GOVERNMENT ZIRTIRI RESIDENTIAL SCIENCE COLLEGE

MZU QUESTIONS BANK FOR DEPT. OF MATHEMATICS (GZRSC)

Subject : Mathematics
Paper Name: Vector Calculus and Solid Geometry
Paper No. : MATH/2/CC/II
Semester : II

Part A: Tick (√) the correct answer in the brackets provided:

1. If $a*(b*c)=(a*b)*c$ for all $a,b,c \in A$, then the binary operation is said to be
   (a) commutative ( )
   (b) associative ( )
   (c) distributive ( )
   (d) none of the above ( )
2. The number of commutative binary operation on a finite set A having *n* elements is
   (a) 2^n ( )
   (b) n^{n^2} ( )
   (c) $\frac{1+n^2}{2}$ ( )
   (d) $\frac{n^2+n}{2}$ ( )
3. The number of binary compositions on a finite set A having *n* elements is
   (a) 2^n ( )
   (b) n^{n^2} ( )
   (c) $\frac{1+n^2}{2}$ ( )
   (d) $\frac{n^2+n}{2}$ ( )
4. The number of generators of a cyclic group of order 16 is
   (a) 2 ( )
   (b) 4 ( )
   (c) 8 ( )
   (d) 16 ( )
5. If H and K be two subgroups of a group G such that H has 7 elements and K has 13 elements, then the number of elements of $H \cap K$ is
   (a) 1 ( )
   (b) 6 ( )
   (c) 7 ( )

(d) 20 ( )

6. When 99^{20} is divided by 25, the remainder is
   (a) 20 ( )
   (b) 1 ( )
   (c) 15 ( )
   (d) 5 ( )

7. What is the remainder if 8^{103} is divided by 103 ?
   (a) 2 ( )
   (b) 4 ( )
   (c) 16 ( )
   (d) 8 ( )

8. A homomorphism of a group into itself is called
   (a) An isomorphism ( )
   (b) An endomorphism ( )
   (c) An automorphism ( )
   (d) None of the above ( )

9. On dividing 11^7 by 18, the remainder is
   (a) 12 ( )
   (b) 13 ( )
   (c) 11 ( )
   (d) 18 ( )

10. If f is a homomorphism of G into G', then the set K of all those elements of G which are mapped by f onto the identity element of G' is called
   (a) kernel of the homomorphism f ( )

(b) homomorphism f ( )

(c) kernel of the isomorphism f ( )

(d) Isomorphism f ( )

11. If f(x) is divided by (ax-b), then the remainder is
    a) f(-b/a) ( )
    b) f(b/a) ( )
    c) f(a) ( )
    d) f(a) ( )
12. The value of k such that $4x^3-3x^2+2x+k$ may be divisible by (x+2) is
    a) 48 ( )
    b) -48 ( )
    c) 24 ( )
    d) -24 ( )
13. If f(x) and g(x) be two polynomials of degrees m and n respectively, then f(x).g(x) is a polynomial of degree
    a) mn ( )
    b) m+n ( )
    c) m/n ( )
    d) m-n ( )
14. If x^{k+1} is divided by x^{k-1}, the remainder will be
    a) positive ( )
    b) negative ( )
    c) 0 ( )
    d) Infinity ( )
15. When $2x^4-5x^2-32x+6$ is divided by x-3, the remainder is
    a) 0 ( )
    b) 27 ( )
    c) -18 ( )
    d) 1 ( )
16. If the equation $x^3+2x^2+ax+b=0$ has one of the roots as complex root c+id, then the real root is
    a) 2+2c ( )
    b) 2-2c ( )
    c) -2+2c ( )
    d) -2-2c ( )
17. The equation $4x^3-13x^2-31x+41=0$ has
    a) 3 positive roots ( )
    b) only one positive root which lies between 0 and 1 ( )
    c) No positive root ( )

d) only one positive root which lies between 1 and 2 ( )

18. The range of values of k for which the equation $x^4+4x^3-8x^2+k=0$ has all real roots is
    a) 0 and 3 ( )
    b) 1 and 3 ( )
    c) 0 and 1 ( )
    d) 1 and 2 ( )
19. An equation of odd degree
    a) always has an imaginary root ( )
    b) always has a real root ( )
    c) has only imaginary root ( )
    d) None of these ( )
20. If the sum of two roots of the equation $x^3-5x^2-16x+p=0$ is zero, then the value of p is
    a) 0 ( )
    b) 16 ( )
    c) 80 ( )
    d) 20 ( )
21. By Cardan's method, the solution of $x^3-18x-35 = 0$ is
    a) $5,w,w^2$ ( )
    b) $5,w-2,w^2$ ( )
    c) $5,w-2,w^2-2$ ( )
    d) $5,w,w^2-2$ ( )
22. w (cube roots of unity) is equal to
    a) $(-1/2)+i\sqrt{3}/2$ ( )
    b) $(1/2)-i\sqrt{3}/2$ ( )
    c) $(1/2)+i\sqrt{3}/2$ ( )
    d) $(-1/2)-i\sqrt{3}/2$ ( )
23. Solution of $x^3+8=0$ is
    a) $2, 2w, 2w^2$ ( )
    b) $-2, -2w, -2w^2$ ( )
    c) $-2, 2w, 2w^2$ ( )
    d) $-2, -2w, 2w^2$ ( )
24. W(1+w) =
    a) 0 ( )
    b) 1 ( )
    c) -1 ( )
    d) 2 ( )
25. The equation of third degree with real coefficient whose two roots are 2 and i is
    a) $x^3 -2x^2 + x - 2 = 0$ ( )
    b) $x^3 -2x^2 - x - 2 = 0$ ( )
    c) $x^3 - 8 = 0$ ( )

d) $x^3 + 8 = 0$ ( )

SECTION – B

Fill in the blanks

1. If $a*b=b*a$ for all $a,b \in A$, then the binary operation $*$ is said to be ____________

2. The identity element of R with respect to multiplication is ________
3. Any two right(left) cosets of a subgroup are either disjoint or ______________
4. Every group of ____________________ order is cyclic
5. The order of each subgroup of a finite group is a ______________ of the order of the group.
6. If G is an infinite cyclic group, then G has exactly ___________ generators.
7. If f(x) and g(x) are nonzero polynomials in F[x], then f(x)+g(x) is nonzero and deg(f(x)+g(x)) = …………………………..
8. A polynomial f(x) is completely divisible by (x-h) if and only if f(h) = ………
9. If f(x) is divided by x+a, the remainder is …………..
10. The equation $x^5+2x^4+2x^3+4x^2+x+2=0$ has ….. multiple roots.
11. The equation $x^{12}-x^4+x^3-x^2+1=0$ has at least ……. complex roots.
12. If α,β,γ are the roots of the equation $3x^3-4x^2+7=0$, then $(1/\alpha) + (1/\beta) + (1/\gamma)$ is …….
13. If $x^3 = a^3$, then x = …………………….
14. By using De Moivre's theorem, cube roots of -1 are …………………..
15. The value of $(i)^{2/3}$ are ………………..

