

Section – A (20 marks)

Note: Section A is compulsory.

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

- i) Domain of $\cot x$ is
- ii) $f(x)$ has relative maxima at $x = c$ if
- iii) $\int \frac{2x}{\sqrt{1-x^2}} dx = \dots\dots\dots$
- iv) Equation of straight line in slope intercept form is
- v) Equation of a parabola with vertex at origin and focus $(0, -2)$ is

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

- i) $f(x) = x^2 + 1$, x is dependent variable T / F
- ii) $\int \ln x dx = \frac{1}{x}$ T / F
- iii) A point of solution where two of its boundary lines intersect is called vertex T / F
- iv) $\lim_{x \rightarrow 0} \frac{\tan x}{x} = 1$ T / F
- v) In an ellipse $e > 1$ T / F

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

- i) $\sec^2 x = \dots\dots\dots$
 - a) $1 + \tanh^2 x$
 - b) $\tanh^2 x - 1$
 - c) $1 - \tanh^2 x$
 - d) None
- ii) $\int e^x (\sin x + \cos x) dx$ is

 - a) $e^x \cos x$
 - b) $e^x \sin x$
 - c) $e^x \tan x$
 - d) None

- iii) Angle between two parallel lines is

 - a) 90°
 - b) 270°
 - c) 0°
 - d) None

- iv) A feasible region is restricted to

 - a) x - axis
 - b) 1st Quadrant
 - c) 2nd Quadrant
 - d) None

- v) If \underline{i} , \underline{j} and \underline{k} are unit vectors then:

 - a) $\underline{i} \cdot \underline{i} = 0$
 - b) $\underline{i} \times \underline{j} = 1$
 - c) $\underline{i} \cdot \underline{j} = 0$
 - d) None

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.	Identity Function	e^x	
ii	$ax + by + c = 0$	Parabola	
iii	$c = \frac{a}{m}$	$f(x) = x$	
iv	Moment of force	Straight line	
v	$1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \dots$	$\vec{r} \times \vec{F}$	

ANSWERS

Q . 1(a):

- (i) $\{x : x \in \mathbb{R} \wedge x \neq np, n \in \mathbb{Z}\}$ (ii) $f''(c) < 0$ (iii) $-2\sqrt{1-x^2}$
 (iv) $y = mx + c$ (v) $x^2 = -8y$

Q . 1(b):

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

Q . 1(c):

- (i) c (ii) b (iii) c (iv) b (v) c

Q . 1(d):

- (i) $f(x) = x$ (ii) Straight line (iii) Parabola (iv) $\vec{r} \times \vec{F}$ (v) e^x

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Section –B (4 × 10 =40 marks)

Q # 2. Attempt any **TEN** parts. Graph paper will be supplied on demand.

(i) Evaluate: $\lim_{x \rightarrow 0} \frac{\sec x - \cos x}{x}$	Ex 1.3 – 3(x) – p27
(ii) Determine whether the given $f(x) = \sin x + \cos x$ is even or odd.	Ex 1.1 - Exp3(c) - p10
(iii) If $y = a^x$, prove that $\frac{dy}{dx} = a^x \ln a$.	Ex 2.6 - Art 2.10(2) - p80
(iv) Apply Maclaurin series to prove: $\cos x = 1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \frac{x^6}{6!} + \dots$	Ex 2.8 – 1(ii) – p101
(v) Evaluate: $\int \sin^{-1} x \, dx$	Ex 3.4 – 1(xiii) – p144
(vi) Evaluate: $\int \frac{1}{\sqrt{a^2 + x^2}} \, dx$	Ex 3.3 – Exp1 – p136
(vii) Use differential to approximate the value of $(17)^{\frac{1}{4}}$	Ex 3.1 – Exp1 – p122
(viii) The xy -coordinate axes are rotated about the origin through an angle of 30° . The new axes are OX and OY . Find the XY -coordinate of the point whose xy -coordinate are $(3, -7)$.	Ex 4.2 - 3(ii) – p190
(ix) Use slopes, prove that following points are collinear: $(4, -5)$, $(7, 5)$, $(10, 15)$.	Ex 4.3 – 4(b) – p215
(x) Indicate the solution region of the following system of linear inequalities by shading. (use graph paper) $x + y \leq 5$, $y - 2x \leq 2$, $y \geq 0$.	Ex 5.1 – 3(ii) – p237 Changed
(xi) Find equation of a parabola with given elements: Focus $(-3, 1)$, Directrix: $x = 3$	Ex 6.4 – 2(i) – p281
(xii) Find equation of the tangent to the given curve at indicated point: $x^2 + 5xy - 4y^2 + 4 = 0$ at $y = -1$	Ex 6.9 – 3(ii) – p324
(xiii) Prove that the normal lines of a circle pass through the centre of the circle.	Ex 6.1 – 1 – p272
(xiv) Use vectors to prove: $a^2 = b^2 + c^2 - 2bc \cos A$.	Ex 7.3-Exp8(i)- p348

