

Section –B (4 × 10 =40 marks)

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

(i) Evaluate: $\lim_{q \rightarrow 0} \frac{1 - \cos pq}{1 - \cos qq}$	Ex 1.3 – 3(xi) – p27
(ii) Discuss the continuity of $f(x)$ at $x = c$ $f(x) = \begin{cases} 2x+5 & \text{if } x \leq 2 \\ 4x+1 & \text{if } x > 2 \end{cases}, c = 2$	Ex 1.4 – 2(i) – p28
(iii) If $y = \tan\left(2\tan^{-1}\frac{x}{2}\right)$, show that $\frac{dy}{dx} = \frac{4(1+y^2)}{4+x^2}$.	Ex 2.5 – Exp2 – p78
(iv) Find $\frac{dy}{dx}$ if $y = x^2 \ln \frac{1}{x}$.	Ex 2.6 – 2(iv) – p89
(v) Find the differential equation $x^2(2y+1)\frac{dy}{dx} - 1 = 0$	Ex 3.8 – 1(ii) – p177
(vi) Evaluate: $\int \frac{\cot \sqrt{x}}{\sqrt{x}} dx$	Ex 3.3 – Exp4 – p132
(vii) Evaluate: $\int \frac{x \sin^{-1} x}{\sqrt{1-x^2}} dx$	Ex 3.4 – 1(xxi) – p144
(viii) Find an equation of the perpendicular bisector joining the points $A(3,5)$ and $B(9,8)$.	Ex 4.3 – 11 – p216
(ix) Determine the value of p such that the lines $2x - 3y - 1 = 0$, $3x - y - 5 = 0$ and $3x + py + 8 = 0$ meet at a point.	Ex 4.4 – 5 – p223
(x) Graph the solution set of linear inequality in xy – plane: $2x + 1 \geq 0$ (use graph paper)	Ex 5.1 – 1(v) – p236
(xi) Find an equation of the parabola whose focus is $F(-3,4)$ and directrix is $3x - 4y + 5 = 0$.	Ex 6.4 – Exp2 – p277
(xii) Tangent are drawn from $(-3,4)$ to the circle $x^2 + y^2 = 21$. Find an equation of the line joining the points of contact.	Ex 6.2 – Exp8 – p263
(xiii) Find the eccentricity, the coordinate of the vertices and foci of the hyperbola $\frac{y^2}{16} - \frac{x^2}{49} = 1$.	Ex 6.6 – Exp3 – p296
(xiv) If $\underline{a} = 3\underline{i} - \underline{j} - 4\underline{k}$, $\underline{b} = -2\underline{i} - 4\underline{j} - 3\underline{k}$ and $\underline{c} = \underline{i} + 2\underline{j} - \underline{k}$. Find a unit vector parallel to $3\underline{a} - 2\underline{b} + 4\underline{c}$.	Ex 7.2 – 6 – p342

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

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

Q # 3 (a) If q is measured in radian then prove that $\lim_{q \rightarrow 0} \frac{\sin q}{q} = 1$.	Ex 1.3 – Art1.5.8 – p25
(b) If $x = a \cos^3 q$, $y = b \sin^3 q$, show that $a \frac{dy}{dx} + b \tan q = 0$.	Ex 2.5 – 8 – p79

<p>Q # 4 (a). Find the dimensions of a rectangular garden having perimeter 80 meters if its area is to be maximum.</p> <p>(b) Evaluate: $\int e^{-x} \sin 2x \, dx$.</p>	<p>Ex 2.10 – 8 – p117</p> <p>Ex 3.4 – 2(vi) – p144</p>
<p>Q # 5 (a) If $y = (\cos^{-1} x)^2$, prove that $(1 - x^2)y_2 - xy_1 - 2 = 0$.</p> <p>(b) Maximize the function defined as: $f(x, y) = 2x + 3y$ subject to the constraints $2x + y \leq 8$; $x + 2y \leq 14$; $x \geq 0$; $y \geq 0$.</p>	<p>Ex 2.7 - 8 – p95</p> <p>Ex 5.3 – 5 – p248</p>
<p>Q # 6 (a) Evaluate: $\int \sqrt{1 - \cos 2x} \, dx$, $(1 - \cos 2x > 0)$</p> <p>(b) Find the joint equation of the lines through the origin and perpendicular the lines $ax^2 + 2hxy + by^2 = 0$.</p>	<p>Ex 3.2 – 2(vii) – p131</p> <p>Ex 4.5 – 8 – p228</p>
<p>Q # 7 (a) Find equations of two parallel lines perpendicular to $2x - y + 3 = 0$ such that the product of the x- and y-intercept of each is 3.</p> <p>(b) Find an equation of the parabola whose focus is $F(-3, 1)$ and directrix is $x - 2y - 3 = 0$.</p>	<p>Ex 4.3 – 26 – p218</p> <p>Ex 6.4 – 2(iii) – p281</p>
<p>Q # 8 (a) Find equation of circle of radius 2 and tangent to the line $x - y - 4 = 0$ at $A(1, -3)$.</p> <p>(b) Prove that the line segment joining the mid points of two sides of a triangle is parallel to the third side and half as long. Use vector method.</p>	<p>Ex 6.1 – 9 – p256</p> <p>Ex 7.1 – 14 – p335</p>
<p>Q # 9 (a) Find the unit vector perpendicular to both \underline{a} and \underline{b}. Also find sine of angle between them where $\underline{a} = \hat{i} + \hat{j}$ and $\underline{b} = \hat{i} - \hat{j}$.</p> <p>(b) For the real valued function $f(x) = \frac{2x+1}{x-1}$, $x > 1$. Find $f^{-1}(x)$ and verify $f(f^{-1}(x)) = f^{-1}(f(x))$.</p>	<p>Ex 7.4 – 2(iv) – p358</p> <p>Ex 1.2 – 2(iv) – p14</p>

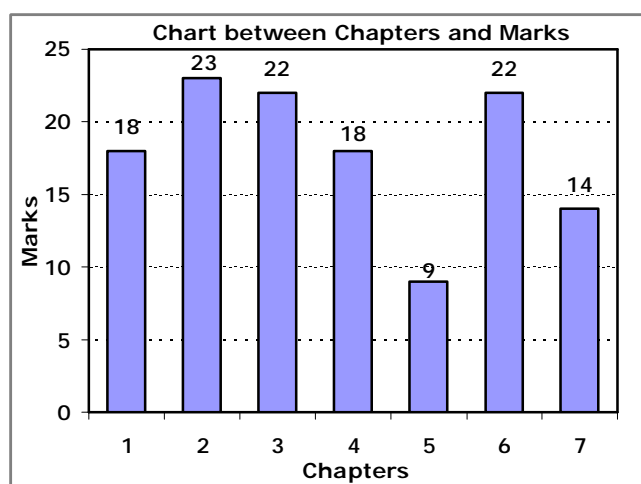
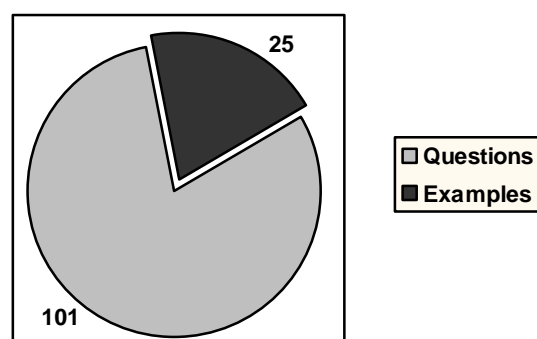


Chart between Question from Exercises and Examples



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