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Answer Key

Part A

1. (b) 2. (d) 3. (a) 4. (c) 5. (a). 6. (c) 7. (d) 8. (c) 9. (c) 10. (a) 11. (b) 12. (a) 13. (b) 14. (c) 15. (b) 16. (d) 17. (d) 18. (a) 19. (b) 20. (c) 21. (c) 22. (a) 23. (b) 24. (c) 25. (a)

Part B

1. Commutative 2. 1 3. Identical 4. Prime 5. Divisor 6. Two 7. max {deg(f(x)), deg(g(x))} 8. 0 9. f(-a) 10. two 11. six 12. 0 13. a, aw, aw^2 14. -1, $(1/2)+i\sqrt{3}/2$, $(-1/2)+i\sqrt{3}/2$ 15. $\text{Cos}\ \{(4k\pi+\pi)/3\} + i\text{Sin}\{(4k\pi+\pi)/3\}$ (k=0,1,2)

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GOVERNMENT ZIRTIRI RESIDENTIAL SCIENCE COLLEGE

Subject : Mathematics
Paper Name: Vector Calculus and Solid Geometry
Paper No. : MATH/4/CC/IV
Semester : IV

Part A: Tick (√) the correct answer in the brackets provided:

1. Given the scalar field defined by $\phi(x, y, z) = 3x^2z - xy^3 + 5$ at (1, -2, 2) is
   (a)18 ( ) (b) 19 ( )
   (c) 20 ( ) (d) 21. ( )
2. When $\vec{a} = 3\hat{i} - \hat{j} - 4\hat{k}$, $\vec{b} = -2\hat{i} + 4\hat{j} - 3\hat{k}$ and $\hat{c} = \hat{i} + 2\hat{j} - \hat{k}$ then unit vector parallel to $2\vec{a} - \vec{b} + 3\vec{c}$ is
   (a) $11\hat{i} - 8\hat{j} - 4\hat{k}$ ( ) (b) $\frac{11\hat{i} - 8\hat{j} - 4\hat{k}}{\sqrt{185}}$ ( )
   (c) $\frac{11\hat{i} - 8\hat{k}}{\sqrt{185}}$ ( ) (d) $\frac{11\hat{i} - 8\hat{j} - \hat{k}}{\sqrt{185}}$ ( )
3. The d.c.'s of a unit vector which is equally inclined to the coordinate axes are
   (a) (1, 1, 1) ( ) (b) $(\frac{1}{3}, \frac{1}{3}, \frac{1}{3})$ ( )
   (c) $(\frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}})$ ( ) (d) (1, 0, 0) ( )
4. The unit vector perpendicular to the plane of the vectors $\vec{a} = 2\hat{i} - 6\hat{j} - 3\hat{k}$ and $\vec{b} = 4\hat{i} + 3\hat{j} - \hat{k}$ is
   (a) $\pm\frac{(2\hat{i} - 6\hat{j} - 3\hat{k})}{\sqrt{7}}$ ( ) (b) $\pm\frac{(2\hat{i} - 6\hat{j} + 3\hat{k})}{\sqrt{7}}$ ( )
   (c) $\pm\frac{(3\hat{i} - 2\hat{j} + 6\hat{k})}{7}$ ( ) (d) $\pm\frac{(3\hat{i} - 6\hat{j} + 2\hat{k})}{7}$ ( )
5. The value of λ in which the four points with position vectors $(-6\hat{i} + 3\hat{j} + 2\hat{k})$, $(3\hat{i} + \lambda\hat{j} + 4\hat{k})$, $(5\hat{i} + 7\hat{j} + 3\hat{k})$ and $(-13\hat{i} + 17\hat{j} - 2\hat{k})$ are coplanar is
   (a)1 ( ) (b) -1 ( )
   (c)2 ( ) (d) -2 ( )

6. A vector $\vec{\mathbf{V}}$ is irrotational if

   (a) $\nabla \cdot \vec{\mathbf{V}} = 0$ ( )

   (b) $\nabla \times \vec{\mathbf{V}} = 0$ ( )

(c) $\nabla \cdot \vec{\mathbf{V}}$ is always positive ( )

(d) $\nabla \times \vec{\mathbf{V}}$ is always positive ( )

7. If $\phi(x, y, z) = c$ represents a surface, then $\nabla\phi$ is

a) a vector tangential to the surface ϕ ( )

b) always a unit normal to the surface ϕ ( )

c) a vector perpendicular to the surface ϕ ( )

d) none of the above. ( )

8. If $\vec{F} = \nabla\phi$, where ϕ is a single valued function and has continuous partial derivatives, then $\int_C \vec{F}.d\vec{r}$

a) depends on the path C. ( )

b) is independent of the path C ( )

c) does not exist ( )

d) none of the above ( )

9. If $\vec{F}$ is a conservative field, then

(a) $\nabla \times \vec{\mathbf{V}} = 0$ ( )

(b) $\nabla \cdot \vec{\mathbf{V}} = 0$ ( )

(c) $\nabla \cdot \vec{\mathbf{V}}$ is always positive ( )

(d) $\nabla \times \vec{\mathbf{V}}$ is always positive ( )

10. The directional derivatives of $\phi = 4xz^3 - 3x^2y^2z$ at (2,-1,2) in the direction of (2,-3,6) is

a) 367/7 ( )

b) 357/7 ( )

c) 386/7 ( )

d) 376/7 ( )

11. If by any change of axes, without change of origin, the quantity a x^2 +2hxy + by^2 +2gx +2fy + c transforms to $a'x'^2+2h'x'y'+b'y'^2+2g'x'+2f'y'+c'$ then

(a) a + b = a' + b' ( ) (b) ab + h^2 = $ab+h^2=a'b'+h'^2$ ( )

(c) $f^2-g^2=f'^2-g'^2$ ( ) (d) None of these. ( )

12. By a parallel transformation the origin is shifted to the point (a, b), then the equation $\frac{x}{a}+\frac{y}{b}=2$ transforms into

(a) $\frac{x}{a}+\frac{y}{b}=1$ ( ) (b) $\frac{x}{a}+\frac{y}{b}=4$ ( )

(c) $\frac{x}{a}+\frac{y}{b}=2$ ( ) (d) $\frac{x}{a}+\frac{y}{b}=0$ ( )

13. The equation of lines passing through the origin and perpendicular to $5x^2 - 7xy - 3y^2 = 0$ is

(a) $7x^2 - 3xy - 5y^2 = 0$ ( ) (b) $3x^2 - 7xy - 5y^2 = 0$ ( )

(c) $7x^2 + 3xy - 5y^2 = 0$ ( ) (d) $3x^2 + 7xy - 5y^2 = 0$ ( )

14. The angle between the lines joining the origin to the points common to $5x^2 + 12xy - 8y^2 + 8x - 4y + 12 = 0$ and $x - y = 2$ is

(a) $\tan^{-1}\frac{3}{4}$ ( ) (b) $\tan^{-1}-\frac{3}{4}$ ( )

(c) $\tan^{-1}\frac{4}{3}$ ( ) (d) $\tan^{-1}-\frac{4}{3}$ ( )

15. The pole of the straight line x +2y + 3= 0 w.r.t. the conic $x^2 + y^2 - 2x + 5 = 0$ is

(a) (1 , 1) ( ) (b) (1 , 2) ( )

(c) (2 , 1) ( ) (d) (2 , 2) ( )

