ derivable at (a,b) then

a) *Only* $f_x(a,b)$ *exists*

b) Only $f_{y'}(a,b)$ exists

c) *Both* $f_x(a,b)$ and $f_{y'}(a,b)$ exists

d) None of these

(42)

Let $f(x,y)$ is differentiable at (a,b) then

a) $df = f_x(a,b)dx + f_y(a,b)dy$

b) $df = f_y(a,b)dx + f_x(a,b)dy$

c) $df = f_x(x,y)dx + f_y(x,y)dy$

d) None of these

(43) If $F(x,y)=0$ then

a) Always x dependent on y

b) Always y dependent on x

c) Always y and x are independent

d) None of these

(44) If $f_y(a,b)=f_x(a,b)$ then (a,b) is

a) saddle point

b) point of extreme

c) isolated point

d) critical point

(45) If $f(x,y) = x^3 y$ then $df = f$

a) x^3dy

b) $3x^2dy + x^3ydx$

c) $3x^2ydx + x^3ydy$

d) $3x^2ydx + x^3dy$

(46) If $z = x^2 + y^2$ then d^2z is

a) ≥ 0

b) < 0

c) ≤ 0

d) $=0$

(47) $f(x,y) = x\sin y$ then $f_y(0,\pi) =$

a) 0

b) π

c) $-\pi$

d) -1

(48) The area of the triangle whose vertices are (1,3), (0,0), (1,0) is

a) 8

b) 3/2

c) 0

d) None of these

(49) The differential equation $(a_1x-b_1y)dx + (a_2x - b_2y)dy = 0$ is exact if

a) $a_1 = b_2$

b) $b_1 = b_2$

c) $a_1 = -b_2$

d) $a_2 = -b_1$

(50) For a given differential equation, if C.F.=$c_1 \cos 2x + c_2 \sin 2x$, then the Wronskian is

a) 1

b) 2

c) cos2x

d) sin2x

(51) If $\lim_{(x,y)\to(0,0)} f(x,y) = l$ and $\lim_{(x,y)\to(0,0)} g(x,y) = l$ then $\lim_{(x,y)\to(0,0)} f(x,y)g^2(x,y) = ?$

a) l

b) l^2

c) l^3

d) l^4

(52) If $f(x,y)$ is continuous at (a,b) then $\lim_{(x,y)\to(a,b)} f(x,y) = ?$

a) 0
b) 1
c) $f(a,b)$
d) $-f(a,b)$

(53) If $F(x,y)=0$ has an unique implicit function $y=f(x)$ then

a) $\frac{dy}{dx}=-\frac{F_x}{F_y}$
b) $\frac{dy}{dx}=\frac{F_x}{F_y}$
c) $\frac{dy}{dx}=-\frac{F_y}{F_x}$
d) $\frac{dy}{dx}=\frac{F_y}{F_x}$

(54) $\lim_{(x,y)\to(0,0)} \frac{y}{x}$

a) ∞
b) 1
c) 0
d) limit does not exists

(55) If $f(x,y) = \begin{cases} \frac{x^2-xy}{x+y}, & (x,y)\neq(0,0) \\ 0 & (x,y)=(0,0) \end{cases}$. Then $f_x(0,0) =$

a) 0
b) 1
c) 2
d) Does not exists

(56) The domain of the function $f(x,y)=\frac{x}{\sin y}$ is

a) $R^2\times R^2$
b) $R\times R$
c) $R\times(R\setminus\{n\pi : n\in Z\})$
d) None of these

(57) If $u=\log\frac{x^2}{y}$ then $xu_x+yu_y=$

a) u
b) 2u
c) 1
d) 0

(58) The double integral $\iint_R dxdy$ represents

a) area of a region R
b) volume bounded by any surface and the above a region R in xy-plane
c) the area of a region R in xy plane
d) None of these

(59) The value of $\int_0^2\int_0^{x^2}\left(\left(\int_0^y dz\right)dy\right)dx$ is

a) $\frac{8}{5}$
b) $\frac{32}{5}$
c) $\frac{16}{5}$
d) $\frac{4}{5}$

(60)

$\int_0^2 \int_0^{\frac{\pi}{2}} \cos x\, dx\, dy =$ ______

a) 2 | b) -1

c) $R \setminus \{0\}$ | d) None of these

(61) The value of $\int_0^{\log 2} \int_{-1}^{1} y e^{xy}\, dx\, dy$ is

a) $\frac{1}{2}$ | b) 3

c) 12 | d) None of these

(62) The value of $\int_0^1 \int_0^x \int_0^{x+y} e^{x+y+z}\, dx\, dy\, dz$ is

a) $\frac{e^4}{8} - \frac{e^2}{4} + e - 3$ | b) $\frac{e^4}{8} - \frac{3e^2}{4} + e - \frac{3}{8}$

c) $\frac{e^4}{8} - \frac{3e^2}{4} + e - 1$ | d) None of these

(63) The value of $\int_2^4 \int_1^3 \int_9^{10} dx\, dy\, dz$ is

a) 4 | b) 5

c) 2 | d) None of these

(64) The value of $\int_1^e \int_1^e \int_1^e \frac{1}{xyz} dx\, dy\, dz$ is

a) 1 | b) 5

c) $\frac{5}{3}$ | d) None of these

(65) The value of $\iiint_R \sin x \sin y \sin z\, dx\, dy\, dz$, where R is the region $\{0 \le x \le 2\pi, 0 \le y \le \pi, 0 \le z \le \frac{\pi}{2}\}$

a) 0 | b) 2

c) -1 | d) 1

(66) The value of the triple integral $\int_{x=-1}^{1} \int_{y=-2}^{2} \int_{z=-3}^{3} x\, y^2 z^3\, dx\, dy\, dz$ is

a) $\frac{1}{12}$ | b) $\frac{1}{24}$

c) 0 | d) 6

(67) Find the value of $\iint \frac{x}{x^2 + y^2}\, dx\, dy$.

a) $y \tan^{-1} y - \frac{1}{2} \log(1 + y^2)$ | b) $x[y \tan^{-1} y - \frac{1}{2} \log(1 + y^2)]$

c) $y[x \tan^{-1} x - \frac{1}{2} \log(1 + x^2)]$ | d) $x[y \tan^{-1} y - \frac{1}{2} \log(1 + y^2)]$

(68) If double integral in Cartesian coordinate is given by $\iint_R f(x, y)\, dx\, dy$ then the value of same integral in polar form is ______

a) $\iint_R f(r\cos\theta, r\sin\theta)\, r\,dr\,d\theta$

b) $\iint_R f(r\cos 2\theta, r\sin 2\theta)\, r\,dr\,d\theta$

c) $\iint_R f(r\cos 4\theta, r\sin 4\theta)\, r^2\,dr\,d\theta$

d) $\iint_R f(r\sin 3\theta, r\cos 3\theta)\,dr\,d\theta$

(69) If the differential equation $\left(y+\frac{1}{x}+\frac{1}{x^2 y}\right)dx+\left(x-\frac{1}{y}+\frac{A}{xy^2}\right)dy=0$ is exact, then the value of A is

a) 2

b) 1

c) 0

d) -1

(70) The general form of a first order linear equation in x is $\frac{dy}{dx}+Px=Q$ where

a) P and Q are both functions of x

b) P and Q are the functions of x and y, respectiv ely

c) P and Q are both functions of y

d) P and Q are the functions of y and x, respectiv ely