TEST ITEMS
Mathematics (HSSC-II)

(A Research Project)

Federal Board of Intermediate and Secondary Education, Islamabad
Islamic Republic of Pakistan
2003

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INTRODUCTION

When the previous Government was obliged to assume power in October 1999, it found graft and corruption rampant in the country, the economy in a tailspin, and governance in the doldrums. It had to stem the rot and introduce far-reaching changes and reforms in all sectors of national life, including the economy, human resource development, health, education, etc., to keep pace with the dynamics of a fast-changing world.

In the crucial nation-building field of education, a package of reforms, named the Education Sector Reforms (ESR), was introduced. It was to be implemented over a period of time, the primary aim being to modernize education through the use of new methods and technologies. The present democratic government has wisely decided to continue and consolidate the reform process and the innovative policies introduced by its predecessor with a view to improving governance, alleviating poverty, ensuring socio-economic progress and, last but not least, ameliorating the lot of the common man.

The ESR package encompasses all aspects of education, including scientific and technical instruction, requiring reform and qualitative as well as quantitative improvement. One of the areas needing reform is the Examination System, which falls within the purview of the Examining Boards in Pakistan. Educational evaluation forms the hard core of quantitative dimensions of any education system, which should primarily focus on assessing the capacity of students for systematic application, analysis and synthesis of knowledge and consciously aim at promoting comprehension and assimilation of knowledge as well as inculcating and stimulating a spirit of inquiry in the students. An inquiring mind and insatiable curiosity make for discovery, innovation or invention, and must be the ultimate aim and objective of all education.

A concerted effort was made at the level of Inter-Board Committee of Chairmen (IBCC) to introduce modern methods and techniques for critical evaluation of the performance and potential of students. As a part of this, IBCC issued guidelines for development of test instruments (Question Papers) predicated on modern concepts of performance evaluation. As a first step, 60% weightage was given to questions of the objective type and short answers and 40% to those of the subjective type, and the Boards were asked to follow the new guidelines.

In consonance with the IBCC directive, FBISE took the initiative and arranged a workshop in the Science subjects of Physics, Chemistry, Biology and Mathematics at HSSC-I level last year, to impart professional training to teachers and to facilitate students. The initiative was highly appreciated by one and all. New textbooks have been developed at HSSC Part-II level this year, there was a need to prepare Test Items in the afore-mentioned subjects for HSSC Part-II also. For the said purpose, FBISE organized a four-day workshop from 28th to 31st July, 2003 which afforded another opportunity for training to the teachers selected from institutions in Pakistan and overseas within the jurisdiction of the Federal Board along with the preparation of model test items.

It is hoped that the test items developed in the workshop will serve as guidelines for teachers in developing more such items for critical evaluation of the performance of students.

FBISE would be only too glad to welcome any suggestions that might be offered, or any error of omission or commission that might be pointed out, for effecting further sustainable improvement in educational standards as well as in the quality and focus of education as a means to enlightenment and intellectual enrichment.

We are thankful to the Teachers and Resource Persons/Coordinators who worked diligently and with unwavering commitment and dedication to help give final shape to this publication.

MAHMOOD-UL-HASSAN NADEEM
Director (Research)

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CHAPTER-1 (Functions & Limits)

Item-1: Fill in the blanks:

1. The term function was recognized by a German Mathematician…….
2. The volume of sphere depends upon ……
3. Degree of $2x^4 – 3xy^3 + 2x^2 + 1$ is ……..
4. If the degree of a polynomial function is 1, then it is called a …… function.
5. Range of sin x is ……..
6. In natural logarithm, the base is ……
7. If x & y are not separable, then it is called …….. function.
8. If $h(x) = x^3$, then it is an …….. function.
9. $\lim_{x \to 4} (2x-3)^3$ = …….
10. $\lim_{x \to 0} \frac{(e^{x-1})}{x}$ = ……
11. If $f(x) = \frac{x^2 - 1}{x + 1}$ then it is discontinuous at……
12. A relation in which every element in the domain has a unique image in the range is called……
13. $\lim_{x \to \infty} e^{-x}$ = ……
14. f(x) = |x| is ……. function.
15. $f(x) = x^3$ is ……
16. $\tan h^{-1} x$ = ……
17. x = a cos θ, y = b sin θ are parametric equation of ……..
18. $(f^{-1} \text{ of}) (x) = f \text{ of } ^{-1}(x)$=……..
19. If $f(x) \leq g(x) \leq h(x)$ for all real number x containing C and if $\lim_{x \to c} f(x) = L$ and $\lim_{x \to c} h(x) = L$ then ……
20. $\lim_{x \to \infty} a/x^p$ = …… p > 0
21. For continuous function $\lim_{x \to a} f(x)$ = …….
22. Log x is not defined at x = ……..
23. Domain of $f(x) = \sqrt{x}$ is …….
24. Domain of f^{-1} = ……..
25. $\lim_{x \to 0} \frac{\sin 7\theta}{\theta}$ = …….. (where θ is in radians)

Item-2: Encircle the correct answers:

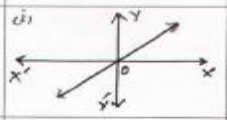
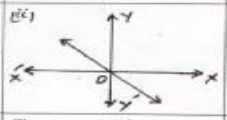
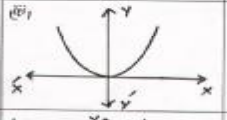
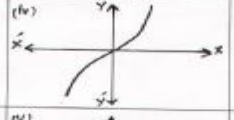
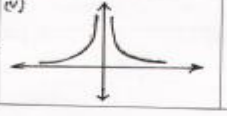
1. The domain of $f(x) = x^2$ is the set of all Rational Nos. T/F
2. If a vertical line cuts a graph in more than one point, then it is a function. T/F
3. For any set X a function $I : X \to X$ or $I(x) = x$, $\forall\ x \in X$, it is called an inverse function. T/F
4. Rational function is defined as where $P(x) / Q(x)$ are polynomials and $Q(x) \neq 0$. T/F
5. Domain of $\sec^x$ is $\{x : x \in R \text{ and } x \neq (2x+1)\pi/2\}$. T/F
6. If $g(x) = 2^x$ than it is called a logarithmic function. T/F
7. When variables x & y are expressed in terms of another variable, then it is called polynomial function. T/F
8. Cosine function is an even function. T/F
9. Let f & g be function defined on variable x then $f\,g(x) = gf(x)$. T/F
10. $\lim_{x \to a} (x^n - a^n) / (x-a) = na^{n-1}$ T/F
11. $\lim_{x \to 0} \sin 90^0/90^0 = 1$ T/F
12. If $f(x) = 3x + 2$ also $f(x) = 17$, then $x = 5$. T/F
13. If $f : x \to x + 2$ then f^{-1} is $y + 2$. T/F
14. If $f(x) = \sqrt{x}$ & $g(x) = \sqrt{4-x^2}$ then $(f/g)(x)$ at $x = 1$ is given by $\sqrt{3}$. T/F
15. If $f(x) = \sin x + \cos x$ then it is neither an even nor an odd function. T/F
16. Parametric equation of hyperbola is $x = a \sec\theta$ $y = a \tan\theta$. T/F
17. The inverse of $\log_e x = y$ is $x = e^y$. T/F
18. Area of sector of a circle of radius r is $\frac{1}{2} r\theta^2$ T/F
19. The graph of $y^2 = 4ax$ is symmetric about x-axis. T/F
20. Volume of a cube can be expressed as the area of its base. T/F
21. The limit of the sequence $1, 1/2, 1/2^2, 1/2^3 \ldots\ldots\ldots\ldots 1/2^n$ approaches to zero $(n \to \infty)$ T/F
22. Equation $y = ax^2 + bx + c$ always represents a parabola. T/F
23. $\lim_{x \to 3} \sqrt{3x^2 + x + 4} = 16$ T/F
24. $\lim_{\theta \to 0} \sin^2\theta / \theta = 1$ T/F
25. $\lim_{x \to \infty} (1 + 4/n)^n = e^4$ T/F

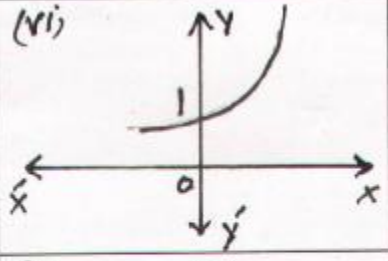
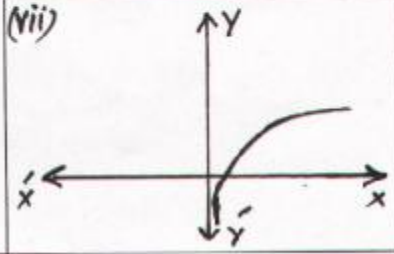
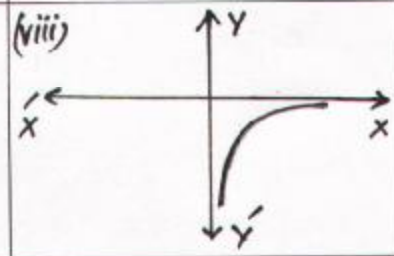
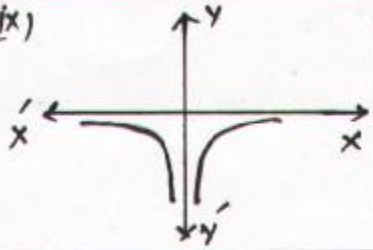
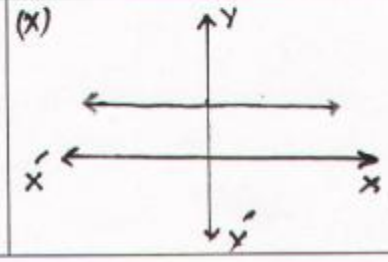
Item-3: Choose and encircle the best possible answers:

1. Let $P(x) = a_n x^n + a_{n-1} x^{n-1} + a_{n-2} x^{n-2} \ldots\ldots\ldots + a_1, x + a_0$ where $a_1, a_2 \in R$ is called:
   a) Rational b) Irrational
   c) Polynomial d) None of these
2. The range of $f(x) = x^3$ is:
   a) Set of all Natural Nos. b) Set of all non-negative Real Nos.
   c) Set of all Real Nos. d) None of these
3. A function $A : X \to Y$ defined by $A(\infty) = a$ is called function:
   a) Identity function b) Constant function
   c) Inverse function d) None of these
4. If $x = a^y$ then y =
   a) $\log_c x$ b) $\log_a x$
   c) $\log_x a$ d) None of these
5. Coth^{-1} is defined as:
   a) $\ln (x+\sqrt{x^2+1})$ b) ½ ln(x+1/x-1)
   b) $\ln (x+\sqrt{x^2-1})$ d) $\ln (1/x + \sqrt{1-x^2}/x$
6. If f(x) = f (-x) then it is called:
   a) Odd function b) Even function
   c) Implicit function d) Explicit function
7. $\text{Cosh}^2 x + \text{Sinh}^2 x =$
   a) $\text{Sinh}^2 x$ b) $\text{Cosh}^2 x$
   c) 1 d) None of these
8. $\lim_{x \to 2} (3x+4/x+3)$ is
   a) 10 b) 2
   c) 5 d) 1
9. If $p(x) = a_n x^n + a_{n-1} x^{n-1} + \ldots\ldots a_1 x + a_0$ isa continuous function of degree n, then $\lim_{x \to c} P(x) =$
   a) a_0 b) a^n
   c) Zero d) P(C)
10. If $f(x) = 2x + 1$ & $g(x) = x^2 + 2x - 1$ then (f-g)(x) is given by
    a) $x^2 + 2$ b) $x^2 - 2$
    c) $-x^2 + 2$ d) $-x^2 - 2$
11. If $h(x) = x+2$ and $j(x) = 4-x^2$, then (hj) (x) is given by:
    a) $-x^2 + 6$ b) $-x^2 - 6$
    c) $x^2 + 6$ d) $x^2 - 6$
12. If $g(x) = x^3 - x$ it is:
    a) Odd function b) Even function
    c) Neither even or odd d) None of them
13. If a point (a,b) lies on the graph of the function which of the following point must lie on the graph of inverse of f.:
    a) (a,b) b) (-a,b)
    c) (a,-b) d) (b,a)
14. $\lim_{x \to 0} \text{Sin } px/qx =$
    a) 1 b) q/p
    c) p/q d) Not defined