16. If a plane meets the axes in A, B, C and the centroid of triangle ABC is (α,β,γ) , then the equation of the plane is

(a) $\frac{x}{\alpha}+\frac{y}{\beta}+\frac{z}{\gamma}=0$ ( ) (b) $\frac{x}{\alpha}+\frac{y}{\beta}+\frac{z}{\gamma}=1$ ( )

(c) $\frac{x}{\alpha}+\frac{y}{\beta}+\frac{z}{\gamma}=2$ (   )   (d) $\frac{x}{\alpha}+\frac{y}{\beta}+\frac{z}{\gamma}=3$ (   )

17. The distance of the point (4, 3, 5) from xz – plane is

(a) 4 units (   )   (b) 3 units (   )

(c) 5 units (   )   (d) 0 unit (   )

18. The equation of the plane which contains the lines $\frac{x-1}{2}=-y-1=\frac{z-3}{4}$ and is perpendicular to the plane x + 2y + z = 12 is

(a) 9x - 2y - 5z + 4 = 0 (   )   (b) 2x - 9y - 4z + 5 = 0 (   )

(c) 9x + 2y - 5z + 4 = 0 (   )   (d) 2x + 9y - 4z - 5 = 0 (   )

19. The perpendicular distance of P(1, 2, 3) from the line $\frac{x-6}{3}=\frac{y-7}{2}=\frac{z-7}{-2}$ is

(a) 4 (   )   (b) 5 (   )

(c) 6 (   )   (d) 7 (   )

20.The image of the point (1, 3, 4) in the plane 2x - y + z + 3 = 0 is

(a) (-3, 5, 2) (   )   (b) (3, -5, 2) (   )

(c) (3, 5, -2) (   )   (d) (3, 5 , 2) (   )

21. The centre of the sphere $x^2+y^2+z^2-8y+10z-10 = 0$ is
    e) (0,4,5)
    f) (0,4,-5)
    g) (0,-4,5)
    h) (0,-4,-5)
22. The greatest distance from the point (1,-1,2) to the sphere $x^2+y^2+z^2-4x+6y-8z-71 = 0$ is
    e) 13 (   )
    f) 11 (   )
    g) 9 (   )
    h) 7 (   )
23. All generator of the cylinder f(x,y) = 0 are parallel to
    a) X-axis (   )
    b) Y-axis (   )
    c) Z-axis (   )
    d) x-1=y=z (   )

24. The angle between lines of intersection of the plane and the cone given by x-3y+z+0 and $x^2-5y^2+z^2 = 0$ is
    e) $\text{Cos}^{-1}(6/5)$ ( )
    f) $\text{Cos}^{-1}(5/6)$ ( )
    g) $\text{Sin}^{-1}(6/5)$ ( )
    h) $\text{Sin}^{-1}(5/6)$ ( )
25. $2x^2+2y^2+7z^2-10yz-10zx+2x+2y+26z-17 = 0$ represents a cone with vertex at
    a) (2,2,1) ( )
    b) (2,1,2) ( )
    c) (1,2,1) ( )
    d) (1,1,2) ( )

Part B : Fill up the blanks

1. If $\vec{a}$ is any vector then $\hat{i}\times(\vec{a}\times\hat{i})+\hat{j}\times(\vec{a}\times\hat{j})+\hat{k}\times(\vec{a}\times\hat{k})$ is ____________.
2. A vector function $\vec{f}(t)$ is constant if and only if __________.
3. A particle moves along the curve $x = 2t^2$, $y = t^2 - 4t$, $z = 3t - 5$ where t is the time . Then, the acceleration at time t = 1 is ____________________________.

4. A vector having unit magnitude is called a ______________ .

5. The directional derivatives is________ in the direction of $\nabla\phi$.

6. If $\vec{F}$ represents the force acting on a particle moving along the path C, then the line integral over C represents the___________ by the force $\vec{F}$.

7. The origin is shifted to the point (3 , -1) and the axes are rotated through an angle $\tan^{-1}\frac{3}{4}$. If the co-ordinates of a point are (5, 10) in the new system, its co-ordinates in the old system is ________.

8. If axes are rotated through an angle 45^0, the equation $3x^2 + 2xy + 3y^2 - 1= 0$ is transformed into __________.

9. If pairs of lines $x^2 - 2pxy - y^2 = 0$ and $x^2 - 2qxy - y^2 = 0$ be such that each pair bisect the angles between the other pairs, then pq = __________.

10. Distance between two points $A(x_1, y_1, z_1)$ and $B(x_2, y_2, z_2)$ is given by AB = ______________________.

11. Let θ be the angle between the planes $a_1x+b_1y+c_1z+d=0$ and $a_2x+b_2y+c_2z+d_2=0$. The condition of perpendicularity is ______________________.

12. Let a, b , c be the direction ratios of the normal to the plane through the point A (x_1, y_1, z_1) and let P(x, y, z) be any variable point on the plane. The direction ratios of AP are __________________.

13. Equation of sphere when centre is (α,β,γ) and the radius is r, is given by ……………………..
14. If d is the distance between the centre of two sphere of radii r_1 and r_2, then the angle between them is …………………..
15. The equation of the right circular cylinder of radius 2 whose axis is the straight line x/1 = y/-2 = z/2 is………………..

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Answer Key

Part A

2. (c) 2. (c) 3. (c) 4. (c) 5. (d). 6. (b) 7. (c) 8. (b) 9. (a) 10. (d) 11. (a) 12. (d) 13. (b) 14. (c) 15. (d) 16. (d) 17. (b) 18. (a) 19. (d) 20. (a) 21. (b) 22. (a) 23. (c) 24. (b) 25. (a)

Part B

2. $2\vec{a}$ 2. $\frac{d\vec{f}(t)}{dt}=\vec{0}$ 3. $4\hat{i}+4\hat{j}$ 4. . unit vector 5. Maximum 6. work done 7. (1,10) 8. $4x^2 + 2y^2 = 1$ 9. -1 10. $\sqrt{(x_2-x_1)^2+(y_2-y_1)^2+(z_2-z_1)^2}$ 11. $a_1a_2+b_1b_2+c_1c_2=0$ 12. $x - x_1$, $y - y_1$, $z - z_1$ 13. $(x-\alpha)^2 + (y-\beta)^2 + (z-\gamma)^2 = r^2$ 14. $\cos^{-1}\{(r_1^2+ r_2^2- d^2)/2r_1r_2\}$ 15. $8x^2+5y^2+5z^2+4xy+8yz-4zx = 36$

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GOVERNMENT ZIRTIRI RESIDENTIAL SCIENCE COLLEGE

Subject: MATHEMATICS
Paper name: MODERN ALGEBRA
Paper No: MATH/6/CC/IX
Semester: VI

A. Multiple choice questions [25 (5 from each unit)]

1. Which group is non-abelian of order
   (a) 144
   (b) 121
   (c) 170
   (d) 100

2. of the aboveIf the order of a group G is p^n, where p is a prime number with centre Z, then
   (a) Z={e}
   (b) $Z \neq \{e\}$
   (c) Z={0}
   (d) None

3. If G is a non-Abelian group pf order p^3, where p is prime, then the order of the center Z of G is
   (a) 1
   (b) p
   (c) p^2
   (d) p^3

