Section – A (20 marks)

Note: Section A is compulsory.

Q. 1(a): Fill in the blanks.

i) Slope of the straight line $2x + 3y + 7 = 0$ is ………………….

ii) $\int a^{3x} dx$ = …………………

iii) A vertical line divides a plane into ……………………….

iv) $2\underline{i} \times 2\underline{j} \cdot \underline{k}$ = ……………………

v) Eccentricity of hyperbola $\dfrac{x^2}{25} - \dfrac{y^2}{9} = 1$ is ……………………

Q. 1(b): Encircle the correct answer as true or false.

i) $\dfrac{d}{dx}(\sin 2x) = \dfrac{1}{2}\cos 2x$ T / F

ii) The point $(0,0)$ lies above the line $5x - 7y + 70 = 0$ T / F

iii) $f(x) = \cos x$ is a constant function   T / F

iv) Focus of parabola $y^2 = 4ax$ is $(0, +a)$ T / F

v) $\underline{i} + \underline{j} + \underline{k}$ is a unit vector   T / F

Q. 1(c): Choose and tick (✓) the best possible answer.

i) $\lim\limits_{x \to 0}(1 + 3x)^{\frac{2}{x}}$ = …………………….

     a) $e^{\frac{2}{3}}$ b) $e^{\frac{1}{3}}$

     c) $e^{\frac{3}{2}}$ d) None

ii) If $A(-2,4)$, $B(5,11)$ then slope of AB = ……………..

     a) 7   b) 1

     c) 1/7   d) None

iii) $\dfrac{d}{dx}(\cosh^{-1} x)$ = ……………….

     a) $\dfrac{1}{\sqrt{x^2 + 1}}$ b) $\dfrac{1}{\sqrt{x^2 - 1}}$

     c) $\dfrac{1}{\sqrt{1 - x^2}}$ d) None

iv) Conic is the parabola if ……………………….

     a) $e = 0$ b) $e > 1$

     c) $e < 1$ d) None

v) Equation of straight line is parallel to $x-$axis if ………………..

     a) $y = 0$ b) $x = 0$

     c) $y = 4$ d) $x = 5$

Q. 1(d): Match the column I with column II and write the correct answer in column III.

	Column I	Column II	Column III
i.	$f^{-1}[f(x)]$	$\vec{F}\cdot\vec{d}$	
ii	3^x	Right Angle	
iii	$\int \cot x\, dx$	x	
iv	Semi circle	Exponential function	
v	Work done	$\ln \sin x$	

ANSWERS

Q . 1(a):

(i) $-\dfrac{2}{3}$ (ii) $3a^{3x}\ln a$ (iii) left and right planes. (iv) 4 (v) $\dfrac{\sqrt{34}}{5}$

Q . 1(b):

(i) F (ii) F (iii) F (iv) F (v) F

Q . 1(c):

(i) d (ii) b (iii) b (iv) a (v) c

Q . 1(d):

(i) x (ii) Exponential function (iii) $\ln \sin x$ (iv) Right Angle (v) $\vec{F}\cdot\vec{d}$

Section –B (4 ´ 10 =40 marks)

Q # 2. *Attempt any **TEN** parts. Graph paper will be supplied on demand.*
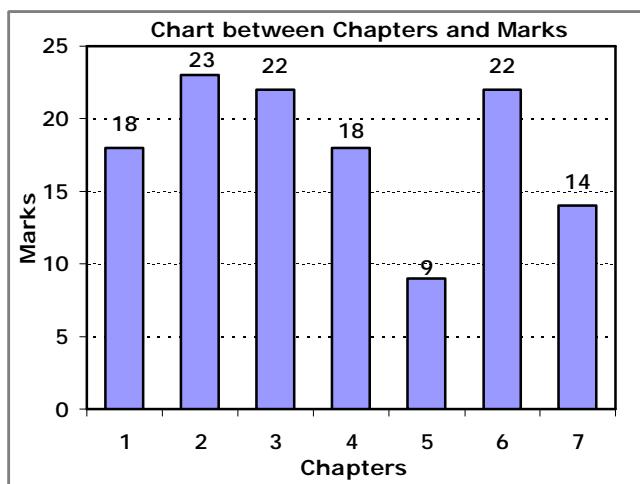
(i) Find $gof(x)$ if $f(x)=\sqrt{x+1}$, $g(x)=\dfrac{1}{x^2}$	Ex 1.2 – 1(ii) – p14
(ii) Evaluate; $\lim\limits_{x\to\infty}\left(\dfrac{x}{1+x}\right)^x$	Ex 1.3 – 4(ix) – p28 Need Correction
(iii) If $y=\sin 2x$, find $\dfrac{dy}{dx}$ using first principle.	Ex 2.5 – 1(i) – p79
(iv) Differentiate $(\ln x)^x$ w.r.t x.	Ex 2.6 – Exp3 – p84
(v) Solve $2e^x\tan y\,dx+(1-e^x)\sec^2 y\,dy=0$	Ex 3.8 – Exp5 – p171
(vi) Evaluate; $\displaystyle\int a^{x^2}\cdot x\,dx$	Ex 3.3 – Exp9 – p134
(vii) Evaluate; $\displaystyle\int\dfrac{\left(1-\sqrt{x}\right)^2}{\sqrt{x}}\,dx$	Ex 3.2 – 1(x) – p130
(viii) Convert into normal form: $2x-4y+11=0$.	Ex 4.3- 21(iii-a)-p217
(ix) Find the lines represented by the equation: $$20x^2+17xy-24y^2=0$$	Ex 4.5 – Exp – p226
(x) Graph the system of inequalities (use graph paper) $$x-2y\le 6,\quad 2x+y\ge 2.$$	Ex 5.1 – Exp1 – p233
(xi) Find an equation of a hyperbola when foci $(5,-2)$, $(5,4)$ and one vertex $(5,3)$.	Ex 6.6 – 1(viii) – p298
(xii) Find the length of the tangent drawn from the point (-5,4) to the circle; $$5x^2+5y^2-10x+15y-131=0.$$	Ex 6.2 – 4 – p263
(xiii) Find equations of the normals to the parabola $y^2=8x$ which are parallel to the line $2x+3y=10$.	Ex 6.7 – 4 – p309
(xiv) If $\underline{a}+\underline{b}+\underline{c}=0$, then prove that $\underline{a}\times\underline{b}=\underline{b}\times\underline{c}=\underline{c}\times\underline{a}$.	Ex 7.4 – 7 – p358

