

**PRACTICE MAKES A MAN PERFECT  
&  
PRACTICE KEEPS A STUDENT TOP**

# **IPE SCANNER**

## **Total Textual Bits**

- Practice without peeping for solutions enhances Grip & Confidence levels.
- All together this IPE Scanner is a confidence booster.
- 'Spot- Answers' are provided to avoid 'waste of time' for checking answers.
- This IPE Scanner is very useful to EAPCET, IIT-JEE Aspirants, because practising this IPE Scanner strengthens the basic 'funda' of the textual content, which is a strong pre-requisite for entrance exams.



EXCLUSIVE FOR **REAL TOPPERS**

VERY SHORT QUESTIONS (2 Marks)	Spot-Answers
<b>CIRCLE</b>	
1. Find the centre and radius of the circle $x^2+y^2+6x+8y-96=0$ . [IPE 94]	(-3,-4),11
2. Find the radius of the circle $\sqrt{1+m^2}(x^2+y^2)-2cx-2mcy=0$ [IPE 10]	c
3. If the circle $x^2+y^2-4x+6y+a=0$ has radius 4 then find a. [AP M 16]	-3
4. If $x^2+y^2-4x+6y+c=0$ represents a circle with radius 6, find the value of c.[TS 18,22]	-23
5. If $x^2+y^2+2gx+2fy-12=0$ is a circle with centre (2,3) then find (g,f) and its radius. [AP J 19]	-2,-3, r=5
6. If $x^2+y^2+ax+by-12=0$ has centre (2,3) then find a, b and radius. [IPE 08,07]	-4,-6, r=5
7. Find the values of a, b if $ax^2+bxy+3y^2-5x+2y-3=0$ represents a circle. Also find the radius and centre. [MP]	a=3, b=0 $\frac{\sqrt{65}}{6}, (\frac{5}{6}, \frac{-1}{3})$
8. Find a if $2x^2+ay^2-3x+2y-1=0$ represents a circle and also find its radius.[IPE 13] [A: a =2, r = $\sqrt{21} / 4$ ] [AP M 15, 23]	
9. Obtain parametric equations of the circle $(x-3)^2 + (y-4)^2=8^2$ [AP M 16,18]	3+8cosθ;4+8sinθ.
10. Find the Parametric equations of the circle $x^2+y^2-6x+4y-12=0$ [IPE 10,06] [A: x = 3+5cosθ, y = -2+5sinθ]	
11. Find the equation of the circle passing through (3,4) and having the centre at (-3,4) [A: $x^2+y^2+6x-8y-11=0$ ] [IPE 12]	
12. Find the equation of the circle passing through (-2,3) and having centre at (0,0).[TS J 15]	$x^2+y^2=13$
13. Show that A(3,-1) lies on the circle $x^2+y^2-2x+4y=0$ . [IPE 12] Also find the other end of the diameter through A.	(-1, -3)
14. Find the equation of the circle with (-4,3), (3,-4) as ends of a diameter. [IPE 13] [TS J 19][A: $x^2+y^2+x+y-24=0$ ]	
15. Find the value of k if the length of the tangent from (2,5) to $x^2+y^2-5x+4y+k=0$ is $\sqrt{37}$ [TS M,J 18][AP J 17] [IPE 06]	k= -2
16. S.T the line $lx+my+n=0$ is a normal to the circle S=0 if and only if $gl+mf=n$ . [MP]	
17. S.T the points (4,-2), (3,-6) are conjugate w.r.to the circle $x^2+y^2=24$ . [IPE 04]	
18. Show that the points (4, 2), (3,-5) are conjugate w.r.to the circle $x^2+y^2-3x-5y+1=0$ . [IPE 96]	