4. A subgroup H of a group G is normal, if it is of index
   (a) 0
   (b) 1
   (c) 2
   (d) 3

5. An element a of group G is self conjugate if and only if there exists x belongs to G, when
   (a) $a^2 = ax$
   (b) a = x
   (c) xa = ax

(d) a = xa

6. The characteristic of an integral domain is either
   (a) 0 or 1
   (b) 0 or prime number
   (c) 1 or composite number
   (d) None of the above
7. A skew field
   (a) Has no divisor of zero
   (b) Is necessarily commutative
   (c) May not possess unity element
   (d) Has no invertible element

8. Which of the following is not an integral domain ?
   (a) The ring of integers
   (b) The ring of all 2 x 2 matrices with elements as integers
   (c) ({ 0, 1, 2, 3, 4}, $+_5$, x_5)
   (d) The ring of all real numbers

9. The ring of Gaussian integers is not
   (a) commutative with respect to addition
   (b) commutative with respect to multiplication
   (c) a field
   (d) an integral domain

10. The characteristic of the ring (I_6, $+_6$, x_6) where I_6 = { 0, 1, 2, 3, 4, 5 } is
   (a) 0
   (b) 3
   (c) 6
   (d) Infinite

11. The units of an integral domain Z[*i*] are
   (a) 1, -1
   (b) *i*, -*i*
   (c) 1, -1, 0, *i*
   (d) 1, -1, *i*, -*i*

12. Let a and b be two elements of a Euclidean ring R, then b is not a unit in R if

(a) d(ab) < d(a)
(b) d(ab) $\geq$ d(a)
(c) d(ab) = d(a)
(d) d(ab) >(a)

13. In the ring of integers, the greatest common divisor(s) of 3 and 6 is/are

(a) 3 and – 3

(b) 3

(c) -3

(d) 1

14. In the quadratic ring of integers $Z\left[i\sqrt{5}\right]=\{a+i\sqrt{5}b; \quad a,b\in Z\}$, the number 3 is

(a) irreducible but not prime

(b) prime but not irreducible

(c) irreducible and prime

(d) neither irreducible nor prime

15. A non-zero integer has

(a) no associate

(b) exactly one associate

(c) exactly two associates

(d) infinite number of associates

16. Which set is a basis for the vector space V_3(R) ?

(a) (1, 0, 0), (1, 1, 0), (1, 1, 1)
(b) (1, 0, 1), (1, 0, 0), (0, 0, 1)
(c) (1, 0, 0), (1, 1, 1)
(d) (1, 0), (0, 1)

17. Which of the following set of vectors is linearly independent in $V_3(R)$?

(a) { (1,2,1), (3,1,5), (3,-4,7)}

(b) { (2,-3,1), (3,-1,5), (1,-4,3)}

(c) { (2,1,2), (8,4,8)}

(d) { (-1,2,1), (3,0,-1), (-5,4,3)}

18. If V(F) is a vector space with zero element 0 and if U and W are disjoint subspaces of V(F), then

(a) $U \cap V = \phi$

(b) $U \cap V = 0$

(c) $U \cap V = \{0\}$

(d) $U \cap V \neq 0$

19. The necessary and sufficient condition of a vector space V(F) to be a direct sum of its two subspaces U and W is

(a) $V = U + W$ and $U \cap W = 0$

(b) $V = UW$ and $U \cap W = \{0\}$

(c) $V = U + W$ and $U \cap W \neq \{0\}$

(d) $V = U + W$ and $U \cap W = \{0\}$

20. Which of the following is not a subspace of R^3, where R is the set of all real numbers?

(a) $S = \{(x, y, z): \quad x + z = 0\}$

(b) $S = \{(x, y, z): \quad x - y + 2z = 0\}$

(c) $S = \{(x, y, z): \quad x \leq 0\}$

(d) $S = \{(x, y, z): \quad x - 3y \in R\}$

21. The eigenvalues of a real symmetric matrix are

(a) Pure imaginary

(b) All real

(c) All zero

(d) None of the above

22. Which of the following functions T from R^2 into R^2 is a linear transformation?

(a) T (x_1, x_2)= (1+x_1, x_2)

(b) T (x_1, x_2) = (x_1^2, x_2)

(c) T (x_1, x_2) = (x_1-x_2, 0)

(d)) T (x_1, x_2) = (sin x_1, x_2)

23. Let $T: R^3 \to R^3$ be a linear transformation whose nullity is 2. Then the rank of T is

(a) 0

(b) 1

(c) 2

(d) 3

24. An n x n matrix A over the field F is diagonalizable if and only if

(a) A has n linearly dependent eigenvectors

(b) A has n linearly independent eigenvectors

(c) A has n^2 linearly dependent eigenvectors

(d) A has n^2 linearly independent eigenvectors

25. If T is a linear transformation from vector space $V_1(F)$ into the vector space $V_2(F)$ and $V_1(F)$ is finite dimensional of dimension n then

(a) rank (T) + nullity (T) = n

(b) rank (T) + nullity (T) = 1

(c) rank (T) + nullity (T) = n^2

(d) rank (T) + nullity (T) = n^n.

Fill up the blanks [15 (3 from each unit)]

1. A group having no proper subgroup is called __________________
2. Every subgroup of an abelian group is __________________
3. Every homomorphic image of a group G is _____________________ to some quotient group of G.
4. The characteristic of an integral domain is either __________________ or a prime number.
5. A commutative ring with unity is a __________ if it has no proper ideal.
6. An ideal S of a commutative ring R is __________ if and only if the residue class ring R/S is a field.
7. In any commutative ring with unity, the associate of 0 is only ______________.

8. An ideal S of the Euclidean ring R is maximal iff S is generated by some _______________ of R.
9. Every Euclidean ring possesses __________________ elements.
10. If two vectors are linearly dependent, one of them is a _________________ of the other.
11. There exists a ________________ for each finite dimensional vector space.
12. Two finite dimensional vector spaces are isomorphic iff they are of the ____________.
13. Any system consisting of a single non-zero vector is always linearly ____________.
14. Similar matrices have the same _____________ .
15. An n x n matrix A over the field F is diagonalizable iff A has _________________ eigenvectors.