15. If $f(x) = x\sqrt{x^2-4}$, then domain of f(x) is:
    a) R b) R – {0}
    c) R – [2,-2] d) R – {4}
16. If f(x) = 2 for all real Nos., then f (x+2) =
    a) 0 b) 2
    c) 4 d) x
17. Lt $(1+3x)^{1/x}$ =
    $x \to 0$
    a) 3 b) 3e
    c) ∞ d) e^3
18. The relation $x^2y + xy^2 - 3 = 0$ is:
    a) quadratic function b) Explicit function
    c) Implict function d) None of these
19. If A = {1,2} & B = {a,b} and R_1 is{(1,a), (2b)} then R_1^{-1} is
    a) {(a,1),(b,2)} b) {(a,1),(2,b)}
    c) {(1,a),(2,b)} d) {(1,a),(b,2)}
20. Lt a^t-1/t =
    $x \to 0$
    a) e b) ∞
    c) ln a d) $\log_{10}a$
21. Lt $e^{1/x}-1/e^{1/x}+1$ =
    $x \to \infty$
    a) 2 b) 0
    c) ½ d) Not defined
22. Lt $5x^2-3/7x^3-1$ =
    $x \to \infty$
    a) 1 b) Undefined
    c) 0 d) ∞/∞

Item-4: Match the items in the column A with column B and write the correct answer in column C:

COLUMN-A	COLUMN-B	COLUMN-C
(a) $y = ax^3$, $a>0$	(i) 	
(b) $y = ax$, $a>0$	(ii) 	
(c) $y = ax$, $a<0$	(iii) 	
(d) $y = ax^2$, $a>0$	(iv) 	
(e) $y = \frac{a}{x^2}$, $a>0$	(v) 	

COLUMN-A	COLUMN-B	COLUMN-C
(f) $y = a^x$, $a > 0$	(vi) 	
(g) $y = \log x$	(vii) 	
(h) $y = C$	(viii) 	
(i) $y = \frac{a}{x^2}$, $a < 0$	(ix) 	
(j) $y = \frac{a}{x}$, $a > 0$	(x) 	

ANSWERS

Item-1: Fill in the blanks:

1: Leibniz 2: Radius of sphere (radius) 3: 4 4: Linear 5: $\{-1 \leq x \leq 1\}$

6: e 7: Implicit 8: Odd 9: 125 10: 1 11: $x = -1$

12: Function 13: Zero 14: Even 15: Odd 16: $\frac{1}{2} \ln \left(\frac{1+x}{1-x}\right)$ $|x|<|$

17: Ellipse 18: x 19: $\lim_{x \to c} h(x) = L$ 20: Zero 21: f(a)

22: Zero 23: $x \geq 0$ 24: Range of f 25: 7

Item-2: Encircle the correct answers:

1: F 2: F 3: F 4: T 5: T 6: T 7: F 8: T 9: F 10: T 11: F 12: T

13: F 14: F 15: T 16: F 17: F 18: F 19: T 20: T 21: T 22: T 23: F 24: F

25: T

Item-3: M.C.Qs:

1: c 2: c 3: b 4: b 5: b 6: b 7: c 8: c 9: d 10: c 11: a

12: a 13: d 14: c 15: c 16: b 17: c 18: c 19: a 20: c 21: b 22: c

Item-4: Match the items in the column A with column B and write the correct answer in column C

a: iv b: i c: ii d: iii e: v f: vi g: vii h: x i: ix j: viii

CHAPTER-2 (Differentiation)

Item-1: Fill in the blanks:

1. In the expression $\phi(\theta) = \theta^2 + 1/\theta$, θ is …….. variable.
2. If $\lim_{\delta x \to 0} \frac{f(x+\delta x) - f(x)}{\delta x}$ exists then f(x) is said to be …….
3. The derivative of $1/\sqrt{x}$ is ……..
4. The Leibnitz symbol for the derivative of y w.r.t. x is …….
5. If $x = t^3$ and $y = 1 + t^2$ then dy/dx is ……
6. …….. is the derivative of $\sin^2 2x$.
7. The derivative of $2^{\tan x}$ is ……
8. If $y = \tan^{-1} 2x$ then dy/dx = ……...
9. d/dx [cos h (3x)] is ……
10. The second derivative of e^{2x} is …….
11. $f(x) = f(0) + xf'(0) + \frac{x^2}{2!} f''(0) + \frac{x^3}{3!} f'''(0) +$ …….. is known as……
12. $e^{x+h} = e^x\{1 + h + \frac{h^2}{2!} + \frac{h^3}{3!} +$ ……..$\}$is called …….. series expansion of e^x.
13. $f(x) = 1/x^2$ is a non …… function on [1, 10].
14. y = sin x is a non ……. function on $[0, \pi/2]$.
15. The maximum value of 2 cos x on the interval $[-\pi, \pi]$. is ……..
16. $f(x) = x^3 + 2x - 4$ is a non …….. function on [-1, 4].
17. The second derivative of y = - cos (x/2) is ……..
18. If $f''(c) > 0$ then f has a …….. at c.
19. A stationary point is also called a …….. if it is either a maximum or a minimum point.
20. f is decreasing on] a,b [,if $f'(x)$ is ……. for each x ε] a,b [.
21. The slope of $y = x^2 + \sin x$, is ……. at x = 0.
22. $\frac{d}{dx}[1/g(x)]$ = …….
23. If u and v are two functions of x then d/dx (u/v) = $(v.u' - uv')/v^2$ is called ……..
24. The derivative of $[f(x)]^n$ w.r.t. x is ……
25. If $x^3 + y^3 = 9$ then dy/dx = …….
26. dy/dx = dy/du . du/dx is known as ……. rule.
27. The derivative of sin x w.r.t. cos x is ……..
28. …… is the derivative of $\ln e^{2x}$.
29. d/dx (sin θ + x) is …….
30. $\frac{1}{\sqrt{1+x^2}}$ is the derivative of ……

Item-2: Encircle the correct answers:

1. When y = f(x), y is called the independent variable. T/F
2. If $\lim_{\delta t \to 0} \frac{S(t+\delta t) - S(t)}{\delta t}$ exists, is called the instantaneous rate of change of distance with respect to "t". T/F
3. The notation $f'(x)$ for derivative of y = f(x) was introduced by Newton. T/F
4. The derivative of $y = \sin\pi$ w.r.t. x is $\cos\pi$. T/F
5. The equation of tangent line of the curve $y = x^2 + 1$ at x = 1 is y = 2x. T/F
6. d/dx (1/x) = 1 T/F

7. $d/dx\ (c.f(x)) = c.\ f'(x)$. T/F
8. $d/dx\ [(x+a)/(x-a)] = 1/(x-a)^2$ T/F
9. $\frac{d}{dx}\ [1/g(x)] = \frac{-g'(x)}{[g(x)]^2}$ is known as reciprocal law. T/F
10. The derivative of $(\sqrt{x}+2)\ (\sqrt{x}-2)$ is 1. T/F
11. If $x = \sin t/2$, $y = \cos t/2$ then $dy/dx = \tan t/2$. T/F
12. The derivative of ln sin x w.r.t. x is tan x. T/F
13. If $x = 2at$ and $y = at^2$ then $dy/dx = x/2a$. T/F
14. If $xy = 3$ then $dy/dx = x/y$. T/F
15. For finding the derivatives of trigonometric functions f(x), x must be in degrees. T/F
16. The derivative of $\tan x^2$ is $\sec^2 x$. T/F
17. $d/d\theta\ (\cos^{-1} 2\theta) = 1/\sqrt{1-4\theta^2}$ T/F
18. $d/dx\ [\log_a^x] = \ln a/x$ T/F
19. The tenth derivative of e^θ w.r.t.θ is e^θ. T/F
20. The fourth derivative of cos x is sin x. T/F
21. A series of the form $a_0 + a_1x + a_2x^2 + a_3x^3 + \ldots\ldots\ldots + a_nx^n + \ldots\ldots\ldots$ is called a power series expansion. T/F
22. Maclaurin's series expansion of sin x is, $x - x^3/3! + x^5/5! - x^7/7! + \ldots\ldots\ldots$ T/F
23. Maclaurin's series expansion of cos x is $1 - x^2/2! - x^4/4! - x^6/6! - x^8/8! - \ldots\ldots\ldots$ T/F
24. There is no tangent line to the graph of $y = |x|$ at $x = 0$. T/F
25. When $f'(x) < 0$ for each $x \in]a,b[$ then f(x) is increasing. T/F
26. Relative maxima is not necessarily the highest point of the graph. T/F
27. $f''(x)$ is positive at the point $x = c$ where f has relative maxima. T/F
28. If $f(x) = \cos x$ then $f''(\pi/2) = 1$. T/F
29. The increment in x should always be positive. T/F
30. $d/dx\ (\coth^{-1}x) = 1/(1+x^2)$ T/F

Item-3: Choose and encircle the best possible answers:

1. A function f(x) has a minimum value at x = a if:
   a) $f''(a) = 0$, $f'(a) = 0$ b) $f''(a) > 0$, $f'(a) = 0$
   c) $f''(a) < 0$, $f'(a) = 0$ d) $f''(a) = 0$, $f'(a) = 0$
2. If y = f(x) then dy/dx is:
   a) Slope of normal line b) Slope of x-axis c) Slope of y-axis d) Slope of tangent line
3. The derivative of cos (ax/c) is:
   a) -a/c sin (ax/c) b) a/c sin (ax/c) c) 1/c sin (ax /c) d) -1/c sin (ax/c)
4. $d/dx\ [\frac{\sin \pi/2}{\sec x}] =$:
   a) Sin x b) Cos x c) -Sin x d) -Cos x
5. If $f'(x) = 0$ at x = c then f(c) is:
   a) Maximum at x = C b) minimum at x = C
   c) Stationary point d) Insufficient in formation
6. d/dx [Sin x Cos x] is:
   a) $\sin^2 x$ b) Cos2 x c) $\cos^2 x$ d) Sin2 x/2
7. The derivative of $x^2 + y^2 = 9$ is:
   a) -x/y b) 2x + 2y = 0 c) y/x d) y^2/x^2
8. If $x = a\cos^2\theta$, $y = b\sin^2\theta$ then dy/dx is:
   a) b/a b) a/b c) -b/a d) $b\cos\theta / a\sin\theta$
9. The derivative of $\sin x^0$ w.r.t. to x:
   a) $\cos x^0$ b) $x^0 \cos x^0$ c) $\pi/180 \sin x^0$ d) $\pi/180 \cos x^0$

10. If $y = x^7 + x^6 + x^5$ then $D^8(y)$ =:
    a) 7! b) 7! x c) 7! + 6! d) 0
11. d/dx [cos C. Sin 45^0] =:
    a) 0 b) Sin C. Sin 45^0 c) -Sin C. Sin 45^0 d) Cos C. Cos 45^0
12. d/dx [x^{x2}] is:
    a) x^{x2} [1+lnx] b) x^{x2+1} [1+lnx] c) x^{x2-1} [1+lnx] d) x^{x2+1} [1+2lnx]
13. d/dx (a^{b+c}):
    a) 0 b) (b+c) a^{b+c-1} c) ba^{b+c} d) (b+c) a^{b+c} Ina
14. y = Cos (bx + c) then d^4/dx^4 Cos (bx+c):
    a) Cos (bx + c) b) Sin (bx + c) c) b^4 Cos (bx + c) d) b^4 Sin (bx + c)
15. If $y^3 = x^2$ then dy/dx is:
    a) (3/2) (y^2/x^2) b) (2/3) (x/y^2) c) (2/3) (x^2/y^2) d) (3/2) (x/y)
16. $d^4/dx^4(x^8 + 12)$ is:
    a) $8.7.6x^5$ b) $8x^7$ c) (8! / 4!) x^4 d) $8.7.6.5.4.x^3$
17. d/dx [Cos ax + Cos bx + Cos cx]:
    a) (a+b+c) Sin x b) -(a+b+c) Sin x
    c) a Sin ax + b Sin bx + c Sin cx d) -(a Sin ax + b Sin bx + c Sin cx)
18. d/dx ($\cos^{-1}\sqrt{x}$) =:
    a) $1 / \sqrt{2}(1-x)$ b) $1 / \sqrt{2x}$ c) $1 / \sqrt{x}(1-x)$ d) $-1 / \sqrt{2x}(1-x)$
19. d/dx [Sin h^{-1} (ax + b)]:
    a) $1 / \sqrt{1-(ax+b)^2}$ b) $a / \sqrt{1+(ax+b)^2}$
    c) $a / \sqrt{1+(ax+b)}$ d) $a+b / \sqrt{1-(ax+b)^2}$
20. d/dx $(\ln f(x))$ =:
    a) $f'(x) / f(x)$ b) $f(x) / f'(x)$
    c) $-f'(x) / f(x)$ d) $- f(x) / f'(x)$
21. $1+x+x^2/2!+x^3/3!+$ …….. is an expansion of:
    a) Sin x b) e^{2x} c) Tan x d) e^x
22. $1-t^2/2!+t^4/4!-t^6/6!+$…….. is an expansion of:
    a) $\cos^{-1}t$ b) Sin t c) e^t d) Cos t
23. The minima of the function $y = x^2 - x$ on [0,1] is:
    a) -1/4 b) 1/2 c) 1/4 d) -1/2
24. Cos h^{-1}x can also be written as:
    a) $1 / \sqrt{1+x^2}$ b) $1 / \sqrt{1-x^2}$ c) $\ln (x+\sqrt{x^2-1})$ d) $\ln (x+\sqrt{x^2+1})$
25. The equation of tangent line to the curve $x^2 + y^2 = c^2$ at (a,b):
    a) x/a = y/b b) $ax + by = C^2$ c) bx + ay = C d) ax + by = C
26. d/dx (Sin x) $^{-1}$:
    a) $1 / \sqrt{1-x^2}$ b) $-(\text{Sin } x)^{-2}$ c) - Cosec x cot x d) Cosec x cot x
27. d/dx (3^{3x+7}) =:
    a) 3^{3x+7} (ln 3) b) $3^{3x+7} / \ln 3$ c) $3^{3x+8}/\ln 3$ d) 3^{3x+8} (ln3)
28. $1 - x + x^2 / 2! - x^3 / 3! + x^4 / 4!+$…….. is an expansion of:
    a) e^x b) Sin x c) Cos x d) e^{-x}
29. Value of d^2/dx^2 (-Cos x) at $x = \pi/4$ is:
    a) $1 / \sqrt{2}$ b) $-1/\sqrt{2}$ c) 1/2 d) -1/2
30. Two numbers such that their difference is 50 and product is minimum are:
    a) 50, 0 b) 0, -50 c) 25, -25 d) 25, 25