19. Find the equation of the circle passing through the point  $(-2, 14)$  and concentric with  $x^2+y^2-6x-4y-12=0$  [Ans:  $x^2+y^2-6x-4y-156=0$ ] [IPE 14]
20. Find the centre and radius of the circle  $x^2+y^2+2ax-2by+b^2=0$ .  $(-a, b), a$
21. If  $x^2+y^2+2gx+2fy=0$  is a circle with centre  $(-4, -3)$  then find  $(g, f)$  and its radius. [Ans:  $g = 4, f = 3, r = 5$ ]
22. Find the Parametric equations of the circle  $x^2+y^2=4$  [A:  $x=2\cos\theta, y=2\sin\theta$ ] [IPE 14]
23. If  $x^2+y^2-6x+4y-12=0$  represents a circle, then find the parametric equations of the circle.  $x=3+5\cos\theta$   
[TS J 15]  $y = -2+5\sin\theta$
24. Find the equation of the circle passing through origin and having centre at  $(-4, -3)$ . [Ans:  $x^2+y^2+8x+6y=0$ ]
25. Show that  $A(-3, 0)$  lies on the circle  $x^2+y^2+8x+12y+15=0$ .  
Also find the other end of the diameter through A.  $(-5, -12)$
26. Find the power of the point  $P(2, 4)$  w.r.to the circle  $x^2+y^2-4x-6y-12=0$ .  $-24$
27. Find the power of the point  $P(-1, 1)$  w.r.to the circle  $x^2+y^2-6x+4y-12=0$  [TS M16]  $0$
28. Find the length of chord formed by  $x^2+y^2=a^2$  on line  $x\cos\alpha + y\sin\alpha = p$ . [TS J16]  $2\sqrt{a^2 - p^2}$
29. Find the length of the tangent from  $(-2, 5)$  to the circle  $x^2+y^2-25=0$  . [TS J16]  $2$
30. Find the length of the tangent from  $(2, 5)$  to the circle  $x^2+y^2-5x+4y-5=0$ .  $\sqrt{34}$
31. Find the value of  $k$  if the length of the tangent from  $(5, 4)$  to  $x^2+y^2+2ky=0$  is 1 [AP J16] [AP, TS M 15] [AP, TS J 15]  $-5$
32. Find the equation of normal at  $P(3, -4)$  on the circle  $x^2+y^2+x+y-24=0$   $x+y+1=0$
33. Find the pole of  $ax+by+c=0, (c \neq 0)$  with respect to  $x^2+y^2=r^2$ . [AP J 16]  $\left(\frac{-ar^2}{c}, \frac{-br^2}{c}\right)$
34. Find the polar of  $(3, -1)$  with respect to  $2x^2+2y^2=11$   $6x-2y-11=0$
35. Find the equation of the polar of  $(1, -2)$  with respect to circle  $x^2+y^2-10x-10y+25=0$ . [TS M 15]  $4x+7y-30=0$
36. Find the value of  $k$  if  $(1, 3), (2, k)$  are conjugate w.r.to circle  $x^2+y^2=35$ . [AP J 19] [AP M 17, 23] [TS M 19, 22]  $11$
37. Show that the points  $(-6, 1), (2, 3)$  are conjugate w.r.to the circle  $x^2+y^2-2x+2y+1=0$ .
38. Find the value of  $k$  if the points  $(4, 2), (k, -3)$  are conjugate w.r.to the circle  $x^2+y^2-5x+8y+6=0$  [AP M 19] [TS M 17] [IPE 14]  $k=28/3$
39. Find the relative position of the circles  $(x-2)^2+(y+1)^2=9, (x+1)^2+(y-3)^2=4$  [Ans: touch externally]
40. Find the number of possible common tangents that exist for the circles  $x^2+y^2=4, x^2+y^2-6x-8y+16=0$   $3$
41. Find the external centre of similitude for the circles  $x^2+y^2-2x-6y+9=0, x^2+y^2=4$   $(2, 6)$