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Key Answers

A. Multiple choice questions

1. (c)	**2. (b)**	**3. (b)**	**4. (c)**	**5. (c)**	**6. (b)**	**7. (a)**
8. (b)	**9. (c)**	**10. (c)**	**11. (d)**	**12.(d)**	**13. (a)**	**14. (a)**
15. (c)	**16.(a)**	**17. (b)**	**18. (c)**	**19. (d)**	**20. (c)**	**21.(b)**
22. (c)	**23. (b)**	**24.(b)**	**25. (a)**			

B. Fill up the blanks

1. Simple group
2. Normal
3. Isomorphic
4. Zero
5. Field
6. Maximal
7. Zero
8. Prime element
9. Unity
10. Scalar multiple
11. Basis
12. Same dimension
13. Independent
14. Eigenvalues
15. n linearly independent

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GOVERNMENT ZIRTIRI RESIDENTIAL SCIENCE COLLEGE

Subject : MATHEMATICS
Paper name : Advanced Calculus
Paper No : MATH/6/CC/X
Semester : VI

A. Multiple choice questions

1. If f is integrable on $[a,b]$, then $|f|$ is integrable and

a) $\left|\int_a^b f\,dx\right| \leq \int_a^b |f|\,dx$ ☐
b) $\left|\int_a^b f\,dx\right| \geq \int_a^b |f|\,dx$ ☐
c) $\left|\int_a^b f\,dx\right|$ and $\int_a^b |f|\,dx$ are always equal ☐
d) None of the above ☐

2. For a bounded and integrable function f, if $b \geq a$, then

a) $m(b-a) < \int_a^b f\,dx < M(b-a)$ ☐
b) $m(b-a) \geq \int_a^b f\,dx \geq M(b-a)$ ☐
c) $m(b-a) \leq \int_a^b f\,dx \leq M(b-a)$ ☐
d) $m(b-a) > \int_a^b f\,dx > M(b-a)$ ☐

3. If P and S are any two partitions of [a,b], then

a) $L(P,f) \leq U(S,f)$ ☐

b) $U(S,f) \leq L(P,f)$ ☐

c) $U(S,f) \leq U(P,f)$ ☐

d) $U(P,f) \leq U(P,f)$ ☐

4. If P* is a refinement of P, then for a bounded function f,

a) $L(P^*,f) \leq L(P,f)$ ☐

b) $L(P^*,f) \geq L(P,f)$ ☐

c) $U(P^*,f) \geq U(P,f)$ ☐

d) None of the above ☐

5. The lower Riemann integral for a function f corresponding to the partition P of the interval [a,b] is given by

a) $\sup U(P,f) = \int_{\bar{a}}^{b} f(x)dx$

b) $\inf L(P,f) = \int_{\bar{a}}^{b} f(x)dx$

c) $\inf U(P,f) = \int_{\bar{a}}^{b} f(x)dx$

d) $\sup L(P,f) = \int_{\bar{a}}^{b} f(x)dx$

6. The improper integral $\int_a^b \frac{1}{(x-a)^n} dx$ is convergent if and only if

a) $n > 1$ ☐
b) $n < 1$ ☐
c) $n = 1$ ☐
d) None of the above ☐

7. If f and g are two positive functions on [a,b] such that

$$\lim_{x\to a^+} \frac{f(x)}{g(x)} = l$$

Where l is a non-zero finite number, then

a) $\int_a^b f\,dx$ converges if $\int_a^b g\,dx$ converges ☐
b) $\int_a^b g\,dx$ converges if $\int_a^b f\,dx$ diverges ☐
c) $\int_a^b f\,dx$ converges if $\int_a^b g\,dx$ diverges ☐
d) $\int_a^b g\,dx$ converges does not need to imply $\int_a^b f\,dx$ converges. ☐

8. The improper integral $\int_a^\infty \frac{1}{x^n} dx$ is convergent if and only if

a) $n > 1$ ☐
b) $n < 1$ ☐
c) $n = 1$ ☐
d) None of the above ☐

9. If f and g are two positive functions on [a,b] such that $f(x) \le g(x) \forall x \in [a,b]$, then

a) $\int_a^b f\,dx$ converges if $\int_a^b g\,dx$ converges ☐
b) $\int_a^b g\,dx$ converges if $\int_a^b f\,dx$ diverges ☐
c) $\int_a^b f\,dx$ converges if $\int_a^b g\,dx$ diverges ☐

d) $\int_a^b g\,dx$ converges does not need to imply $\int_a^b f\,dx$ converges. ☐

10. The integral $\int_0^\infty x^{n-1}e^{-x}\,dx$ converges if and only if

a) $n < 0$ ☐
b) $n = 0$ ☐
c) $n > 0$ ☐
d) $n \le 0$ ☐

11. Suppose f is continuous function of two variables with domain as rectangle $[a, b; c, d] \subset \mathbf{R}^2$. Then the function $\phi(y) = \int_a^b f(x, y)dx$ for a fixed value of $y \in [c, d]$ is

a) discontinuous in $[c, d]$ ☐
b) derivable even though f_y does not exists and continuous ☐
c) continuous in $[c, d]$ ☐
d) none of the above ☐

12. The value of the integral $\int_0^\infty \frac{tan^{-1}ax}{x(1+x)^2}dx$ if $a > 0$ is

a) $\frac{\pi}{2}$ ☐
b) $-\frac{\pi}{2}$ ☐
c) $\frac{\pi}{2(1+a)}$ ☐
d) $\frac{\pi}{2}\log(1 + a)$ ☐

13. The value of the improper integral $\int_0^\infty e^{-x^2}\,dx$ is

a) $\frac{\pi}{2}$ ☐
b) $\sqrt{\frac{\pi}{2}}$ ☐
c) $\frac{\pi}{\sqrt{2}}$ ☐
d) $\frac{\sqrt{\pi}}{2}$ ☐

14. The uniformly convergent improper integral of a continuous function

a) is not continuous ☐
b) is itself continuous ☐
c) may be continuous ☐
d) none of the above ☐

15. If f is a continuous function when $c \le y \le d$, $x \ge a$; and the integral $\phi(y) = \int_a^\infty f(x,y)dx$ is uniformly convergent, then

a) $\int_c^d \{\int_a^\infty f(x,y)dx\}dy = \int_c^d \phi(y)dy = \int_a^\infty \left\{\int_c^d f(x,y)dy\right\}dx$ ☐
b) $\int_c^d \{\int_a^\infty f(x,y)dx\}dy \ne \int_c^d \phi(y)dy$ ☐
c) $\int_a^\infty \left\{\int_c^d f(x,y)dy\right\}dx \ne \int_c^d \phi(y)dy$ ☐
d) $\int_c^d \{\int_a^\infty f(x,y)dx\}dy \ne \int_a^\infty \left\{\int_c^d f(x,y)dy\right\}dx$ ☐

16. The integral $\int_c \ xy\,dx$ along the arc of a parabola $x = y^2$ from (1,-1) to (1,1) is

a) 3 ☐
b) $4/5$ ☐
c) $2/3$ ☐
d) 2 ☐

17. The integral $\int_c \ (x^2ydx + xy^2dy)$ where C is the line segment from (1,0) to (0,1) is

a) $-2/3$ ☐
b) $1/6$ ☐
c) $2/3$ ☐
d) 0 ☐

18. The value of the double integral

$$\iint\limits_{00}^{11} \frac{x-y}{(x+y)^3}\,dxdy \text{ is}$$

a) 0 ☐ b)
$-\frac{1}{2}$ ☐
c) $\frac{1}{2}$ ☐
d) 1 ☐

19. The value of $\int_C (2x^2 + y^2)dx + 3(y-4x)dy$ where the path C is a triangle PQR with P(0,0), Q(2,0) and R(0,2)

a) $23/60$ ☐ b)
$-23/60$ ☐
c) $-80/3$ ☐
d) $80/3$ ☐

20. Choose the correct one

a) $\int_{-C} f dx + g dy = -\int_{C} \ f dx + g dy$ ☐ b) $\int_{-C} f dx + g dy = -\int_{-C} f dx + g dy$ ☐

c) $\int_{-C} f dx + g dy = -\int_{-C} f dx - g dy$ ☐

a) $\int_{-C} f dx + g dy = \int_{C} \ f dx + g dy$ ☐

21. The sequence of function $\{f_n\}$ where $f_n(x) = x^n$ is

a) Neither pointwise nor uniformly continuous for $x \in [0,1]$ ☐
b) Pointwise continuous for $x \in [0,1]$ ☐
c) Uniformly continuous for $x \in [0,1]$ ☐
d) None of the above ☐