Item-4: Match the items in the column A with column B and write the correct answer in column C:

COLUMN-A	COLUMN-B	COLUMN-C
a) d/dx (c)	i) 6	
b) y = sin x on [0, π/2]	ii) 2	
c) $y = 1/x^3$ on [-5, -3]	iii) 1	
d) d/dx $(x)^{2/3}$ at x = 8	iv) Decreasing	
e) Maxima of $y = 4 \cos x$ on $[-\pi,\pi]$	v) – ¼	
f) Third derivative of $x^3 - 5$	vi) ½	
g) Slope of the tangent line of $y = x^2 + 1$ at x = 1	vii) Increasing	
h) d/dx (sin (cos x)) at x = π/2	viii) 4	
i) d/dx $(1+x)^{-1}$ at x = 1	ix) Zero	
j) Third derivative of $x^3/12 - x^2/6 + x/2 + 7$	x) 1/3	
	xi) 5	
	xii) –1	

ANSWERS

Item-1: Fill in the blanks:

1: Independent 2: Differentiable 3: $-1/2\ x^{-3/2}$ 4: dy/dx 5: 2/3t
6: 4 sin 2x cos 2x 7: $2^{\tan x} \sec^2 x.\ln 2$ 8: $2/(1+4x^2)$ 9: 3 sinh3x
10: $4e^{2x}$ 11:Maclaurin's series 12: Taylor series 13: Increasing
14: Decreasing 15: 2 16: Decreasing 17: ¼ cos x/2
18: Relative Minima 19: Turning point 20: Less than zero
21: 1 22: $-[g(x)]^{-2}\ g(x)'$ 23: Quotient rule 24: $n[f(x)]^{n-1}f(x)'$
25: $-x^2/y^2$ 26: Chain rule 27: -cotx 28: 2 29: 1 30: $\sinh^{-1}x$

Item-2: Encircle the correct answers:

1: T	2: T	3: F	4: F	5: T	6: F	7: T	8: F	9: T	10: T	11: F
12: F	13: T	14: F	15: F	16: F	17: F	18: F	19: T	20: F	21: T	22: T
23: F	24: T	25: F	26: T	27: F	28: F	29: F	30: F			

Item-3: M.C.Qs:

1: b	2: d	3: a	4: c	5: c	6: b	7: a	8: c	9: d	10: d	11: a
12: d	13: a	14: c	15: b	16: c	17: d	18: d	19: b	20: a	21: d	22: d
23: a	24: c	25: b	26: c	27: d	28: d	29: a	30: c			

Item-4: Match the items in the column A with column B and write the correct answer in column C:

a: ix b: vii c: iv d: x e: viii f: i g: ii h: xii i: v j: vi

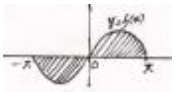
CHAPTER-3 (Integration)

Item-1: Fill in the blanks:

1. The inverse process of differentiation is called……
2. In $dy = f'(x)\,dx$, …….. is called the differential coefficient.
3. The differential of x is denoted by ……..
4. If $\phi'(x) = f(x)$, then ……. is called an integral of f(x).
5. $x^2 + x + c$ is the indefinite integral of …….
6. In $\int f(x)\,dx$; f (x) is called ……..
7. In $\int_a^b f(x)\,dx$ the upper limit is …….
8. In $\int_a^b f(x)dx$, the ……. Limit is a.
9. In $\int_a^x f(t)dt$, the integral will be a function of …….
10. …….. are used to find the area under the curves.
11. The area above the x-axis and under the curve y = f(x) from a to b is ……..
12. Area under the curve y = sin x and above x-axis, from 0 to π is ……..
13. If $\int_0^1 f(x)dx = 5$ and $\int_1^3 f(x)dx = 3$, then $\int_0^3 f(x)dx$ = ……
14. Area under the line y = x and above the x-axis from 0 to 1 is ……
15. Differential equations contain at least …….. derivative of a dependent variable.
16. The order of differential equation is the order of the ……. in the equation.
17. The order of differential equation $x\,d^2y/dx^2 + dy/dx - 2x = 0$ is …….
18. The …… solution of a differential equation represents a family of curves.
19. The general solution of differential equation of order n contains ……. arbitrary constants.
20. n arbitrary …… in the solution of a differential equation can be determined by n initial conditions.
21. The solution obtained by giving a particular value to arbitrary constant in general solution is …….. of the differential equation.
22. The highest order derivative in the differential equation is the …….. of the differential equation.
23. The term $f'(x)\,dx$ is called…… of the dependent variable y.
24. $\int e^x/1+e^x\,dx$ = …….
25. The interval [a,b] is called the ……. of integration in $\int_a^b f(x)\,dx$

Item-2: Encircle the correct answers:

1. $\int (ax+b)\,dx = \frac{(ax+b)^{n+1}}{n+1}$ where $n \in Z$ T/F
2. $d/dx\{\int f(x)dx\} = f(x) + c$ T/F
3. $\int d/dx\{f(x)\}\,dx = f(x) + c$. T/F
4. The general solution of differential equation in variable separable form contains two independent variables. T/F
5. The order of a differential equation is the order of the highest derivative in the equation. T/F
6. Area bounded by the curve x = f(y) and x-axis is $\int_a^b f(x)dx$ $a \le x \le b$. T/F
7. A=Area of the Shaded region T/F



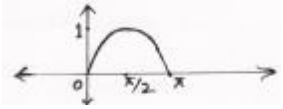
$= \int_{-\pi}^{0} f(x)dx + \int_0^{\pi} f(x)dx$

8. $\int_a^b f(x)\,dx = \int_a^b f(x)\,dx$ T/F
9. $dy = \delta y$ T/F
10. $y = ce^{-x}$ is solution of differential equation $dy/dx = -y$. T/F

11. $\int_a^b f(x)\,dx$ has a definite value. T/F
12. Area under the curve is always taken positive. T/F
13. If f(x) is even function then $\int_{-a}^{a} (fx)dx = 2\int_0^a f(x)\,dx$. T/F
14. The degree of differential equation $xd^2y/dx^2 + (dy/dx)^3 + 1 = 0$ is 2. T/F
15. $\int \frac{f(x)}{g(x)}\,dx = \int f(x)\,dx \times \int \frac{1}{g(x)}\,dx$ T/F
16. $\int [f(x)]^n f'(x)\,dx = [f(x)]^{n+1}/_{n+1} + C$ where n is any integer. T/F
17. The integral of product of two functions is the product of their integrals. T/F
18. $\int a^{kx}\,dx = a^{kx} / _{\ln a} + c \quad (a > 1)$ T/F
19. $d(e^{ax}) = ae^{ax}$ T/F
20. Volume of cube with length of a side x is x^3. T/F
21. $\int \frac{dx}{ax+b} = \ln|ax+b| + c$ T/F
22. The arbitary constants involved in the solution of differential equation can be determined by initial values conditions. T/F
22. $\int \sec x\,dx = \ln|\sec x - \tan x| + C$ T/F
23. $\int \cot(ax+b)dx = 1/a \ln|\sin(ax+b)| + C$ T/F
24. $\int_0^2 x\,dx = ¼$. T/F
25. If S is the distance then dS/dt represents acceleration of the particle. T/F
26. $\int \ln x\,dx = 1/x + C$. T/F
27. $\int \tan x\,dx$ cannot be evaluated. T/F
28. $\int 2x\,e^{x2}\,dx = e^{x2} / _2 + C$ T/F
29. $\int dx/x \ln x = \ln|x| + C$ T/F
30. $x - \ln x^2 + k$ is the result of integrating $(x-2)/_x$ w.r.t. x. T/F

Item-3: Choose and encircle the best possible answers:

1. $f(x) = x^2$, when x =2 and dx = 0.01. Which one is true?
   a) dy = 0.0001 b) dy = 0.001 c) dy = .02 d) dy = 2.01
2. Which one is correct?
   a) $\int \text{Cosec}^2 x\,dx = -\text{Cot}x + C$ b) $\int \text{Sec}^2 x\,dx = \tan^2 x + C$
   c) $\int \text{Cosec}^2 x\,dx = \text{Cot}x + \text{Cd})$ $\int \text{Sec}^2 x\,dx = -\tan x + C$
3. If an integrand involves $\sqrt{x^2 - a^2}$, which one is the suitable substitution?
   a) $x = a \sin\theta$ b) $a \sec\theta$ c) $x = a \tan\theta$ d) $x - a = a \sin\theta$
4. Which one is the anti derivative of 1/x?
   a) $\ln|x| + C$ b) $\ln|x^{-1}| + C$ c) $-1/x^2 + C$ d) None of these
5. If $I = \int (5x+8)/(x^2-5x+6)\,dx$, choose the correct partial fractions of $(5x+8)/(x^2-5x+6)$
   a) $(Ax+B) / (x^2-5x+6)$ b) $A/(x-3) + B/(x-2)$
   c) $A/(x+2) + B/(x+3)$ d) None of these
6. Which one is not the anti derivative of $x\sqrt{x^2+1}$?
   a) $1/3\,(x^2+1)^{3/2} + C$ b) $1/3\,(x^2+1)^{3/2}$
   c) $1/3\,(x^2+1)^{-3/2} + C$ d) $1/3\,(\sqrt{x^2+1})^3 + C$
7. Choose the correct response to $\int e^x (1/x + \ln x)\,dx$:
   a) $e^x (1/x) + C$ b) $e^x \ln x + C$ c) $e^x (1+\ln x/x) + C$ c) $e^x \ln x/x + C$
8. Which one is the area of lined portion showing one arch of sine curve?