**SYSTEM OF CIRCLES**

42. Find the angle between  $x^2+y^2-12x-6y+41=0$ ,  $x^2+y^2+4x+6y-59=0$  [AP J 19][TS M, J 15][AP M18]  $\pi/4$
43. Show that the angle between the circles  $x^2+y^2=a^2$ ,  $x^2+y^2=ax+y$  is  $3\pi/4$ . [TS J16]
44. Find the angle between the circles  $x^2+y^2+4x-14y+28=0$ ,  $x^2+y^2+4x-5=0$  [AP J 17]  $\theta=60^\circ$
45. S.T the circles  $x^2+y^2-2x-2y-7=0$ ,  $3x^2+3y^2-8x+29y=0$  intersect orthogonally.
46. Show that the circles  $x^2+y^2-2lx+g=0$ ,  $x^2+y^2+2my-g=0$  intersect orthogonally.
47. Find  $k$  if the pair of circles are  $x^2+y^2+2by-k=0$ ,  $x^2+y^2+2ax+8=0$  are orthogonal  $k=8$
48. Find  $k$  if pairs of circles  $x^2+y^2+4x+8=0$ ,  $x^2+y^2-16y+k=0$  are orthogonal. [AP ,TSM 16][AP M18]  $-8$
49. Find the equation of the radical axis of the circles [AP J16]  
 $23x+2y+7=0$ ,  $x^2+y^2-2x-4y-1=0$ ,  $x^2+y^2-4x-6y+5=0$
50. Find the equation of the common chord of  $(x-a)^2+(y-b)^2=c^2$ ,  $(x-b)^2+(y-a)^2=c^2$ . ( $a \neq b$ ) [AP M, J 15]  $x-y=0$
51. Find the radical centre of the circles  $x^2+y^2+4x-7=0$ ,  $2x^2+2y^2+3x+5y-9=0$  and  $x^2+y^2+y=0$  (2,1) [IPE 14]

**PARABOLA**

52. Find the coordinates of the point on the parabola  $y^2=8x$ , [IPE 14][AP M 16,17] whose focal distance is 10. [AP J 19][AP,TS J 17][TS M 17,23]  $(8,\pm 8)$
53. Find the coordinates of the point on the parabola  $y^2=2x$  whose focal distance is  $5/2$  [IPE 07,09,13] [AP M, J 15]  $(2,\pm 2)$
54. Find the equation of the parabola whose vertex is  $(1,-2)$ , focus is  $(1,-7)$  [MP] [IPE 12] [A:  $(x-1)^2=-20(y+2)$ ][TS M, J 15]
55. Find the equation of tangent to the parabola  $y^2=16x$ , inclined at  $60^\circ$  to the X-axis. [A:  $3x-\sqrt{3}y+4=0$ ] [IPE 04][AP J 16]
56. Find the equation of the parabola whose vertex is  $(3,-2)$ , focus is  $(3,1)$  [TS J 19][AP M 20] [A:  $(x-3)^2=12(y+2)$ ]
57. Find the vertex, focus, equation of the directrix and axis of the parabola  $y^2=16x$  [Ans: A=(0,0), S=(4,0),  $x+4=0$ ,  $y=0$ ]
58. Find the equations of axis and directrix of the parabola  $y^2+6y-2x+5=0$  [A:  $y+3=0$ ,  $2x+5=0$ ]
59. Find the value of  $k$  if the line  $2y=5x+k$  is a tangent to parabola  $y^2=6x$ . [AP M 18,23]  $6/5$
60. Show that the line  $2x-y+2=0$  is a tangent to the parabola  $y^2=16x$ . Find the point of contact.  $(1,4)$

61. Find the equation of the tangent and normal at the positive end of L.R on the parabola  $y^2=6x$ . [A:  $2x-2y+3=0, 2x+2y-9=0$ ]

62. If  $(1/2,2)$  is one extremity of a focal chord of the parabola  $y^2=8x$ . [IPE 14] (8,-8)  
Find the coordinates of the other extremity. [TS J 16]

63. Prove that the point on the parabola  $y^2=4ax, (a>0)$  nearest to the focus is its vertex.

64. A comet moves in a parabolic orbit with the sun as focus. When the comet is  $2 \times 10^7$  K.M from the sun, the line from the sun to it makes an angle  $\pi/2$  with the axis of the orbit. Find how near the comet comes to the sun.  $10^7$  K.M

65. Find the equation of the parabola whose vertex and focus are on the positive x-axis at a distance 'a' and 'a' from the origin respectively. [A:  $y^2 = 4|a'-a|(x-a)$ ]

### HYPERBOLA

66. If  $e, e_1$  are the eccentricities of a hyperbola and its conjugate hyperbola, then prove that  $\frac{1}{e^2} + \frac{1}{e_1^2} = 1$  [TS J 18][AP M 22]

67. If the eccentricity of a hyperbola is  $5/4$ , then find the eccentricity of its conjugate hyperbola. [TS M 19,22][AP 17,23].[AP M J 16][AP J 15][TS M, J 15] [AP J 19] 5/3