22. The series $\sum_{n=1}^{\infty} \frac{1}{n^p}$ is uniformly continuous if

a) $p < 1$ ☐
b) $p = 1$ ☐
c) $p > 1$ ☐
d) $p \leq 1$ ☐

23. The sequence of function $\{f_n\}$ where $f_n(x) = \frac{n}{x+n}$ is

a) uniformly convergent in $[0, \infty)$ ☐

b) uniformly convergent in $[0, k]$ where k is any finite number. ☐

c) nowhere convergent. ☐

d) none of the above. ☐

24. The sequence of function $\{f_n\}$ where $f_n(x) = \frac{n}{1+nx}$ $\forall\, x \in [0,1]$

a) diverges ☐

b) converges but not uniformly. ☐

c) converges pointwise only ☐

d) converges uniformly ☐

25. If a sequence of function $\{f_n\}$ are continuous and uniformly convergent and converges to f on [a,b], then

a) f is constant on $[a, b]$ ☐

b) f is differentiable on $[a, b]$ ☐

c) f is continuous on $[a, b]$ ☐

d) none of the above ☐

B. Fill in the blanks

1. If P* is a refinement of P, then for a bounded function f, then $U(P^*, f)$____$U(P, f)$.

2. By Darboux's theorem, if f is a bounded function on [a,b], then for every $\epsilon > 0$, there exist $\delta > 0$, such that for every partition P on [a,b], with norm $\mu(P) < \delta$,__________.

3. Every continuous function is ___________

4. Every ___________ convergent integral in $[a, b]$ is convergent in $[a, b]$.

5. If f and g are two positive functions on $[a, b]$ such that

$$\lim_{x \to a^+} \frac{f(x)}{g(x)} = l$$

where l is non-zero finite number, then the two integrals $\int_a^b f dx$ and $\int_a^b g dx$ ___________ together at a .

6. The improper integral $\int_a^\infty f(x) dx$ is said to be absolutely convergent if ________is convergent.

7. Let $f(x, y)$ be a continuous function an let $\phi(y) = \int_a^b f(x, y) dx$, if f_y exists and is continuous in $[a, b\ ;\ c, d]$, then ϕ is __________ and

$$\phi'(y) = \int_a^b f_y(x, y) dx \quad \forall\, y \in [c, d]$$

8. If $|a| < 1$, then show that

$$\int_0^\pi \frac{\log(1 + a\cos x)}{\cos x} dx = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_$$

9. ____________improper integral of a continuous function is a continuous function.

10. If f(x,y) is ___________ over a rectangle R defined by $a \le x \le b; c \le y \le d$, then

$$\int_a^b\int_c^d f(x,y)dydx = \int_c^d\int_a^b f(x,y)dxdy$$

11. Ellipse is a _______________curve.

12. The value of the double integral

$$\int_0^1\int_0^1 \frac{x-y}{x+y}dxdy \text{ is } \_\_\_\_\_$$

13. The necessary and sufficient condition for uniform convergence of a sequence of function $\{f_n(x)\}$ on a domain $[a,b]$ is that for every $\epsilon > 0$ there exist a $+ve$ integer 'n' such that ______________, $\forall n \geq m, x \in [a,b]\ and\ \forall\ p \in \mathbb{N}$

14. The sum of a uniformly convergent series of a continuous function is ___________ .

15. The function $f_n(x) = nx\ e^{-nx^2}$ is _____________________ convergent on $[0,\infty)$.

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Answer Key

A. Multiple choice questions

1. a) 2. c) 3. a) 4. b) 5. d) 6. b) 7. a) 8. a) 9. a) 10. c) 11. c) 12. d) 13. d) 14. b) 15. a) 16. b) 17. d) 18. b) 19. c) 20. a) 21. b) 22. c) 23. c) 24. d) 25. b)

B. Fill in the blanks

1. $\geq$

2. $U(P,f) < \int_a^{\bar{b}} f(x)dx + \epsilon$

3. integrable

4. absolute

5. converge and diverge

6. $\left|\int_a^{\infty} f(x)dx\right|$

7. derivable

8. $\pi sin^{-1}a$

9. Uniformly convergent

10. continuous

11. Jordan/simple closed

12. 0 (zero)

13. $\left|f_{n+p}(x) - f_n(x)\right| < \epsilon$

14. continuous

15. pointwise

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GOVERNMENT ZIRTIRI RESIDENTIAL SCIENCE COLLEGE

Subject : Mathematics
Paper Name: Mechanics
Paper No. : MATH/6/CC/XI
Semester : VI

SECTION – A
Multiple Choice

UNIT – I

1. Three coplanar forces acting on a rigid body is in equilibrium if
   (a) two of them form a couple
   (b) the resultant R vanishes
   (c) all three meet at a point
   (d) two of them meet at a point
2. If α and λ be the angle of inclination of an inclined plane and the angle of friction, then a body of weight W cannot rest on the inclined plane if
   (a) $a > \lambda$
   (b) $a = \lambda$
   (c) $a < \lambda$
   (d) $a \neq \lambda$
3. The equation of the resultant of any number of coplanar forces acting on a rigid body is given by
   (a) $xR_x - yR_y = G$
   (b) $G + xR_x - yR_y = 0$
   (c) $G + xR_y - yR_x = 0$
   (d) $xR_y - yR_x = G$
4. If a body of weight W is placed on a rough inclined plane inclined at an angle α to the horizon be acted on by a force P at an angle θ to the plane. Then the body is just on the point of slipping down if
   (a) $P = W\dfrac{\sin(\alpha - \lambda)}{\cos(\theta + \lambda)}$
   (b) $P = W\dfrac{\sin(\alpha + \lambda)}{\cos(\theta - \lambda)}$
   (c) $P = W\dfrac{\sin(\theta + \lambda)}{\cos(\alpha - \lambda)}$
   (d) $P = W\dfrac{\sin(\theta - \lambda)}{\cos(\alpha + \lambda)}$

5. If a body rests in limiting equilibrium on a rough inclined plane for which the coefficient of friction is $\frac{1}{4}$, then the angle of friction is

(a) $\frac{\pi}{2}+\tan^{-1}\left(\frac{1}{4}\right)$

(b) $\pi+\tan^{-1}\left(\frac{1}{4}\right)$

(c) $\tan^{-1}\left(\frac{1}{4}\right)$

(d) None of the above

UNIT – II

6. The centre of gravity of a semi-circular arc is given by

(a) $\left(\frac{a}{\pi},0\right)$

(b) $\left(\frac{2a}{\pi},0\right)$

(c) $\left(\frac{3a}{\pi},0\right)$

(d) $\left(\frac{4a}{\pi},0\right)$

7. The centre of gravity of a circular arc of radius 4 cm subtending at an angle 90˚ lies on the axis of symetry at a distance of