a) 1 b) 2 c) 4 d) π

9. Which one is the area bounded by the x-axis and graph of sine curve from $-\pi$ to π?
   a) 0 b) 2 c) 4 d) None of these
10. If $\int_{-2}^{1} g(x)\,dx = 5$; $\int_{1}^{3} g(x)\,dx = 4$, choose the correct one:
    a) $\int_{-2}^{3} g(x)\,dx = 0$ b) $\int_{-2}^{3} g(x) = 9$ c) $\int_{-2}^{3} g(x)\,dx = 45$ d) $\int_{-2}^{3} g(x) = 1$
11. Which one is the correct value of $\int x^3\,dx$?
    a) 20 b) 24 c) 28 d) None of these
12. What is the area bounded by the line y =2 and the x-axis from –1 to 1?
    a) 2 b) 4 c) 0 d) 1
13. Which one of the following is correct?
    a) A differential equation involves at least one term containing derivative.
    b) A differential equation involves exactly one term containing derivative.
    c) A differential equation involves at the most one term containing derivative.
    d) None of these.
14. What is the order of the differential equation $d^2y/dx^2+(dy/dx)^3+3\,dy/dx = 2x$
    a) One b) Two c) Three d) Six
15. What is the degree of the differential equation $d^2y/dx^2+(dy/dx)^3+3\,dy/dx = 2x$
    a) One b) Two c) Three d) Six
16. Give the solution of the differential equation $x\,dy/dx = y + 1$:
    a) $xy' = y + C$ b) $xy = y + C$ c) $y = cx – 1$ d) $y = cx + 1$
17. Which one of the following is the differential equation of $x + y + c = 0$?
    a) $dy + dx = 0$ b) $dy/dx = x^2/2$
    c) $dy/dx + dx/dy = 0$ d) $x^2/2 + y^2/2 + cx = 0$
18. Choose the differential equation of straight line:
    a) $y = mx + C$ b) $dy/dx = mx + C$ c) $dy/dx + mx = C$ d) $dy/dx = m$
19. What is the general solution of the differential equation $dy/dx = 3x^2$?
    a) $y = 6x + C$ b) $y = x^3 + 1$ c) $y = x^3 + C$ d) $y = 6x + 1$
20. What is the particular solution of the differential equation $x\,dy/dx + 8 = 2y$?
    a) $y = Cx^2 + 4$ b) $-Cx^2 + 4$ c) $y = x^2 + 4$ d) $y = -x^2 + C$
21. $\int a^x dx$ = ?
    a) $a^{x+1}/x+1$ b) xa^{x-1} c) $a^x/\log a$ d) $a^x \log a$
22. $\int (1 + x) / x\,dx$ = ?
    a) $\log x + 1$ b) $\log (xc)$ c) $\log x - 1$ d) $\log x + x$
23. $\int o\,dx$ = ?
    a) $-1/x^2$ b) x c) Constant d) $1/x$
24. $\int (x+2)/(x+1)\,dx$ = ?
    a) $\log_e (x+1)$ b) $\log_e (x+1) + 1$
    c) $\log_e (x+1) + x$ d) $\log_e (x+1) + x^2 + C$
25. $\int e^x (\sec x + \tan^2 x)\,dx$ = ?
    a) $e^x \sec^2 x$ b) $e^x \sec x$ c) $e^x \tan^2 x$ d) $e^x \tan x$

Item-4: Match the items in the column A with column B and write the correct answer in column C:

COLUMN-A	**COLUMN-B**	**COLUMN-C**
a) Reverse process of differentiation.	i) Family of curves	
b) $\int (ax+b)^n dx$	ii) $x^3 - a^3$	
c) $\int (ax+b)^{-1}$, $ax + b \neq 0$	iii) Particular value of arbitrary constant	
d) General solution of differential equation.	iv) $1/a \ln \lvert ax+b \rvert + C$	
e) Particular solutions.	v) Integration	
f) $\int_a^x 3t^2 dt$	vi) $(ax+b)^{n+1}/a(n+1) + C$	
g) $\int_a^b f(x) dx$	vii) $\phi(b)-\phi(a)$	
h) $\int_0^{\pi} \cos x \, dx$	viii) $x \, d^2y/dx^2+dy/dx-2x = 0$	
i) Differential equation	ix) Infinite	
j) Arbitrary constants	x) 0	

ANSWERS

Item-1: Fill in the blanks:

1: Integration or anti-derivation 2: $f'(x)$ 3: dx 4: $\phi(x)$ 5: $2x + 1$
6: Integrand 7: b 8: Lower 9: x 10: Definite integrals
11: $\int_a^b f(x) dx$ 12: 2 13: 8 14: ½ 15: One
16: Highest derivative 17: 2 18: General 19: n
20: Constants 21: Particular solution 22: Order 23: Differential
24: $\ln \lvert 1+e^x \rvert + C$ 25: Range

Item-2: Encircle the correct answers:

1: F	2: F	3: T	4: F	5: T	6: F	7: F	8: F	9: T	10: T	11: F
12: T	13: T	14: F	15: F	16: F	17: T	18: F	19: F	20: T	21: F	22:T
23: T	24: F	25: F	26: F	27: T	28:F	29: F	30: T			

Item-3: M.C.Qs:

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

Item-4: Match the items in the columns:

a: (v) b: (iv) c: (vi) d: (i) e: (iii) f: (ii) g: (vii) h: (x) i: (viii) j: (ix)

CHAPTER-4 (Introduction to Analytic Geometry)

Item-1: Fill in the blanks:

1. X-coordinate is the directed distance from …….
2. Y-coordinate is the directed distance from …….
3. All points (x,y) with $x > 0$, $y > 0$ lie in …….. quadrant.
4. All points (x,y) with $x < 0$, $y > 0$ lie in …… quadrant.
5. All points (x,y) with $x < 0$, $y < 0$ lie in …… quadrant.
6. All points (x,y) with $x > 0$, $y < 0$ lie in …… quadrant.
7. Distance between two points A (x_1,y_1) and B (x_2,y_2) is given by $|AB|$ = …….
8. If the directed distances AP and PB have opposite signs then P is said to divide AB ……
9. If P (x,y) is the mid point of AB with end points A (x_1,y_1) and B (x_2,y_2) then x = ……, y = ……
10. Bisectors of angles of a triangle are ……. and point of concurrency has co-ordinates (……., ……..)
11. Point-slope form of the equation of a straight line is ……..
12. Slope of a line joining two points A (x_1,y_1), B (x_2,y_2) is …….
13. a) Slope of x-axis is ……
    b) Slope of y-axis is …….
14. Equation of a line with x-intercept 'a' and y intercept 'b' is ……
15. A linear equation in two variables x and y is ……..
16. Slope of general equation $ax + by + c = 0$ is m = …….
17. The equation $x \cos\alpha + y \sin\alpha = p$ represents …….. of a straight line.
18. Two non-parallel lines intersect each other at ……..…… point.
19. The necessary and sufficient condition of concurrency of the given three lines $a_1x+b_1y+c_1=0$, $a_2x+b_2y+c_2=0$ and $a_3x+b_3y+c_3=0$ is ……..
20. Altitudes of a triangle are…….
21. Distance 'd' from the point P (x_1,y_1) to the line $ax + by + c = 0$ is d = ……..
22. Area of triangle whose vertices are P (x_1,y_1), Q (x_2,y_2) and R (x_3,y_3) is Δ = …….
23. A quadrilateral having two parallel and two non-parallel sides is called …….
24. If points P (x_1,y_1), Q (x_2,y_2) and R (x_3,y_3) are collinear then area i.e. Δ = …….
25. The lines lying on the same plane are called …….. lines.
26. Angle between the two lines l_1 and l_2 having slopes m_1, m_2 respectively is $\tan\theta$ = ……
27. When two lines l_1 and l_2 having slopes m_1, m_2 respectively are parallel then …….
28. If two lines l_1, l_2 having slope m_1, m_2 respectively are perpendicular then ……
29. An equation f (x,y) = 0 is said to be homogeneous of degree n if f (kx, ky) = ……..
30. A general second degree homogeneous equation can be written as ……..

Item-2: Encircle the correct answers:

1. All points (x,y) with $x < 0$, $y < 0$ lie in 1st quadrant. T/F
2. All points (x,y) with $x < 0$, $y > 0$ lie in 2nd quadrant. T/F
3. All points (x,y) with $x > 0$, $y > 0$ lie in 3rd quadrant. T/F
4. All points (x,y) with $x > 0$, $y < 0$ lie in 4th quadrant. T/F
5. The point P is said to divide the line segment AB in ratio $k_1 : k_2$ internally according as P is beyond AB. T/F

6. If $k_1 : k_2 = 1 : 1$ then P becomes mid point of AB and Co-ordinates of P are $x = (x_1 + x_2)/2$, $y = (y_1 + y_2)/2$ T/F
7. If a line l is parallel to x-axis then $\alpha = 90^0$. T/F
8. If a line l is parallel to y-axis then $\alpha = 0^0$. T/F
9. Equation of a straight line perpendicular to y-axis at (0,a) is y = a. T/F
10. Equation of a straight line parallel to y-axis at a distance 'b' from it is y = b. T/F
11. If a > 0 in the equation of y = a then the line l is below x-axis. T/F
12. If a=0 in equation y=a, then line l becomes x-axis and the equation of x-axis is y = 0. T/F
13. If a line intersects x-axis at (a,0) then a is called y-intercept of the line. T/F
14. If a line l intersects y-axis at (0,b) then 'b' is called x-intercept of the line. T/F
15. Equation of a straight line with slope m and y-intercept c is y = mx + c. T/F
16. $x-x_1/\cos\alpha = y - y_1/\sin\alpha = r$ is symmetric form of equation of a straight line. T/F
17. Three lines $a_1x+b_1y+c = 0$, $a_2x+b_2y+c_2 = 0$ and $a_3x+b_3y+c_3 = 0$ are concurrent if T/F

$$\begin{vmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{vmatrix} \neq 0$$

18. The medians of a triangle are concurrent. T/F
19. The centroid of a Δ ABC is a point which divides each median in the ratio 2:1. T/F
20. The point P (x_1, y_1) is above the line $ax + by + c = 0$ if $ax_1 + by_1 + c < 0$. T/F
21. Equation of a non-vertical straight line passing through two points P (x_1, y_1), Q (x_2, y_2) is $(y-y_1)(x_2-x_1) = (x-x_1)(y_2-y_1)$. T/F
22. The distance d from a point (x_1,y_1) to the line l:ax+by+c=0 is $d = \sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$ T/F
23. If the points P (x_1,y_1), Q (x_2,y_2) and R (x_3,y_3) are collinear then T/F

$$\Delta = 1/2 \begin{vmatrix} x_1 & y_1 & 1 \\ x_2 & y_2 & 1 \\ x_3 & y_3 & 1 \end{vmatrix}$$

24. Area of trapezoidal region = ½ (sum of // sides) (distance between // sides). T/F
25. Area of a triangular region whose vertices are P (x_1,y_1), Q (x_2,y_2) and R (x_3,y_3) is T/F

$$\Delta = \begin{vmatrix} x & y & 1 \\ x_1 & y_1 & 1 \\ x_2 & y_2 & 1 \end{vmatrix}$$

26. A linear equation ax + by + c = 0 in two variables x and y has its matrix form
[a b] [x y] = o T/F
27. The general equation ax + by + c = 0 is called homogeneous equation of the second degree in two variables x,y. T/F
28. If the matrix $\begin{bmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{bmatrix}$ is singular then the lines are concurrent. T/F
29. A pair of lines represented by homogeneous second degree equation $ax^2+2hxy+by^2=0$ will be imaginary if $h^2 > ab$. T/F
30. A pair of lines represented by $ax^2+2hxy+by^2=0$ will be orthogonal if a + b = 0. T/F

Item-3: Choose and encircle the best possible answers:

1. Equation of straight line with slope m and passing through (x_1,y_1) is:
   a) $y-y_1 = x-x_1$ b) $y_1 = mx_1 + c$
   c) $x/x_1 + y/y_1 = 1$ d) $y-y_1 = m(x-x_1)$
2. Equation of a line passing through (x_1,y_1), (x_2,y_2) is:
   a) $(y-y_1)(x_2-x_1) = (y_2-y_1)(x-x_1)$ b) $(y-y_2)(y_2-y_1) = (x-x_2)(x_2-x_1)$
   c) $y-y_1 = x-x_1$ d) $y-y_2 = (x-x_2)$