68. Show that the angle between the asymptotes of the hyperbola  $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$  is  $2\text{Sec}^{-1}(e)$  (or)  $2\text{Tan}^{-1} \frac{b}{a}$  [MP] [IPE 12]

69. Find the equation of the hyperbola whose foci are  $(\pm 5, 0)$  the transverse axis is of length 8 [A:  $9x^2 - 16y^2 = 144$ ] [TS M 16] [IPE 11][AP J 18]

70. If the angle between the asymptotes is  $30^\circ$  then find its eccentricity. [TS M 20]  $\sqrt{6} - \sqrt{2}$

71. Find the value of k if  $3x-4y+k=0$  is a tangent to the hyperbola  $x^2-4y^2=5$ . [TS 17,23][AP M 20]  $k=\pm 5$

72. Define Rectangular Hyperbola and find its eccentricity. [AP M 15]

[Ans: The hyperbola in which the length of transverse axis is equal to the length of its conjugate axis is called a rectangular hyperbola. eccentricity =  $\sqrt{2}$  ]

73. Find the equation of the hyperbola whose asymptotes are  $3x = \pm 5y$  and the vertices are  $(\pm 5, 0)$ . [A:  $9x^2 - 25y^2 = 225$ ]

74. If the lines  $3x-4y=12$  and  $3x+4y=12$  meet on a hyperbola  $S=0$  then find the eccentricity of the hyperbola  $S=0$ . 5/4

75. Find the equation of the normal at  $\theta = \pi/3$  to the hyperbola  $3x^2-4y^2=12$   $x+y=7$

76. Find the product of lengths of the perpendiculars from any point on the hyperbola

$\frac{x^2}{16} - \frac{y^2}{9} = 1$  to its asymptotes. [TS J 19] [AP M 19][TS J 16] 144/25

**INDEFINITE INTEGRALS**

- |  |   |
|--|---|
| 77. Evaluate on $\int \left( \frac{1}{1-x^2} + \frac{1}{1+x^2} \right) dx$ on $(-1, 1)$ [TS J 16][TS M 22] | Tanh <sup>-1</sup> x+Tan <sup>-1</sup> x+c                              |
| 78. Evaluate $\int \left( \frac{1}{\sqrt{1-x^2}} + \frac{2}{\sqrt{1+x^2}} \right) dx$ [IPE 12]             | Sin <sup>-1</sup> x + 2Sinh <sup>-1</sup> x + c                         |
| 79. Evaluate the integral $\int \frac{(3x+1)^2}{2x} dx$ , [AP J 16]  | $\frac{9}{4}x^2 + 3x + \frac{1}{2} \log x  + c$                         |
| 80. Evaluate $\int \left( x + \frac{1}{x} \right)^3 dx, x > 0$ [IPE 12]                                    | $\frac{x^4}{4} + 3 \cdot \frac{x^2}{2} + 3 \log x - \frac{1}{2x^2} + c$ |
| 81. Evaluate $\int \left( x + \frac{4}{1+x^2} \right) dx$ [TS J 15]  | $\frac{x^2}{2} + 4 \tan^{-1}x + c$                                      |
| 82. Find $\int e^{\log(1+\tan^2 x)} dx$ . [IPE 09]   | tanx+c  |
| 83. Evaluate $\int \sec^2 x \cdot \csc^2 x dx$ [AP J 17][TS J 18]  | tanx-cotx+c   |
| 84. Find $\int \frac{\cos x + \sin x}{\sqrt{1 + \sin 2x}} dx$ [IPE 09]                                     | x+c   |
| 85. Evaluate $\int \frac{1 + \cos^2 x}{1 - \cos 2x} dx$ [TS M 19] [IPE 13]                                 | $-\cot x - \frac{1}{2}x + c$  |
| 86. Evaluate $\int e^x \sin e^x dx$ [IPE 11]   | $-\cos(e^x)+c$  |
| 87. Evaluate $\int \frac{\sin(\tan^{-1}x)}{1+x^2} dx$ [IPE 13][AP M 18]                                    | $-\cos(\tan^{-1}x) + c$   |
| 88. Evaluate $\int \frac{1}{\sqrt{\sin^{-1}x} \sqrt{1-x^2}} dx$ [AP J 15]                                  | $2\sqrt{\sin^{-1}x} + c$  |
| 89. Evaluate $\int \frac{\sin^4 x}{\cos^6 x} dx$ [MP]  | $\frac{\tan^5 x}{5} + c$  |
| 90. Evaluate $\int e^x (\sec x + \sec x \tan x) dx$ [AP J 16] [IPE 13]                                     | e <sup>x</sup> secx+c   |
| 91. Evaluate $\int e^x \left( \frac{1+x \log x}{x} \right) dx$ [TS J 19] [AP M 15,18]                      | e <sup>x</sup> logx+c   |
| 92. Evaluate $\int \frac{dx}{(x+1)(x+2)}$ [APM 19][IPE 11,12,14]   | $\log \left( \frac{x+1}{x+2} \right) + c$                               |
| 93. Evaluate $\int \frac{1}{(x+3)\sqrt{x+2}} dx$ [MP] [IPE 14]   | $2 \tan^{-1}(\sqrt{x+2}) + c$   |
| 94. Evaluate $\int \sqrt{1-\cos 2x} dx$ [AP M 23][TS M 23]   | $-\sqrt{2} \cos x + c$  |