(a) $\frac{2\sqrt{2}}{\pi}$ from the centre

(b) $\frac{4\sqrt{2}}{\pi}$ from the centre

(c) $\frac{6\sqrt{2}}{\pi}$ from the centre

(d) $\frac{8\sqrt{2}}{\pi}$ from the centre

8. The centre of gravity of three uniform rods forming a triangle is at

(a) the centroid of the triangle

(b) the orthocentre of the triangle

(c) the incentre of the triangle

(d) none of the above

9. If the length of the median AD of a triangle ABC is 6 cm. Then the distance of the C.G. from the vertex A is

(a) 2 cm

(b) 3 cm

(c) 4 cm

(d) 5 cm

10. The centre of gravity of a triangular lamina is at
    (a) the centroid of the triangle
    (b) the orthocentre of the triangle
    (c) the incentre of the triangle
    (d) none of the above

UNIT – III

11. If the angular velocity of a point moving in a plane curve be constant about a fixed origin, then
    (a)transverse acceleration is perpendicular to its velocity
    (b) transverse acceleration varies as its radial velocity
    (c) radial acceleration varies as its radial velocity
    (d) radial acceleration is perpendicular to its velocity
12. If time *t* be regarded as a function of velocity *v*, then the rate of decrease of acceleration is given by
    (a) $f^4 \frac{d^2t}{dv^2}$
    (b) $f^3 \frac{d^2t}{dv^2}$
    (c) $f^2 \frac{d^2t}{dv^2}$
    (d) $f \frac{d^2t}{dv^2}$
13. If the maximum velocity of a body moving with SHM is *6cm/sec* and its period is $\frac{1}{3}$ sec, then its amplitude is given by
    (a) $\frac{1}{\pi} cm$
    (b) $\frac{2}{\pi} cm$
    (c) $\frac{1}{2\pi} cm$
    (d) $\frac{1}{4\pi} cm$

14. If a particle moves in a plane with constant speed, then

(a) its acceleration is perpendicular to its velocity
(b) its acceleration is parallel to its velocity
(c) its acceleration is zero
(d) none of the above

15. For a particle executing SHM of period $\frac{\pi}{10}$ sec and amplitude 5 cm, the maximum velocity attained is
(a) 5 cm/sec
(b) 50 cm/sec
(c) 10 cm/sec
(d) 100 cm/sec

UNIT – IV

16. If a particle is projected with a velocity *7m/s* from the ground at an angle α with the horizontal, then the velocity of the particle at height $\frac{1}{19.6}$ is
(a) $4\sqrt{3}\ m/s$
(b) $5\sqrt{3}\ m/s$
(c) $6\sqrt{3}\ m/s$
(d) $7\sqrt{3}\ m/s$

17. The maximum range down an inclined plane is
(a) $\frac{u^2}{g(1-cos\beta)}$
(b) $\frac{u^2}{g(1+cos\beta)}$
(c) $\frac{u^2}{g(1-\sin\beta)}$
(d) $\frac{u^2}{g(1+\sin\beta)}$

18. For a given velocity of projection, the range down an inclined plane is 5 times the range up the inclined plane, then the inclination of the plane to the horizontal is
(a) $\sin^{-1}\left(\frac{1}{2}\right)$
(b) $\sin^{-1}\left(\frac{2}{3}\right)$

(c) $\sin^{-1}\left(\frac{1}{3}\right)$

(d) $\sin^{-1}\left(\frac{3}{2}\right)$

19. If the equation of motion of a body falling under gravity in a resisting medium is , then the terminal velocity is
(a) the initial velocity
(b) the least velocity attained
(c) the velocity when the acceleration is greatest
(d) the maximum velocity attained
20. If u and be the velocity and angle of projection, then the time taken to reach its greatest height is given by
(a) $t = \frac{u \sin\alpha}{g}$
(b) $t = \frac{u \cos\alpha}{g}$
(c) $t = \frac{u \tan\alpha}{g}$
(d) $t = \frac{u \cot\alpha}{g}$

UNIT – V

21. A sphere of mass m strikes a plane normally with velocity u and is rebounded. If e is the coefficient of restitution, then the loss of K.E. due to the impact is
(a) $\frac{1}{2}me^2u^2$
(b) $\frac{1}{2}mu^2$
(c) $\frac{1}{2}m\left(1+e^2\right)u^2$
(d) $\frac{1}{2}m\left(1-e^2\right)u^2$
22. A sphere of mass m impinges on a fixed plane with velocity u at an angle with the normal and is rebounded. If e is the coefficient of restitution, then the impulse of the blow is
(a) $mu\left(1+e\right)\cos\alpha$
(b) $mu\left(1+e\right)\sin\alpha$

(c) $mu(1-e)\cos\alpha$

(d) $mu(1-e)\sin\alpha$

23. If the earth's attraction on a particle varies inversely as the square of its distance from the earth's centre and if the radius of the earth is *a* Km, then the work done by the earth's attraction on a particle of weight 6 Kg on the surface of the earth is
(a) *3a*
(b) *4a*
(c) *5a*
(d) *6a*

24. For a perfectly elastic impact, the coefficient of restitution '*e*' equals
(a) -1
(b) 1
(c) 2
(d) 0

25. A smooth sphere impinges directly with a velocity u on another smooth sphere of equal mass at rest. If the spheres are perfectly elastic, then the velocity of the second sphere is
(a) 0
(b) $\frac{1}{2}u$
(c) u
(d) $2u$

SECTION – B
Fill in the blanks

UNIT – I

1. In case of limiting equilibrium of a body on a rough surface, if F be the limiting friction at the point of contact, R the normal reaction between the bodies and μ the coefficient of friction, then $\mu =$ ______
2. If three forces of magnitude 1P, 5P and 7P act along the side of an equilateral triangle ABC, then the magnitude of the resultant is _______
3. If three forces acting on a rigid body be in equilibrium, then they must be ___________

UNIT – II

4. The centre of gravity of a hemispherical surface of radius *a* is on the axis at a distance _____ from the centre.

5. The moment of inertia of a circular disc of radius r about an axis through its centre perpendicular to its plane is ______________
6. The centre of gravity of a semi-circular lamina of radius *a* is at a distance __________ from the centre.