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

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

Q # 3 (a) Draw the graph: $x = t$, $y = t^2$, $-3 \leq t \leq 3$, t is a parameter.	Ex 1.5 – 2(i) – p40
(b) Find $\frac{dy}{dx}$, using 1 st principle when $y = \sqrt{x+2}$.	Ex 2.1 – 2(i) – p51

<p>Q # 4 (a). If $y = x \sin^{-1} \frac{x}{a} + \sqrt{a^2 - x^2}$, find $\frac{dy}{dx}$</p> <p>(b) Evaluate: $\int x \sqrt{x+a} dx$</p>	<p>Ex 2.5 – Exp1 – p78</p> <p>Ex 3.3 – 3 – p137 Excluded</p>
<p>Q # 5 (a) Find two positive integer whose sum is 12 and product of one with square of the other will be maximum.</p> <p>(b) Find the area between the curve $y = x(x-1)(x+1)$ and the x-axis.</p>	<p>Ex 2.10 - 3 – p117</p> <p>Ex 3.7 – 10 – p168</p>
<p>Q # 6 (a) Find joint equation of the lines through the origin and perpendicular to the lines $x^2 - 2xy \tan a - y^2 = 0$</p> <p>(b) Graph the feasible region of the following system of linear inequalities and find the corner points: $2x + y \leq 10$, $x + 4y \leq 12$, $x + 2y \leq 10$, $x \geq 0$, $y \geq 0$</p>	<p>Ex 4.5 – 7 – p228</p> <p>Ex 5.2 – 2(i) – p243</p>
<p>Q # 7 (a) If two vertices of an equilateral triangle are $A(-3,0)$ and $B(3,0)$. Find the third vertex. How many of these triangles are possible.</p> <p>(b) Derive standard equation of hyperbola.</p>	<p>Ex 4.1 – 12 – p186</p> <p>Ex 6.7 – Art – p291</p>
<p>Q # 8 (a) Find an equation of the circle passing through the points $A(3,-1)$, $B(0,1)$ and having centre at $4x - 3y - 3 = 0$.</p> <p>(b) Find a unit vector perpendicular to the plane containing \underline{a} & \underline{b} if $\underline{a} = 2\underline{i} - 6\underline{j} - 3\underline{k}$, $\underline{b} = 4\underline{i} - 3\underline{j} - \underline{k}$</p>	<p>Ex 6.1 – 4(a) – p255</p> <p>Ex 7.4 – 2(i) – p358</p>
<p>Q # 9 (a) Use vectors to prove that perpendicular bisectors of the sides of a triangle are concurrent.</p> <p>(b) If $f(x) = [-x+9]^3$, find $f^{-1}(x)$. Also verify $f[f^{-1}(x)] = f^{-1}[f(x)] = x$</p>	<p>Ex 7.3 – 8 – p350</p> <p>Ex 1.2 – 2(i) – p14</p>

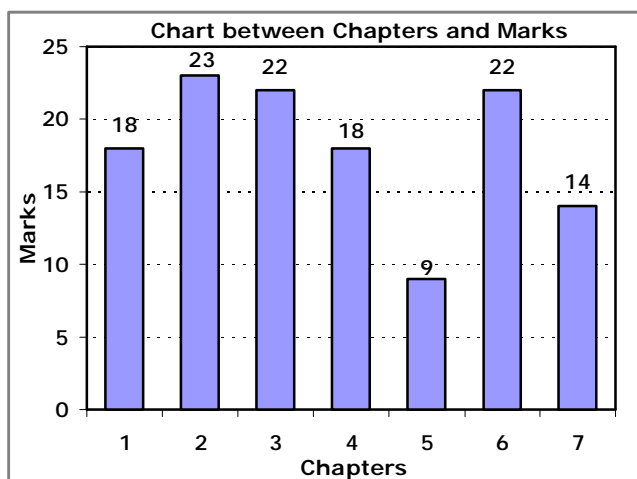
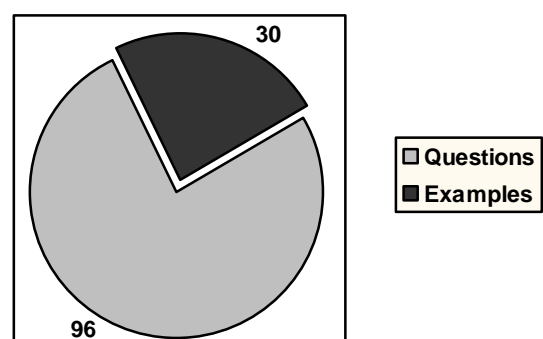


Chart between Question from Exercises and Examples



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