95. Evaluate  $\int \frac{\cot(\log x)}{x} dx$  [IPE 09]  $\log |\sin(\log x)| + c$
96. Evaluate  $\int \frac{1}{x \log x [\log(\log x)]} dx$  [TS M 19] [IPE 11]  $\log(\log(\log x)) + c$
97. Evaluate  $\int \frac{e^x(1+x)}{\cos^2(xe^x)} dx$  [AP J 17][TS M 17] [AP M 19]  $\tan(xe^x) + c$
98. Evaluate  $\int \frac{x^8}{1+x^{18}} dx$  [TS 19,23] [AP M 16]  $\frac{1}{9} \tan^{-1}(x^9) + c$
99. Evaluate  $\int \log x dx$  [IPE 99,10]  $x \log x - x + c$
100. Evaluate  $\int \sin^{-1} x dx$  [IPE 05]  $x \sin^{-1} x + \sqrt{1-x^2} + c$
101. Evaluate  $\int e^x(\cos x - \sin x) dx$  [IPE 99]  $e^x \cos x + c$
102. Evaluate  $\int \left( \frac{1-\sqrt{x}}{x} \right) dx$   $\log x - 2\sqrt{x} + c$
103. Evaluate  $\int (1-x)(4-3x)(3+2x) dx$   $\frac{3}{2}x^4 - \frac{5}{3}x^3 - \frac{13}{2}x^2 + 12x + c$
104. Evaluate  $\int \frac{e^{\log x}}{x} dx$  on  $(0, \infty)$   $x + c$
105. Evaluate  $\int \sqrt{1 - \sin 2x} dx$   $-\cos x - \sin x + c$  (or)  
 $-(\sin x + \cos x) + c$
106. Evaluate  $\int \sqrt{1 + \cos 2x} dx$   $\sqrt{2} \sin x + c$
107. Evaluate  $\int \frac{\sin^2 x}{1 + \cos 2x} dx$   $\frac{1}{2}(\tan x - x) + c$
108. Evaluate  $\int \frac{1}{1 + \cos x} dx$  [TS M 15]  $-\cot x + \operatorname{cosec} x + c$
109. Evaluate  $\int \frac{1}{\cosh x + \sinh x} dx$  [AP J 19][TS M 17][AP M 16]  $\sinh x - \cosh x + c$
110. Evaluate  $\int \cos x \cos 3x dx$   $\frac{\sin 4x}{8} + \frac{\sin 2x}{4} + c$
111. Evaluate  $\int \frac{2x+1}{x^2+x+1} dx$  [TS M 20]  $\log |x^2+x+1| + c$