UNIT – III

7. An oscillatory periodic motion is known as ______________________
8. The maximum displacement of a particle from the mean position is called the ____________ of the motion.
9. The number of complete oscillations in one second is called the _____________

UNIT – IV

10. The path of a projectile is known as the _______________
11. If *u* be the velocity of projection, then the maximum horizontal range is ________
12. The distance between the point of projection and the point where the particle strikes the horizontal plane through the point of projection is called the _________

UNIT – V

13. Two equal and perfectly elastic spheres interchange their ___________ after impact.
14. The phenomenon of two or more bodies colliding with or striking against or impinging on each other is called _________
15. If a particle moves so that its normal acceleration is always zero, then the path is a _______

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GOVERNMENT ZIRTIRI RESIDENTIAL SCIENCE COLLEGE

Answer key

Section A

1. (b)	2. (a)	3.(d)	4.(a)	5. (c)	6.(b)	7.(d)
8.(c)	9.(c)	10.(a)	11.(b)	12.(d)	13.(a)	14.(c)
15.(b)	16.(a)	17.(c)	18.(b)	19.(d)	20.(a)	21.(d)
22.(a)	23. (c)	24.(b)	25.(c)			

Section – B

1. $\frac{F}{R}$ 2. $2\sqrt{7}P$ 3. coplanar 4. $\frac{a}{2}$ 5. $\frac{1}{2}Mr^2$ 6. $\frac{4a}{3\pi}$

7. Simple Harmonic Motion (SHM) 8. amplitude 9. frequency

10. trajectory 11. $\frac{u^2}{g}$ 12. range 13. velocities 14. impact

15. hyperbola

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GOVERNMENT ZIRTIRI RESIDENTIAL SCIENCE COLLEGE

Subject : Mathematics
Paper Name: Computer Programming in C
Paper No. : MATH/6/CC/XIIC
Semester : VI

Part A: Tick (√) the correct answer in the brackets provided:

1. The number of keywords available in C is
   (a) 30 ( ) (b) 31 ( )
   (c) 32 ( ) (d) 33 ( )
2. Suppose a = 14 and b = 4 , what will be the result of a % b ?
   (a) 1 ( ) (b) 2 ( )
   (c) 3 ( ) (d) 4 ( )
3. Every C programming must contains only one :
   (a) printf ( ) function ( ) (b) exit ( ) function ( )
   (c) scanf ( ) function ( ) (d) main ( ) function ( )
4. Which one of the following is the proper declaration of a pointer ?
   (a) * x ; ( ) (b) int & x ; ( )
   (c) ptr x ; ( ) (d) int * x ; ( )
5. An array is the collection of :
   (a) different data types scattered throughout the memory ( )
   (b) the same data type scattered throughout the memory ( )
   (c) the same data type placed next to each other in memory ( )
   (d) different data type placed next to each other in memory ( )
6. Continue statement is used :
   (a) to go to the next iteration in a loop ( )
   (b) to come out of the loop ( )
   (c) to exit and return to the main function ( )
   (d) to restart iteration from the beginning of a loop ( )

7. int testarray [3][2][2] = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12} what values does testarray [2][1][0] in the sample code above contain?
   (a) 5 ( ) (b) 7 ( )
   (c) 9 ( ) (d) 11 ( )
8. Which of the following is not user – defined types?
   (a) structures ( ) (b) arrays ( )
   (c) enumerations ( ) (d) all of the above ( )
9. What is the similarity among structure, union and enumeration?
   (a) All of them let you define new data types; ( )
   (b) All of them let you define new values; ( )
   (c) All of them let you define new pointers; ( )
   (d) All of them let you define new structure; ( )
10. Which of the following is not included in a structure declaration?
   (a) struct ( ) (b) tag name ( )
   (c) identifiers ( ) (d) all of the above ( )
11. Which keyword is used for skipping part of the loop?
   (a) skip ( )
   (b) continue ( )
   (c) break ( )
   (d) jump ( )
12. The value of x = 2*3/4 + 4/8 + 8 – 2 + 5/8;
   (a) 5 ( ) (b) 6 ( )
   (c) 7 ( ) (d) 8 ( )
13. The declaration void function (int) indicates function which
   (a) return but no argument ( )
   (b) return nothing but argument ( )
   (c) no return no argument ( )
   (d) both (i) and (ii). ( )
14. How many times is a do – while loop guaranteed to loop?
   (a) 0 ( ) (b) 1 ( )

(c) indefinitely ( ) (d) unknown ( )

15. Which one of the following is the correct usage of conditional operators used in C?

(a) a > b ? c = 30: c = 40; ( ) (b) a>b? c = 30; ( )

(c) max = a > c? a: c : b > c? b: c; ( ) (d) return (a > b)? (a: b); ( )

16. Which one of the following is the proper declaration of a pointer ?

(a) * x ; ( ) (b) int & x ; ( )

(c) ptr x ; ( ) (d) int * x ; ( )

17. The keyword used to transfer control from a function back to the function is

(a) switch ( ) (b) goto ( )
(c) return ( ) (d) break ( )

18. Which of the following in character – oriented console I/O function?

(I) getcher( ) and putchar( ) ( ) (ii) gets( ) and puts( ) ( )
(iii) scanf( ) and printf( ) ( ) (iv) fgets ( ) and fputs( ) ( )

19. File manipulation function in C are available in which the following header files?

(a) streams.h( ) ( ) (b) stdlib.h( ) ( )
(c) stdio.h( ) ( ) (d) files.h( ) ( )

20. What will be the output of the following cod? (assuming that the union exist)

```
Main( )
{
  union student x;
x.a = 5; x.b = 7;
printf (“%d”, x.a, x.b};
}
```

(a) 5 and 5 ( ) (b) 7 and 7 ( )
(c) 5 and 7 ( ) (d) 7 and 5 ( )

21. Which of the following is exit – control loop?

(a) while ( ) ( ) (b) for ( ) ( )

(c) do … while ( ) ( ) (d) if ( ) ( )

22. Which one of the following gives the memory address of integer variable x ?

(a) *x; ( ) (b) x; ( )

(c) & x; ( ) (d) address (x); ( )

23. The library function used to reverse a string is

(a) strstr ( ) ( ) (b) strrev ( ) ( )

(c) revstr ( ) ( ) (d) strreverse ( ) ( )

24. Which of the following adds one string to the end of another ?

(a) strcat ( ) ( ) (b) stradd ( ) ( )

(c) stringadd ( ) ( ) (d) append ( ) ( )

25. The unoccupied space between the member of a structure is known as

(a)slake byte ( ) (b) word boundary ( )

(c) structure space ( ) (d) bit fields ( )

Part B: Fill up the blanks : 15X1 = 15

1. C was developed in the year ___________at AT & T Bell's Laboratory .
2. A variable name can be maximum _______ characters.
3. The ____________ statement transfers the control out of the loop.
4. The ____________ is an entry controlled loop statement.
5. _____________ is the process of arranging elements in the list according to their values.
6. If the operator _________ precedes a variable, it returns the address of the variable associated with it.
7. The _____________function reports the status of the file indicated.
8. The function named _________ reads a character from a file.
9. Input/output in C can be achieved using scanf( ) and ___________ functions.
10. && and || are binary operators, whereas, ! is a __________ operator.

11. A _________ statement skips the execution of the statements after it and takes the control to the beginning of the loop.
12. The __________ keyword is followed by an integer or an expression that evaluates to an integer.
13. A function can be called either by value or by ____________.
14. For reading a double type value, we must use the specification _____________.
15. A ___________ is usually used when we wish to store dissimilar data together.

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Key Answer

(Part A)

1. (c) 2. (b) 3. (d) 4. (d) 5. (c) 6. (d) 7. (d) 8. (d) 9. (a) 10. (c) 11. (c) 12. (c) 13. (b) 14. (b) 15. (a) 16. (d) 17. (c) 18. (a) 19. (b) 20. (c) 21. (c) 22. (c) 23. (b) 24. (a) 25. (b).

(Part B)

1. 1972 2. 31 3. break 4. while 5. sorting 6. & 7. feof 8.getc 9.printf ( ) 10.unary 11.continue 12.switch 13. Reference 14.%lf 15.structure.

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