3. Equation of x-axis is:
   a) $x = 0$ b) $y = 0$ c) $x-y = 0$ d) $x = 1$
4. If a line l is parallel to y-axis then inclination α =:
   a) 0^0 b) 90^0 c) 45^0 d) 80^0
5. If slope of AB = Slope of BC then the points A, B and C are:
   a) Collinear b) Coincident c) Non-collinear d) vertices of triangle
6. Equation of a st. line having x-intercept "a" and y-intercept "b" is:
   a) $x/a - y/b = 1$ b) $x/a + y/b = 0$
   c) $x/a + y/b = 1$ d) $a/x + b/y = 1$
7. Equation of the line passing through (8,-3) having slope 0 is:
   a) $x = 8$ b) $y + 3 = 0$ c) $y = 3$ d) $x-3 = 0$
8. The equation $x \cos \alpha + y \sin \alpha = p$ is in the form:
   a) Slope-intercept b) Symmetric c) Intercept d) Perpendicular
9. A general equation of a straight line is of degree:
   a) Zero b) Two c) One d) Three
10. If m_1 and m_2 are the slopes of two lines l_1 and l_2 then the angle θ between them is:
    a) $\tan \theta = m_2-m_1/1+m_1m_2$ b) $\tan \theta = m_2+m_1/1+m_1m_2$
    c) $\tan \theta = m_2-m_1/1-m_1m_2$ d) $\tan \theta = m_2+m_1/1-m_1m_2$
11. Slope of a line $ax + by + c = 0$ is:
    a) a/b b) b/a c) -a/b d) c/a
12. The point dividing A (-6,3) and B (5,-2) in the ratio 2:3 internally has coordinates:
    a) (3/5,0) b) (-28,13) c) (-1/5, 1/5) d) (-8/5,1)
13. Distance between the two parallel lines $2x + y + 2 = 0$ and $6x + 3y - 8 = 0$ is:
    a) 2 b) $14/3\sqrt{5}$ c) $14/\sqrt{3}$ d) $8/\sqrt{45}$
14. Two line $l_1 : a_1x + b_1y + c_1 = 0$ and $l_2 : a_2x + b_2y + c_2 = 0$ are perpendicular if:
    a) $a_1a_2 + b_1b_2 = 0$ b) $a_1b_2 + a_2b_1 = 0$
    c) $a_1b_1 + a_2b_2 = 0$ d) $a_1b_2 - a_2b_1 = 0$
15. Two st. lines $a_1x + b_1y + c_1 = 0$, $a_2x + b_2y + c_2 = 0$ are parallel if:
    a) $a_1/b_1 = a_2/b_1$ b) $a_1/a_2 = b_1/b_2$
    c) $a_1a_2 = b_1b_2$ d) $a_1/c_1 = a_2/c_2$
16. Distance of points (0,4) from the line $x + y + 4 = 0$ is:
    a) 4 b) 8 c) $4\sqrt{2}$ d) $4/\sqrt{2}$
17. Determine whether the point (-7,6) is above, below or lie on the line $3x - 5y + 8 = 0$:
    a) Below b) Above c) On the line d) None of them
18. Distance between the two given points A(3,1), B(-2,-4) is:
    a) $5\sqrt{2}$ b) $\sqrt{58}$ c) $\sqrt{2}$ d) $\sqrt{10}$
19. If the points P (x_1,y_1), Q(x_2,y_2) and R(x_3,y_3) are collinear then the area of the triangular region must be:
    a) Zero b) Unity c) Positive d) Negative
20. Two non-parallel and coplanar lines $a_1x + b_1y + c_1 = 0$, $a_2x + b_2y + c_2 = 0$ intersect only if:
    a) $a_1a_2 - b_1b_2 = 0$ b) $a_1a_2 - b_1b_2 = 1$
    c) $a_1b_2 - a_2b_1 \neq 0$ d) $a_1a_2 - b_1b_2 \neq 1$
21. An equation $ax^2 + 2hxy + by^2 = 0$ represents two real and distinct straight lines if:
    a) $h^2 > ab$ b) $h^2 < ab$ c) $h^2 = ab$ d) $h = 0$
22. An equation $ax^2 + 2hxy + by^2 = 0$ represents two real and coincident lines if:
    a) $h^2 < ab$ b) $h^2 = ab$ c) $h^2 > ab$ d) None of them
23. An equation $ax^2 + 2hxy + by^2 = 0$ represents two imaginary lines if:
    a) $h^2 > ab$ b) $h^2 = ab$ c) $h^2 < ab$ d) $ab = 0$
24. Two lines represented by $ax^2 + 2hxy + by^2$ will be orthogonal if:
    a) $a + b = 0$ b) $a = b$ c) $a = 0$ d) $b=0$

25. The acute angle between the lines represented by $x^2 - xy - 6y^2 = 0$ is:
    a) 30^0 b) 60^0 c) 75^0 d) 45^0
26. An equation of st. line with slope 2 and y-intercept 5 is:
    a) $y = 5x + 2$ b) $y - 2x = 5$ c) $y = 2x$ d) $y = 2x + 5$
27. Two lines $5x + 7y = 35$ & $3x - 7y = 21$ intersect at:
    a) (0,7) b) (7,1) c) (2,5) d) (7,0)
28. The point (-4,7) lies in:
    a) 1^{st} quadrant b) 2^{nd} quadrant c) 3^{rd} quadrant d) 4^{th} quadrant
29. Radius of the circle with A(-5,-2) and B (5,-4) as end points of diameter is:
    a) $(1/2)\sqrt{26}$ b) 9/2 c) $2\sqrt{56}$ d) $\sqrt{26}$
30. Centroid of the triangle whose vertices are A (3,-5), B(-7,4) and C(10,-2) is:
    a) (5,-3/2) b) (2,-1) c) (-2,1) d) (3/2,-3/4)

Item-4: Match the items in the column A with column B and write the correct answer in column C:

COLUMN-A	**COLUMN-B**	**COLUMN-C**
a) Slope of a straight line with inclination α:	i) 0	
b) For a nonzero real k, the equation $l_1+kl_2=0$ represents a:	ii) Normal form	
c) General equation of straight line:	iii) $\|A\| \neq 0$	
d) The equation $x-x_1/\cos\alpha = y-y_1/\sin\alpha = r$ represents a straight line:	iv) $\theta = \tan^{-1}(m_2-m_1/1+ m_1.m_2)$	
e) A general second degree homogeneous equation:	v) $ax + by + c = 0$	
f) The equation $x\cos\alpha + y\sin\alpha = p$ represents a straight line:	vi) $h^2 > ab$	
g) If the point $P(x_1,y_1)$ lies on l then the distance d = :	vii) $ax^2 + 2hxy + by^2 = 0$	
h) A system of linear equations has a solution iff:	viii) Family of st. lines.	
i) A pair of lines represented by $ax^2 + 2hxy + by^2 = 0$ are real and distinct:	ix) Symmetric form	
j) Given two lines l_1,l_2 ,angle θ between them:	x) $m = \tan\alpha$	
	xi) Intercept form	
	xii) 1	

ANSWERS

Item-1: Fill in the blanks:

1: Y-axis 2: X-axis 3: First 4: 2^{nd} 5: 3^{rd} 6: 4^{th}

7: $\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$ 8: Externally 9: $(x_1+x_2)/2,(y_1+y_2)/2$

10: Concurrent, $(ax_1 + bx_2 + cx_3 / a + b + c , ay_1 + by_2 + cy_3 / a + b + c)$.

11: $y-y_1 = m(x-x_1)$ 12: y_2-y_1/x_2-x_1 13: a). 0 b). Undefined 14: $x/a+y/b=1$

15: $ax+by+c = 0$ 16: $-a/b$ 17: Normal form 18: one and only one

19: $\begin{vmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{vmatrix} = 0$ 20: Concurrent 21: $|ax_1+by_1+c| / \sqrt{a^2+b^2}$

22: $\frac{1}{2}\begin{vmatrix} x_1 & y_1 & 1 \\ x_2 & y_2 & 1 \\ x_3 & y_3 & 1 \end{vmatrix}$ 23: Trapezium 24: Zero 25: Coplanar

26: $m_2-m_1/1+m_1m_2$ 27: $m_1 = m_2$ 28: $m_1m_2 = -1$ 29: $k^nf(x,y)$ 30: $ax^2+2hxy+by^2 = 0$

Item-2: Encircle the correct answers:

1: F 2: T 3: F 4: T 5: F 6: T 7: F 8: F 9: T 10: F 11: F 12: T

13: F 14: F 15: T 16: T 17: F 18: T 19: T 20: F 21: T 22: F 23: T 24: T

25: F 26: F 27: F 28: T 29: F 30: T

Item-3: M.C.Qs:

1: d 2: a 3: b 4: b 5: a 6: c 7: b 8: d 9: c 10: a 11: c 12: d

13: b 14: a 15: b 16: c 17: a 18: a 19: a 20: c 21: a 22: b 23: c 24: a

25: d 26: b 27: d 28: b 29: a 30: b

Item-4: Match the items in the column A with column B and write the correct answer in column C:

1: x 2: viii 3: v 4: ix 5: vii 6: ii 7: i 8: iii 9: vi 10: iv

CHAPTER-5 (Linear Inequalities and Linear Programming)

Item-1: Fill in the blanks:

1. A vertical line divides the plane into ……. and …… half planes.
2. A non vertical line divides the plane into …….. and …….. half planes.
3. In linear inequality, the linear Eq. Ax + by = c is called ……
4. A test point is chosen which determines that the half plane is on which side of the ……..
5. If 2x -3>1, then x is greater than ……..
6. The solution set (x,y) for the inequalities in feasible region is always ……..
7. A point of a solution region where two of its boundary line, intersect, is called……..
8. The system of linear inequalities involved in the problem concerned are called……..
9. Each point of the feasible region is called a …….. of the system of linear inequalities.
10. A function which is to be maximized or minimized is called an ……..
11. If the line segment obtained by joining any two points of a region lies entirely within the region, then the region is called……
12. The feasible solution which maximizes or minimizes the objective function is called the ……..
13. The maximum and minimum values of the objective function occur at ……. of the feasible region.
14. The graph of the linear equation is a ……
15. The point (0,0) does not ……. the inequality.

Item-2: Encircle the correct answers:

1. The order (or sense) of an inequality is changed by multiplying its each side by a negative constant. T/F
2. The order (or sense) of an inequality is changed by adding a constant to its each side. T/F
3. A solution of a linear inequality in x and y is an order pair which does not satisfy the inequality. T/F
4. A vertical line divides the plane into upper and lower half planes. T/F
5. The order pairs (x,y) satisfying the inequalities $ax + by < c$, $ax + by > c$ are called half planes. T/F
6. There are finite many ordered pairs that satisfy the inequality $ax + by < c$, so its graph will be a half plane. T/F
7. The graphs of $ax + by < c$ are closed half planes. T/F
8. The graphs of $ax + by \leq c$ or $ax + by \geq c$ are open half plane. T/F
9. The graph of the inequality $2x > -3$ is the open half plane to the left of the line $2x = -3$. T/F
10. The graph of $y \leq 2$ consists of the boundary line and the open half plane below the line $y = 2$. T/F
11. The variables used in the system of linear inequalities relating to the problems of every day life are non-negative and are called non-negative constraints. T/F
12. The non-negative constraints play an important role for making decision. So these variables are called decision variables. T/F
13. The region restricted to the first quadrant, is referred as a feasible region for the set of given constraints. T/F
14. Any point of the feasible region of the system of the linear inequalities is called corner point. T/F
15. The point (4,1) is a corner point of the linear inequalities $x-y \leq 3$, $x+2y \leq 6$. T/F

Item-3: Choose and encircle the best possible answers:

1. Let a,b,c all positive real number such that $a < b$ then:
   a) $ac > bc$ b) $ac < bc$ c) $ac = bc$
2. If $3x - 2 < 4$ then:
   a) x is the set of all positive real Nos.
   b) x is the set of all negative real Nos.
   c) x is the set of all real No. less than and equal to 2

d) x is the set of all real No. less than 2

3. The associated equation of the linear inequality $ax + b < c$ is:
   a) $ax + b \geq c$ b) $ax + b > c$ c) $ax + b = c$ d) $ax + b < c$
4. A point of a solution region where two of its boundary lines intersect is called:
   a) Optional point b) Boundary point c) Corner point
5. A set consisting of all the feasible solution of the system of linear in equalities is called a:
   a) Feasible solution set b) Feasible region c) Decision variables
6. If $x + y = 3$ then the solution set contains:
   a) Infinite many elements b) Only one element
   c) Finite number of element d) Empty set
7. The linear Eq. $Y = 0$ represents:
   a) x-axis b) y-axis c) A line parallel to x-axis d) A line parallel to y-axis
8. The linear Eq. $X = o$ represents:
   a) x-axis b) y-axis c) A linear parallel to x-axis d) A line parallel to y-axis
9. The linear Eqs. $X-3y+1=0$ and $2x–6y+7=0$:
   a) Intersect at "a" point b) Do not intersect c) (2,1) is a point of intersection
10. If $ax + by< c$ and $d > 0$ then:
    a) $a/d\ x + b/d\ y > c/d$ b) $cdx + bdy > cd$
    c) $a/d\ x + b/d\ y < c/d$ d) $a/d\ x + b/d\ y < c/d$

Item-4: Match the items in the column A with column B and write the correct answer in column C:

COLUMN-A	**COLUMN-B**	**COLUMN-C**
a) $ax + by = c$	i) Open half plane	
b) Non vertical line	ii) First quadrant	
c) $ax + by < c$	iii) Non-negative constraints	
d) $ax + by \leq c$	iv) Left and Right half planes	
e) Corner point	v) Associated Eq	
f) Feasible Region	vi) Ordered pairs in feasible region	
g) Optional solution	vii) Closed half plane	
h) Decision variables	viii) Intersection of boundary lines	
i) Vertical line	ix) Maximum or minimum	
j) Feasible solution	x) Upper and Lower half plane	

ANSWERS

Item-1: Fill in the blanks:

1: Left and Right 2: Upper and Lower 3: Corresponding equation 4: Boundary line
5: $x > 3/2$ 6: $x \geq 0$ 7: Corner point or vertex 8: Problem constraints
9: Feasible solution 10: Objective 11: Convex 12: Optimal solution 13: Corner point
14: Straight line 15: Satisfy

Item-2: Encircle the correct answers:

1: T 2: F 3: F 4: F 5: T 6: F 7: F 8: F 9: F 10: T 11: T 12: T
13: T 14: F 15: T

Item-3: M.C.Qs:

1: b 2: d 3: c 4: c 5: a 6: a 7: a 8: b 9: b 10: c

Item-4: Match the items in the column A with column B and write the correct answer in column C:

a: v b: x c: i d: vii e: viii f: ii g: ix h: iii i: iv j: vi

CHAPTER-6 (Conic Section)

Item-1: Fill in the blanks:

1. $(x-h)^2 + (y-k)^2 = r^2$ is an equation of circle with center ……. and radius ……..
2. $x^2 + y^2 = r^2$ is equation of circle with center …….
3. $x^2 + y^2 + 2gx + 2fy + c = 0$ is a general form of an equation of a ……..
4. $xx_1 + yy_1 + g(x+x_1) + f(y+y_1) + C = 0$ is the equation of …… to the circle.
5. The point $P(x_1,y_1)$ lies …….. the circle if $x_1^2 + y_1^2+2gx_1+2fy_1+C < 0$.
6. The point $P(x_1,y_1)$ lies ……. the circle if $x_1^2 + y_1^2+2gx_1+2fy_1+C = 0$.
7. The point $P(x_1,y_1)$ lies …….. the circle if $x_1^2 + y_1^2+2gx_1+2fy_1+C > 0$.
8. Length of tangent to the circle from a point (x_1,y_1) is = ……..
9. A line segment whose end points lie on a circle is called a …….
10. A …… of a circle is chord containing the center of the circle.
11. Length of a diameter of the circle $x^2 + y^2 = a^2$ is ……..
12. Perpendicular dropped from the center of a circle on chord …… the chord.
13. The perpendicular bisector of any chord of a circle passes through the …….. of a circle.
14. The number e is called the …… of the conic.
15. If e =1, then the conic is a …….
16. If e < 1, then the conic is an ……..
17. If e > 1, then the conic is a ……
18. The line through the focus and $\perp$r to the directix is called ……. of the parabola.
19. The focal chord $\perp$r to the axis of the parabola is called …… of the parabola.
20. The standard equation of ……. is $y^2 = 4ax$.
21. $x^2/a^2 + y^2/b^2 = 1$ is an equation of ……
22. Equation of major axis of an ellipse $x^2/a^2 + y^2/b^2 = 1$ is …….
23. End points of latus rectum in 2nd quadrant to the ellipse $x^2/a^2 + y^2/b^2 = 1$ is……..
24. Equation of directrix of an ellipse $x^2/a^2 + y^2/b^2 = 1$ is …….
25. Equation of an ellipse if a > b is ……..
26. Equation of an ellipse if a < b is ……..
27. In an ellipse $x^2/a^2 + y^2/b^2 = 1$, $a^2-a^2c^2$ = ……..
28. In an ellipse $x^2/a^2 + y^2/b^2 = 1$, $a^2e^2-a^2$ = ……..
29. Equation of an asymptotes, of a hyperbola $x^2/a^2 + y^2/b^2 = 1$ are …….
30. Equation of transverse axis of $x^2/a^2 + y^2/b^2 = 1$ is ……..

Item-2: Encircle the correct answers:

1. $x^2/a^2 + y^2/a^2 = 1$ isequation of an ellipse. T/F
2. Length of a diameter of a circle $x^2 + y^2 = a^2$ is "a" T/F
3. A line segment whose end points lie on a circle is called diameter of the circle. T/F
4. An angle of a semi-circle is a right angle. T/F
5. The point (x_1,y_1) lies inside the circle if $x_1^2+y_1^2+2gx_1+2fy_1+c = 0$ T/F
6. The equation $y = mx + a\,(1+m^2)^{1/2}$ is a tangent to a circle $x^2+y^2+2gx+2fy+c = 0$ T/F
7. The line joining the center of a circle to the mid point of a chord is perpendicular to the chord. T/F
8. The perpendicular at outer end of a radial segment is tangent to the circle. T/F
9. If e > 1, then conic is parabola. T/F
10. If e < 1, then conic is ellipse. T/F
11. If e = 1, then conic is hyperbola. T/F
12. In each ellipse length of major axis = 2a and length of minor axis = b. T/F
13. Direct ices of $x^2/a^2 + y^2/b^2 = 1$, a>b are $y = \pm c/e^2$. T/F
14. Eccentricity of the ellipse is e = c/a. T/F
15. There are four types of parabola. T/F

16. $ax^2+2hxy+by^2+2gx+2fy+c=0$ represents a pair of line if: T/F
$$\begin{vmatrix} a & h & g \\ h & b & f \\ g & f & c \end{vmatrix} \neq 0$$
17. $ax^2+2hxy+by^2+2gx+2fy+c=0$ represents an ellipse or a circle if $h^2 - ab < 0$ T/F
18. $ax^2+2hxy+by^2+2gx+2fy+c=0$ represents a parabola if $h^2 - ab = 0$ T/F
19. $ax^2+2hxy+by^2+2gx+2fy+c=0$ represents a hyperbola if $h^2 - ab > 0$ T/F
20. If $y = mx + c$ touches $y^2 = 4ax$ then $c \neq a/m$. T/F
21. If $y = mx + c$ touches $x^2/a^2 + y^2/b^2 = 1$ then $c = \pm\sqrt{a^2m^2+b^2}$ T/F
22. If $y = mx + c$ touches $m/a - y^2/b^2 = 1$ then $c = \pm\sqrt{a^2m^2+b^2}$ T/F
23. Equation of the tangent to the ellipse $x^2/a^2+y^2/b^2 =1$ at (x_1,y_1) is $x.x_1/a^2+y.y_1/b^2=1$ T/F
24. Equation conjugate axis of $x^2/a^2-y^2/b^2 = 1$ is $y = 0$ T/F
25. Equation of the asymptotes of $x^2/a^2 – y^2/b^2 = 1$ are $y = \pm a/bx$ T/F
26. $(a \cos \theta, b \sin \theta)$ lies an ellipse $x^2/a^2 + y^2/b^2 = 1$ T/F
27. Length of latus rectum of $x^2/a^2 + y^2/b^2 = 1$ is $2b^2/a$ T/F
28. Equation of latera recta of $x^2/a^2 + y^2/b^2 = 1$ are $x = \pm ae$ T/F
29. Product of the distances from the foci to any tangent to the hyperbola $x^2/a^2 – y^2/b^2 = 1$ is b^2 T/F
30. The ellipse and hyperbola are called central conics because each has a center of symmetry. T/F

Item-3: Choose and encircle the best possible answers:

1. $(x-h)^2 + (y+k)^2 = r^2$ is equation of circle with center:
   a) (0,0) b) (-h,k) c) h,-k) d) (h,k)
2. $x^2+y^2-2gx-2fy+c=0$ is equation of circle with center:
   a) (g,f) b) (-g,-f) c) (-g, f) d) g, -f)
3. A point $P(x_1,y_1)$ lies outside the circle if:
   a) $x_1^2 + y_1^2 + 2gx_1 + 2fy_1 + c = 0$
   b) $x_1^2 + y_1^2 + 2gx_1 + 2fy_1 + c > 0$
   c) $x_1^2 + y_1^2 + 2gx_1 + 2fy_1 + c < 0$
   d) None of these
4. Radius of the circle $x^2 + y^2 + 2gx + 2fy + c = 0$
   a) $g^2 + f^2 –c$ b) $\sqrt{g^2 + f^2 –c}$ c) $\sqrt{g^2 + f^2 +c}$ d) $\sqrt{g^2 + f^2 –c^2}$
5. If one end of a diameter of $4x^2 + 4y^2 + 24x –8y + 15 = 0$ circle be (2,3) the co-ordinate of other end are:
   a) (1,1) b) (8,1) c) (-8,-9) d) (8,9)
6. Centre of the circle $45x^2 + 45y^2 – 60x + 36y + 19 = 0$ is:
   a) (-2/3, -2/5) b) (-2/3, 2/5) c) (2/3, -2/3) d) (0, 2/5)
7. The point (6,9) lies ……. the circle $x^2 + y^2 = 100$:
   a) On b) Outside c) Inside d) None of these
8. Equation of tangent to the circle $x^2 + y^2 = 10$ at the point whose abscissa is 1 is:
   a) $x + 3y = 10$ b) $-x + 3y = 10$ c) $-x –3y = 10$ d) $x + 3y = 10$
9. Which of the following equation is the circle with center at origin and touching to the line with equ. $3x-7y=29$:
   a) $x^2 + y^2 = 12$ b) $2x^2 + 2y^2 = 29$ c) $x^2 + y^2 = 15$ d) $x^2 + y^2 = 10$
10. Length of tangent from (3,4) to the circle $2x^2+2y^2+3x-4y+7=0$ is:
    a) 25 b) $\sqrt{5}$ c) 5/2 d) 5
11. If eccentricity e =1 then conic is:
    a) Ellipse b) Circle c) Hyperbola d) Parabola
12. The focus of parabola x^2+4ay is:

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

13. The vertex of the parabola $y^2 = 8ax$ is:
a) (0,0) b) (2,0) c) (2,2) d) (0,2)

14. The directrix of the parabola $y^2 = 8x$ is:
a) x+2 = 0 b) x-2 = 0 c) x+4 = 0 d) x-4 = 0

15. The equ. of the parabola with focus (-3,1) & directrix x = 3 is tangent at the vertex of parabola $y^2 = 4ax$ is:
a) $(y-1)^2 = -12x$ b) $(y+1)^2 = 12x$ c) $(y+1)^2 = -12x$ d) $(y-1)^2 = 12x$

16. Tangent at the vertex of parabola $y^2 = 4ax$ is:
a) y = 0 b) x = 0 c) x = a d) y = a

17. Equation of latus-rectum of parabola $y^2 = 4ax$ is:
a) y = a b) y = -a c) x = -a d) x = a

18. Axis of parabola $(x-h)^2 = 4a(y-k)$ is:
a) y = k b) x = h c) x = -h d) y = -x

19. If eccentricity e < 1 then conic is:
a) Circle b) Parabola c) Hyperbola d) Ellipse

20. Standard form of an equ. of ellipse is:
a) $x^2/a^2 + y^2/b^2 = 1$ b) $x^2/a^2 - y^2/b^2 = 1$
c) $x^2/b^2 + y^2/a^2 = 1$ d) $x^2 + a^2 = r^2$

21. Eccentricity of ellipse $x^2/a^2 + y^2/b^2 = 1$ is:
a) e = c/a b) e = a/c c) e = -a/c d) -c/a

22. Foci of an ellipse $x^2+4y^2 = 16$ is:
a) $(\pm 2\sqrt{3})$ b) $(0, \pm 2\sqrt{3})$ c) $(\pm 3\sqrt{2})$ d) $(0, \pm 3\sqrt{2})$

23. Eccentricity (e) of an ellipse $x^2+4y^2 = 16$ is:
a) $2/\sqrt{3}$ b) $-2/\sqrt{3}$ c) $\sqrt{3}/2$ d) $-\sqrt{3}/2$

24. Vertex of an ellipse $x^2+4y^2 = 16$ is:
a) $(\pm 4, 0)$ b) $(0, \pm 4)$ c) $(\pm 2, 0)$ d) $(0, \pm 2)$

25. Equ. of major axis of ellipse $x^2/a^2 + y^2/b^2 = 1$ is:
a) y = 0 b) x = a c) y = a d) x = a

26. Equ. of ellipse with vertices $(\pm 5, 0)$ and end of memoir axis $(0,\pm 1)$ is:
a) $x^2/1 + y^2/5 = 1$ b) $x^2 + 25y^2 = 25$ c) $x^2/5 + y^2/1 = 1$ d) None of these

27. If eccentricity e > 1 then conic is:
a) Circle b) Parabola c) Ellipse d) Hyperbola

28. For hyperbola $x^2/4 + y^2/a = 1$ vertices are:
a) $(0, \pm 2)$ b) $(0, 0)$ c) $(\pm 2, 0)$ d) None of these

29. Ends of latus rectum of hyperbola $16y^2 - 9x^2 = 144$ are:
a) $(\pm 16/3, \pm 3)$ b) (+3, 4/3) c) $(\pm 3, 16/3)$ d) None of these