112. Evaluate  $\int \frac{2x+3}{\sqrt{x^2+3x-4}} dx$

113. Evaluate  $\int \frac{ax^{n-1}}{bx^n+c} dx$

114. Evaluate  $\int \frac{x^2 dx}{\sqrt{1-x^6}}$

115. Find  $\int \frac{3x^2}{1+x^6} dx$

116. Evaluate  $\int \frac{\cos(\log x)}{x} dx$

117. Evaluate  $\int \frac{1}{x \log x} dx$

118. Find  $\int \frac{\log(1+x)}{1+x} dx$

119. Find  $\int 2xe^{x^2} dx$

120. Find  $\int x^3 \sin(x^4) dx$

121. Evaluate  $\int \frac{\cos \sqrt{x}}{\sqrt{x}} dx$

122. Evaluate  $\int \sqrt{\sin x} \cos x dx$

123. Find  $\int \sec(\tan x) \sec^2 x dx$

124. Find  $\int \tan^4 x \sec^2 x dx$ .

125. Evaluate  $\int \frac{\sec^2 x}{(1+\tan x)^3} dx$

126. Evaluate  $\int \frac{\operatorname{cosec}^2 x}{(a+b \cot x)^5} dx$

127. Evaluate  $\int \frac{\cos x}{(1+\sin x)^2} dx$

[TS M 15]

$$2\sqrt{x^2+3x-4} + c$$

$$\frac{a}{nb} \log |bx^n+c| + k$$

$$\frac{1}{3} \operatorname{Sin}^{-1} t = \frac{1}{3} \operatorname{Sin}^{-1}(x^3) + c$$

$$\operatorname{Tan}^{-1}(x^3) + c$$

$$\sin(\log x) + c$$

$$\log(\log x) + c$$

$$\frac{(\log(1+x))^2}{2} + c$$

$$\int e^t dt = e^t + c = e^{x^2} + c$$

$$-\frac{1}{4} \cos(x^4) + c$$

$$2 \sin \sqrt{x} + c$$

$$\frac{2}{3} (\sin x)^{3/2} + c$$

$$\log \left| \tan \left( \frac{\pi}{4} + \frac{1}{2} (\tan x) \right) \right| + c$$

$$\frac{\tan^5 x}{5} + c$$

$$\frac{-1}{2(1+\tan x)^2} + c$$

$$\frac{1}{4b(a+b \cot x)^4} + c$$

$$\frac{-1}{1+\sin x} + c$$



128. Evaluate  $\int \frac{1}{1+\sin 2x} dx$

129. Find  $\int \sec x \log(\sec x + \tan x) dx$ .

130. Evaluate  $\int \cos^3 x dx$

131. Evaluate  $\int \frac{2}{\sqrt{25+9x^2}} dx$  on R.

132. Evaluate  $\int \frac{3}{\sqrt{9x^2-1}} dx$  on  $(1/3, \infty)$

133. Evaluate  $\int \sqrt{16-25x^2} dx$

134. Evaluate  $\int x \log x dx$  [AP M 20,22]

135. Evaluate  $\int \sqrt{x} \log x dx$  on  $(0, \infty)$  [TS M 16]

136. Evaluate  $\int x \cos x dx$ .

137. Evaluate  $\int x \sec^2 x dx$

138. Evaluate  $\int \frac{\log x}{x^2} dx$

139. Evaluate  $\int e^x \cos x dx$  [AP J 15]

140. Evaluate  $\int e^x (1 + \tan^2 x + \tan x) dx$

141. Evaluate  $\int e^x (\tan x + \sec^2 x) dx$

142. Evaluate  $\int e^x (\tan x + \log(\sec x)) dx$  [TS J 15,18][AP 23]

143. Evaluate  $\int e^x \left( \tan^{-1} x + \frac{1}{1+x^2} \right) dx$  [TS M 22]

144. Evaluate  $\int \frac{xe^x}{(x+1)^2} dx$  [IPE 14]

$$\frac{-1}{1+\tan x} + c$$

$$\frac{1}{2} (\log |\sec x + \tan x|)^2 + c$$

$$\frac{1}{12} (9 \sin x + \sin 3x) + c$$

$$\frac{2}{3} \operatorname{Sinh}^{-1} \left( \frac{3x}{5} \right) + c$$

$$\operatorname{Cosh}^{-1}(3x) + c$$

$$\frac{x}{2} \sqrt{16-25x^2} + \frac{16}{10} \operatorname{Sin}^{-1} \frac{5x}{4} + c$$