Section C (40 Marks (5+5 each))

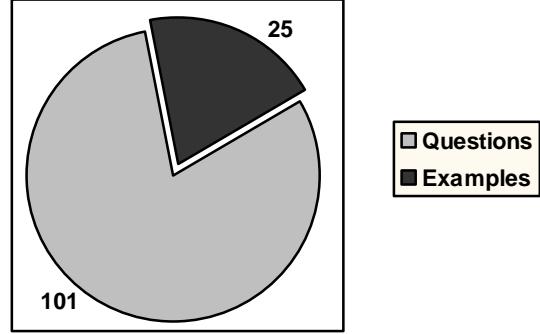*Note: Attempt any **FOUR** questions. Graph paper will be supplied on demand.*

Q # 3 (a) Find the graphically; $x=\sin 2x$.	Ex 1.5 – 4(i) – p40
(b) If $x=\dfrac{1\left(1-t^2\right)}{\left(1+t^2\right)}$, $y-=\dfrac{2bt}{1+t^2}$. Find $\dfrac{dy}{dx}$.	Ex 2.4 – 3(ii) – p71
Q # 4 (a). Expand $\sin(x+y)$ in power of y and verify that $$\sin(x+y)=\sin x\cos y+\cos x\sin y.$$	Ex 2.8 – 2 – p101 (Excluded)
(b) Evaluate; $\displaystyle\int\sqrt{a^2-x^2}\,dx$	Ex 3.4 – 4(i) – p144

Q # 5 (a) If $y = e^x \sin x$, show that $\dfrac{d^2 y}{dx^2} - 2\dfrac{dy}{dx} + 2y = 0$. And evaluate $\cos 61°$.	Ex 2.7 - 6 – p95
(b) Evaluate; $\displaystyle\int \cos 3x \sin 2x \, dx$	Ex 3.2 – 2(xii) – p131
Q # 6 (a) Derive equation of a straight line in one point and slope form.	Ex 4.3 – Th – p195
(b) Minimize $f(x, y) = 2x + 5y$ subject to the constraints $2y - x \le 8, \quad x - y \le 4, \quad x \ge 0, \quad y \ge 0$.	Ex 5.3 – 1 – p248 (Changed)
Q # 7 (a) Find an equation of the line through the intersection of the lines $x - y - 4 = 0$ and $7x + y + 20 = 0$ and perpendicular to the line $6x + y - 14 = 0$.	Ex 4.4 – 2(b-ii) – p223
(b) Find an equation of the parabola having its focus at origin and directrix parallel to the $x - $axis.	Ex 6.4 – 3(i) – p281
Q # 8 (a) Find the equation of the tangent to the circle $x^2 + y^2 = 2$ parallel to the line $x - 2y + 1 = 0$.	Ex 6.2 – 7(i) – p264
(b) Prove that the line segments joining the midpoints of the sides of a quadrilateral taken in order form a parallelogram.	Ex 7.1 – 15 – p335
Q # 9 (a) Find the volume of the tetrahedron with the vertices $(0,1,2)$, $(3,2,1)$, $(1,2,1)$ and $(5,5,6)$	Ex 7.5 – 6(i) – p366
(b) Evaluate; $\displaystyle\lim_{q \to 0} \dfrac{1 - \cos pq}{1 - \cos qq}$.	Ex 1.3 – 3(xi) – p27

Chart between Chapters and Marks

Marks vs Chapters bar chart: Chapter 1 = 18, Chapter 2 = 23, Chapter 3 = 22, Chapter 4 = 18, Chapter 5 = 9, Chapter 6 = 22, Chapter 7 = 14.

Chart between Question from Exercises and Examples

Pie chart: Questions = 101, Examples = 25.