30. For hyperbola $4x^2-9y^2-32x+36y-8 = o$ If center is:
a) (-2, -4) b) (-2, 4) c) (2, -4) d) (4, 2)

31. Equation of tangent t_1 $x^2/a^2 - y^2/b^2 = 1$ which makes an angle 45^0 with x-axis is:
a) $y = 2x \pm \sqrt{a^2+b^2}$ b) $y = x \pm \sqrt{a^2+b^2}$
c) $y = x \pm \sqrt{a^2+b^2}$ d) None of these

32. In the parabola $y^2 = 8x$, origin is being shifted to (1,1) the new equation is:
a) $y^2 = 8x + 2y - 9$ b) $y^2 = 8x - 2y - 9$
c) $y^2 = 8x - 8$ d) $(y^2-1)^2 = 8x$

33. 2xy = 3 is an equation of:
a) Parabola b) Ellipse c) Hyperbola d) Circle

34. The equation of tangent line to the curve $x^2-4y^2+4=0$ at y =1 is:
a) y = 1 b) y + 1 = 0 c) x = 1 d) y = x-1

35. The focus of the parabola $y^2 = 8x$ is:
a) (2,0) b) (0,2) c) (4,0) d) (0,4)

36. Length of the latus rectum of the parabola $x^2 = 8(y+2)$ is:

a) 2 b) -2 c) 4 d) 8

37. The length of the major axis of $4x^2+9y^2=36$:
a) 4 b) 6 c) $\sqrt{5}$ d) 10

38. The center of an ellipse $(x-1)^2 / 4 + (x+2)^2 / 16 = 1$ is:
a) (2,4) b) (2,-4) c) (1,-2) d) (-1,2)

39. If a = b in the equ. of $x^2/a^2 + y^2/b^2 = 1$ then conic will be:
a) Circle b) Ellipse c) Hyperbola d) Parabola

40. $Ax^2 + By^2 + Gx + Fy + C = 0$ represents a circle if:
a) A = B b) A ≠ B c) A < B d) None of these

Item-4: Match the items in the column A with column B and write the correct answer in column C:

Q:1

COLUMN-A	COLUMN-B	COLUMN-C
a) Equ. of circles with center at origin.	i) $x^2 – y^2 = b^2$	
b) Eqn. of an ellipse a > b	ii) $x^2 = -4ay$	
c) Eqn. of hyperbola when a = b	iii) $x^2 + y^2 + 2gx + 2fy + c = 0$	
d) Eqn. of parabola whose focus at (0,-a)	iv) $x^2 + y^2 = r^2$	
e) Eqn. of circle in general form	v) $x^2 / a^2 + y^2 / b^2 = 1$	

Q:2

COLUMN-A	COLUMN-B	COLUMN-C
a) Radius of $x^2+y^2+2gx+2fy+c= 0$	i)$\sqrt{x_1^2+y_1+2gx_1+2fy_1+c} = 0$	
b) Parametric equation of an ellipse	ii) x = a Cos θ, y = b Sin θ	
c) Parametric equation of hyperbola	iii) x = a sec θ, y = b tan θ	
d) Parametric eqn. of parabola	iv) $\sqrt{g^2+f^2-c}$	
e) Length of tangent segment of $p(x_1,y_1)$ to the circle $x^2 + y^2 + 2gx + 2fy + c = 0$	v) $x = at^2$, y = 2at	

Q:3

COLUMN-A	COLUMN-B	COLUMN-C
a) Length of latus rectum of parabola	i) b	
b) Length of latus rectum of ellipse $x^2 / a^2 + y^2 / b^2 = 1$	ii) 2a	
c) Length of latus rectum of hyperbola $x^2 / a^2 - y^2 / b^2 = 1$	iii) $2b^2/a$	
d) Length of transverse axis of $x^2 / a^2 - y^2 / b^2 = 1$	iv) 4a	
e) Length of semi-minor axis of $x^2 / a^2 + y^2 / b^2 = 1$	v) b^2/a	

Q:4

COLUMN-A	COLUMN-B	COLUMN-C
a) The tangent line to a circle at any point is	i) Parabola	
b) For e = 1	ii) x = 3	
c) Vertex of $y^2 = 6(x+3)$	iii) (0,-3)	
d) Centre of $x^2/16+(y+3)^2/9 =1$	iv) (-3,0)	
e) Directrix of $y^2 = 12x$ is	v) Unique	

Q:5

COLUMN-A	COLUMN-B	COLUMN-C
a) $x = a\cos\theta$, $y = b\sin\theta$	i) x + y = 3	
b) Eqn. of tangent line to $x^2/9+y^2/12=1$at point (3,4)	ii) 4	
c) Normal to the circle $x^2+y^2=10$ at point (5,5) is	iii) 3/2	
d) The centricity of $x^2/2-y^2=1$	iv) y – x = 0	
e) Latus rectum of $x^2/9+y^2/6=1$	v) Ellipse	

ANSWERS

Item-1: Fill in the blanks:

1: {(h,k), r} 2: Origin 3: Circle 4: Tangent 5: Inside 6: On
7: Outside 8: $\sqrt{x_1^2+y_1^2+2gx_1+2fy_1+c}$ 9: Chord 10: Diameter 11: 2a
12: Bisect 13: Centre 14: Eccentricity 15: Parabola 16: Ellipse
17: Hyperbola 18: Axis 19: Latus ractum 20: Parabola 21: Ellipse
22: y = 0 23: $(-al, -b^2/a)$ 24: $x = a/e$ 25: $x^2/a^2+y^2/b^2 = 1$
26: $x^2/b^2+y^2/a^2 = 1$ 27: b^2 28: b^2 29: $y = \pm\, b/a\, x$ 30: y =0

Item-2: Encircle the correct answers:

1: F	2: F	3: F	4: T	5: F	6: F	7: T	8: T	9: F	10: T	11: F	12: T
13: F	14: T	15: T	16: F	17: T	18: T	19: T	20: F	21: T	22: T	23: T	24: F
25: F	26: T	27: T	28: T	29: T	30: T						

Item-3: M.C.Qs:

1: c	2: a	3: b	4: b	5:	6: c	7: b	8: a	9: b	10: d	11: d	12: c
13: a	14: a	15: a	16: b	17: d	18: b	19: d	20: a	21: a	22: a	23: c	24: a
25: a	26: b	27: d	28: c	29: d	30: d	31: b	32: a	33: c	34:	35:	36: d
37: b	38: c	39: a	40: a								

Item-4: Match the items in the column A with column B and write the correct answer in column C:

Q-1: a: iv b: v c: i d: ii e: iii
Q-2: a: v b: iv c: ii d: iii e: I
Q-3: a: iv b: iii c: v d: ii e: i
Q-4: a: v b: i c: iv d: iii e: ii
Q-5: a: v b: i c: iv d: iii e: ii

CHAPTER-7 (Vectors)

Item-1: Fill in the blanks:

1. A vector quantity has a magnitude as well as …….
2. A scalar quantity is only defined by its…….
3. If A & B are any two points then its magnitude is …….
4. A unit vector has magnitude equal to …….
5. Two vectors $\overrightarrow{AB}$ & $\overrightarrow{CD}$ are said to be equal if their …….. are equal as well as their directions are ……
6. If 0 is the origin and p(x,y) is any paint in the plane then the position vector OP =
7. If $\overrightarrow{AB}$ & $\overrightarrow{BC}$ are any two vectors acting along two sides of the triangle ABC then their resultant is equal to ……
8. If $\vec{r}$ = xi + yj then its magnitude is equal to | r |
9. $\vec{r}$ = xi + yj then the unit vector r = ……..
10. If 0 is the origin and p(x, y, z) is any point in the space then OP = ……
11. If $\vec{r}$ = xi + yj + zk then its magnitude | r | = …….
12. If p(x,y,z) and Q (x_2,y_2,z_2) are any two points in space then the distance between P & Q is equal to…….
13. If any line in the psace makes angles α, β, γ with x-axis, y-axis and z-axis then $\cos^2\alpha + \cos^2\beta + \cos^2\gamma$ = ……..
14. If any line in the space makes angles α, β, γ then $\text{Sin}^2\alpha + \text{Sin}^2\beta + \text{Sin}^2\gamma$ = ……
15. The scalar product of any two vectors a & b is a …….
16. If a and b are two vectors in space then a. b = ……
17. If $a = a_1i + a_2j + a_3k$ and $b = b_1i + b_2j + b_3k$ then a . b = …….
18. Two vectors a, b are said to be perpendicular if a . b = ……
19. If i, j, k are unit vectors in space then i.j = …….. j.k. = …….. k.i. = ……. i.i. = …… j.k. = ……. k.k. = …….
20. The cross product of two vectors a & b is donated by a x b and it is equal to ……..
21. If $\vec{a} = a_1i + a_2j + a_3k$ and $\vec{b} = b_1i + b_2j + b_3k$ then a x b = …….
22. If i.j.k are any three unit vectors in the space, then:
    I x j = ……. i x i = ……. j x k = …….
    i x j = ……. k x i = ……. k x k = …….
23. If $\vec{u} = a_1i + a_2j + a_3k$ $\vec{v} = b_1i + b_2j + b_3k$ $\vec{w} == c_1i + c_2j + c_3k$ then $\vec{u}.(\vec{v} \times \vec{w})$ =
24. The scalar triple product of three vectors u, v, w shows the ……. of a parallel.
25. The volume of a tetrahedron 0ABC is equal to ……

Item-2: Encircle the correct answers:

1. The scalar quantity is a vector quantity. T/F
2. The vector quantity is a scalar quantity. T/F
3. The distance between two points in any direction is a vector quantity. T/F
4. If 0 is origin and p(x,y,z) is any point in the space then op = xi + yj – zk. T/F
5. If 0 is the origin and p(x,y,z) is any point then op = xi + yj. T/F
6. If r = xi + yj then $|\vec{r}| = \sqrt{(x^2 - y^2)}$. T/F
7. If r = xi –yj then | r | = $\sqrt{(x^2 - +y^2)}$. T/F
8. If r = 3i + 4j then | r | = $\sqrt{29}$ T/F
9. If $\vec{r}$ = 4i + 2j then | r | = $\sqrt{21}$ T/F
10. If p(x,y) cuts line joining the pts A(1,2), B(3,4) in the ratio 3:4 then AP = 3/7 AB T/F
11. If p(x,y) cuts the line joining A(3,4) B(7,8) in the ratio 3 : 4 then BP = 3/7 BA T/F
12. If r = 1/2i +$\sqrt{3}$/2 j then | r | = 2. T/F
13. Two vectors $\overrightarrow{AB}$ and $\overrightarrow{CD}$ are equal vectors then their directions are the same. T/F

14. If $\overrightarrow{AB} = \overrightarrow{CD}$ then their directions are not in same direction. T/F
15. If i,j,k are three unit vectors in space then: T/F
    i. i.j = k ii. j.k = i iii. k.i = j
16. If I,j,k are any three unit vectors in space then: T/F
    i. i x j = i ii. j x k = j iii. k x i = k
17. If r,j,k are any three unit vectors in space then: T/F
    i) i x j = 0 ii. J x k = 0 iii. k x i = 0
18. If i,j,k are any three unit vectors in space then: T/F
    i) i.j. = 1 ii. j.k. = 1 iii. k.i. = 1
19. If $a = a_1i + a_2j + a_3k$ and $b = b_1i + b_2j + b_3k$ then $a \times b = a_1 a_2 + b_1 b_2 + + c_1 c_2$ T/F
20. If a x b are two vectors then T/F
    $$a.b = \begin{vmatrix} i & j & k \\ a_1 & a_2 & a_3 \\ b_1 & b_1 & b_3 \end{vmatrix}$$
21. a&b are any two vectors in space then: T/F
    a.b = a x b
22. If a,b, c are any three vectors then: T/F
    a.(b x c) always gives the area of a rectangle.
23. If a, b, c are any three vectors in the space then a. (b x c) gives volume of a parallelepiped. T/F
24. If $a = a_1i + a_2j + a_3k$ $b = b_1i + b_2j + b_3k$ $c = c_1i + c_2j + a_3k$ then: T/F
    a . (b x c) = b . (c x a)
25. a, b, c are any three vectors then: T/F
    i). a . (b x c) = [abc] ii) b. (c x a) = [bca] iii) c . (a x b) = [cab]

Item-3: Choose and encircle the best possible answers:

1. If $\vec{A} \times \vec{B} = 0$ then θ = ?
   a) 90^0 b) 0^0 c) 45^0 d) None of the above
2. What is the value of (2i – j) . (3i + k)?
   a) a -6 b) 3 c) 4 d) 6
3. What is equal to i . i = j . j = k . k?
   a) 0 b) 1 c) -1 d) None of the above
4. What is equal to i x i = j x j = k x k?
   a) 0 b) 1 c) -1 d) None of the above
5. If x . y = 0 then what is θ?
   a) 0 b) -1 c) 90 d) None of the above
6. The scalar projection of A = i – 2j + k is onto the direction to $\vec{B}$ = 4i – 4j + 7k:
   a) 19/8 b) 9/19 c) 8/19 d) 19/9
7. The scalar projection of A = 2i + 3j + 6k to the direction of $\vec{B}$ = i + 5j + 3j is:
   a) 6 b) -5 c) 5 d) None of the above
8. 2i x 3k = ?
   a) 6 b) -6j c) 6j d) -6k
9. 3i x (-2k) = ?
   a) 6i b) 6k c) 6j d) 6
10. (2j x i) –3k = ?
    a) -5k b) -5j c) 5i d) None of the above.
11. $|\vec{A} \times \vec{B}|^2 + |\vec{A}.\vec{B}|^2 = ?$
    a) $\overrightarrow{AB}$ b) $\overrightarrow{BA}$ c) $|A|^2 |B|^2$ d) None of the above.
12. If three vectors a, b, c are coplanar then the scalar tripleproduct a . (b x c) = ?
    a) 1 b) 0 c) -1 d) ± 1
13. If $\vec{A}$ = 2i – 3j – k, $\vec{B}$ = i + 4j – 2k then $\vec{A} \times \vec{B}$ = ?

a) $10i + 3j + 11k$ b) $10i - f + 6k$ c) $10i + 3j - k$ d) None of the above

14. If $\vec{A} = 2i - 3j - k$, $\vec{B} = i + 4j - 2k$ then what $(\vec{A} + \vec{B}) \times (\vec{A}-\vec{B}) = ?$
a) $i - 6j + 22k$ b) $-2i - 6j - 22k$ c) $2i + 6j + 22k$ d) None of the above

15. If $\vec{A} = 3i - j + 2k$, $\vec{B} = 2i + j - k$ and $\vec{C} = i - 2j + k$ then what is $(\vec{A} \times \vec{B}) \times \vec{C} = ?$
a) $24i + 7j - 5k$ b) $-24i - 7j + 5k$ c) $22i + 7j - 6k$ d) None of the above

16. Area of the triangle with vertices A (1,3,2) B (2,-1,1) and C(-1,2,3):
a) $\sqrt{65}/2$ b) $\sqrt{107}/2$ c) $\sqrt{107}$ d) None of the above

17. The value of $(2i - 3j) \cdot (i + j - k) \times (3i - k) = ?$
a) +4 b) 0 c) -1 d) None of the above

18. If $\vec{A} = 3i + 2j - k$ and $\vec{B} = 4i - j + 2k$ then $\vec{A} \cdot \vec{B} = ?$
a) 6 b) 8 c) -8 d) None of the above

19. The angle between $A = 3i + 2j - 6k$ and $B = 4i - 3j + k$ is:
a) 0 b) 45 c) 60 d) 90

20. If $\vec{A} = a_1i + a_2j + a_3k$, $\vec{B} = b_1i + b_2j + b_3k$ and $\vec{C} = c_1i + c_2j + c_3k$ then volume of the parallelepiped is:
a) $\begin{vmatrix} a_1 & a_2 & a_3 \\ b_1 & b_2 & b_3 \\ c_1 & c_2 & c_3 \end{vmatrix}$ b) $\begin{vmatrix} a_1 & b_1 & c_1 \\ a_1 & b_2 & c_3 \\ a_1 & b_3 & c_1 \end{vmatrix}$
c) $\begin{vmatrix} a_1 & 0 & a_3 \\ b_1 & 0 & b_3 \\ c_1 & 0 & c_3 \end{vmatrix}$ d) None of the above

21. Area of the parallelogram having diagonals $A = 3i + j - 2k$ and $B = i - 3j + k$ is:
a) 5 b) 3 c) 1 d) $5\sqrt{3}$

22. $(i + 2j) \times k = ?$
a) $3i - j$ b) $2i - j$ c) $2 + 2k$ d) None of the above

23. The area of the triangle with vertices A (1,1,1) B (1,1,0) C (1,0,0) is:
a) 2 b) -2 c) 1 d) None of the above

24. If $F = 3i - j + k$, $d = 2i + j + 4k$ then work done =?
a) -9 b) 9 c) 1 d) None of the above

25. If $A = 6i + 7j$, $B = -7/2i + 3j$ then A & B are:
a) Parallel b) Perpendicular c) Neither d) None of the above

Item-4: Match the items in the columns A with column B and write the correct answer in column C:

Q:1

COLUMN-A	COLUMN-B	COLUMN-C
a) a . b	i) a . b / ab	
b) a x b	ii) |a x b| / ab	
c) |3i – 4j|	iii) ab Sin θ	
d) Cos θ	iv) 5	
e) Sin θ	v) ab Cos θ	

Q:2

COLUMN-A	COLUMN-B	COLUMN-C
a) (2i – j) . (3i + k)	i) x and y are perpendicular	
b) I x j	ii) 1	
c) k . k	iii)Work done = 9	
d) (2i – j – k) . (3i + 2j – 5k)	iv) k	
e) x. y. = 0	v) 6	

Q:3

COLUMN-A	COLUMN-B	COLUMN-C
a) $\|2i - 3j + 6k\|$	i) m = 5	
b) $(6i - 2j + 5k).(2i - 4j + 7k)$	ii) a = 23/19	
c) $(4i-5j-2k) . (-i+2j+4k) \times (5i+2j+3k)$	iii) 99	
d) $(3i+mj-2k).(2i-4j-7k) = 0$	iv) 55	
e) $(2i-5j+k) . (3i+2j+2k) \times (2i-j+ak) = 0$	v) 7	

Q:4

COLUMN-A	COLUMN-B	COLUMN-C
a) Area of a Δ with vertices A(2,1,-3), B(1,1,0), C(1,-3,2)	i) A | | B	
b) $\vec{A} = 6i+7j$ and $\vec{B} = -7/2i+3j$	ii) $\sqrt{195}$	
c) If $\vec{A}=3i-j-2k$, $\vec{B}=2i+3j+k$ then $\|\vec{A}\times\vec{B}\|$	iii) $2\sqrt{195}$	
d) If $\vec{A}=3i-j-2k$, $\vec{B}=2i+3j+k$ then $\|(\vec{A}+\vec{B}) \times (\vec{A}-\vec{B})\|$ is:	iv) $\sqrt{6}$	
e) $\|2i+j-k\|$	v) $\sqrt{41}$	

Q:5

COLUMN-A	COLUMN-B	COLUMN-C
a) $\|\vec{A} \times \vec{B}\|^2 + \|\vec{A} - \vec{B}\|^2$	i) $\sqrt{107}/2$	
b) a. (b x c) = 0	ii) 1	
c) i.(j x k)	iii) 8	
d) (3i+2j-k).(4i-j+2k)	iv) $\vec{a}$, $\vec{b}$, $\vec{c}$ are coplanar	
e) Area of Δ with vertices A(1,3,2,) B(2,-1,1) C(-1,2,3)	v) $\|A\|^2 \|B\|^2$	

Q:6

COLUMN-A	COLUMN-B	COLUMN-C
a) $(2i + 3j + 6k) . (i + 5j + 3k)$	i) 4	
b) (2i) x (3k)	ii) 6j	
c) (3i) x (-2k)	iii) 0	
d) $(2i–3j).(I+j-k) \times (3i-k)$	iv) –6j	
e)a. (a x c)	v) Work done = 35	

Q:7

COLUMN-A	COLUMN-B	COLUMN-C
a) a. (b x c)	i) 0	
b)$[(3i-j+2k)\times(2i+j-k)]\times(I-2j+k)$	ii) 1	
c) $\vec{a}. (\vec{b} \times \vec{a}) = 0$	iii) Vectors $\vec{a}$ & $\vec{b}$ Are coplanar	
d) k. (i x j)	iv) 17i+6j-5k	
e)a x a	v) Volume of a parallelepiped	

Q:8

COLUMN-A	COLUMN-B	COLUMN-C
a) (4i-3j+k).(4i-7j+4k)	i) –8i –6k	
b) Area of Δ with vertices A(3,-1,2) B(1,-1,-3) C (4,3,1)	ii) 2i –j	
c) 2j x (3i –4k)	iii) i –10j –3k	
d)(i + 2j) xk	iv) Work done = 41	
e) (4i + j –2k) x (3i +k)	v) $\sqrt{165}/2$	

Q:9

COLUMN-A	COLUMN-B	COLUMN-C
a) (I-2j-3k).(2i+j-k)x(I+3j-2k)	i) A right angle triangle	
b) 1/6 [a.(b x c)]	ii) 14i-14j-14k	
c) $\vec{A}$ = 3i –2j + k, $\vec{B}$ = 2-3j –5k and C=2i+j–4k vertices of a Δ	iii) 99	
d) (4i+j+3k)x(2i-3j+5k)	iv) volume of tetrahedron	
e) (4i-5-2k) . (-i+2j+4k) x (5i+2j+3k)	v) 20	

Q:10

COLUMN-A	COLUMN-B	COLUMN-C
a) 2(I+2j-3k) + 3 (5i-3j+7k)	i) Area of a parallelogram	
b) P(1,3,2,) Q(4,1,4) R(6,5,5)	ii) Work done	
c) $\lvert\vec{a} \times \vec{b}\rvert$	iii) Area of Δ ABC	
d) F. $\vec{AB}$	iv) Form right angle triangle PQR	
e) 1/2 $\lvert\vec{a} \times \vec{b}\rvert$	v) 17i-5j+15k	

ANSWERS

Item-1: Fill in the blanks:

1: Direction 2: Magnitude 3: $|\vec{AB}|$ 4: 1 5: Magnitudes, same
6: xi + yj 7: 3rd side of a triangle but in opposite direction 8: $|r| = \sqrt{x^2+y^2}$
9: r / | r | 10: $\vec{OP}$ = xi + yj + zk 11: $|r| = \sqrt{+y^2+z^2}$
12: $\vec{PQ} = \sqrt{(x_2-x_1)^2+(y_2-y_1)+(z_2-z_1)^2}$ 13: 1 14: 2 15: Scalar quantity
16: a. b = ab Cos θ where a and b are the magnitudes of the vectors a and b and θ is the angle between them.
17: $a.b = a_1b_1 + a_2b_2 + a_3b_3$ 18: a.b = 0 19: I.j=0 j.k.=0 k.i.=0 i.i=1 j.j=1 k.k=1
20: $\vec{a} \times \vec{b}$ = ab Sin θ (n). a & b are magnitudes of a & b and θ is the angle between them.
21: $\vec{a} \times \vec{b} = \begin{vmatrix} i & j & k \\ a_1 & a_2 & a_3 \\ b_1 & b_2 & b_3 \end{vmatrix}$ 22: i x j = k i x i = 0 j x k = i j x j = 0 k x i = j k x k = 0 23: $\vec{u}.(\vec{v} \times \vec{w}) = \begin{vmatrix} a_1 & a_2 & a_3 \\ b_1 & b_2 & b_3 \\ c_1 & c_2 & c_3 \end{vmatrix}$
24: Volume 25: 1/6 volume of the parallelepiped

Item-2: Encircle the correct answers:
1: F 2: F 3: F 4: F 5: F 6: F 7: T 8: F 9: T 10: T 11: F
12: F 13: T 14: F 15: i) F ii) F iii) F 16: i) F ii) F iii) F 17: i) F ii) F iii) F
18: i) F ii) F iii) F 19: F 20: T 21: F 22: F 23: T 24: T 25: i) T ii) T iii) T

Item-3: M.C.Qs:

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

Item-4: Match the items in the columns A with column B and write the correct answer in column C:

Q.1:	a: 5	b: 3	c: 4	d: 1	e: 2
Q.2:	a: 5	b: 4	c: 2	d: 3	e: 1
Q.3:	a: 5	b: 4	c: 3	d:1	e: 2
Q.4:	a: 5	b: 1	c: 2	d: 3	e: 4
Q.5:	a: 5	b: 4	c: 2	d: 3	e: 1
Q.6:	a: 5	b: 4	c: 2	d: 1	e: 3
Q.7:	a: 5	b: 4	c: 3	d: 2	e: 1
Q.8:	a: 4	b: 5	c: 1	d: 2	e: 3
Q.9:	a: 5	b: 4	c: 1	d: 2	e: 3
Q.10:	a: 5	b: 4	c: 1	d: 2	e: 3