$$(\log x) \left( \frac{x^2}{2} \right) - \frac{x^2}{4} + c$$

$$\frac{2}{3} x^{3/2} \log x - \frac{4}{9} x^{3/2} + c$$

$$x \sin x + \cos x + c$$

$$x \tan x - \log |\sec x| + c$$

$$-\frac{1}{x} \log x - \frac{1}{x} + c$$

$$\frac{e^x}{2} (\sin x + \cos x) + c$$

$$e^x \tan x + c$$

$$e^x \tan x + c$$

$$e^x \log \sec x + c$$

$$e^x \tan^{-1} x + c$$

$$\frac{e^x}{x+1} + c$$

145. Find  $\int \frac{dx}{x^2 - 81}$

146. Evaluate  $\int \frac{dx}{\sqrt{x^2 + 2x + 10}}$

147. Evaluate  $\int \frac{1}{e^x - 1} dx$

148. Evaluate  $\int \frac{x^2 + 1}{x^4 + 1} dx$  [IPE 14]

149. Find  $\int \frac{\sin x}{\sin(a + x)} dx$

150. Find  $\int \cos^4 x dx$

151. Evaluate  $\int \sin \sqrt{x} dx$

152. Evaluate  $\int \cos \sqrt{x} dx$  [TS J 17]

153. Evaluate  $\int \cos(\log x) dx$

$$\frac{1}{18} \log \left| \frac{x-9}{x+9} \right| + c$$

$$\text{Sinh}^{-1} \left( \frac{x+1}{3} \right) + c$$

$$\log(e^x - 1) - x + c$$

$$\frac{1}{\sqrt{2}} \text{Tan}^{-1} \left( \frac{x^2 - 1}{\sqrt{2}x} \right) + c$$

$$x(\cos a) - (\sin a) \log |\sin(a + x)| + c$$

$$\frac{1}{32} (12x + \sin 4x + 8 \sin 2x) + c$$

$$-2\sqrt{x} \cos \sqrt{x} + 2 \sin \sqrt{x} + c$$

$$2(\sqrt{x} \sin \sqrt{x} + \cos \sqrt{x}) + c$$

$$\frac{x}{2} [\sin(\log x) + \cos(\log x)] + c$$

**DEFINITE INTEGRALS**

154. Evaluate  $\int_0^1 \frac{x^2}{1+x^2} dx$  [TS J 18][MP]

155. Evaluate  $\int_0^4 |2 - x| dx$  [AP J 17][IPE 13]

156. Evaluate  $\int_0^{\pi/2} \frac{\sin^2 x - \cos^2 x}{\sin^3 x + \cos^3 x} dx$  [MP]

157. Evaluate  $\int_2^3 \frac{2x dx}{1+x^2}$  [AP M17] [TS M 16,20,23]

158. Evaluate  $\int_0^2 \sqrt{4 - x^2} dx$  [IPE 07,03]

159. Evaluate  $\int_0^2 |1 - x| dx$  [TS M 18] [AP J 19][AP 15, 23]

$$1 - \frac{\pi}{4}$$

$$4$$

$$0$$

$$\log 2$$

$$\pi$$

$$1$$

160. Evaluate $\int_1^5 \frac{dx}{\sqrt{2x-1}}$	[TSM 15]	2
161. Evaluate $\int_0^{\pi/2} \frac{\sin^5 x}{\sin^5 x + \cos^5 x} dx$	[IPE 08,14]	$\pi/4$
162. Evaluate $\int_0^{\pi/2} \sin^4 x \cos^5 x dx$	[IPE 10]	$8/315$
163. Evaluate $\int_{-\pi/2}^{\pi/2} \sin^2 x \cos^4 x dx$	[AP M 16,18,20]	$\pi/16$
164. Evaluate $\int_0^a (\sqrt{a} - \sqrt{x})^2 dx$	[TS M 19]	$\frac{a^2}{6}$
165. Evaluate $\int_0^a \frac{dx}{x^2 + a^2}$	[TS J 19] [AP J 15]	$\frac{\pi}{4a}$
166. Evaluate $\int_0^1 x.e^{-x^2} dx$		$\frac{1}{2} \left( 1 - \frac{1}{e} \right)$
167. Evaluate $\int_0^3 \frac{x dx}{\sqrt{x^2 + 16}}$	[TS M 17]	1
168. Evaluate $\int_1^4 x \sqrt{x^2 - 1} dx$		$\frac{1}{3} (15)^{3/2}$
169. Evaluate $\int_0^{\pi} \sqrt{2 + 2 \cos \theta} d\theta$	[AP M 16,18,22] [TS M 22]	4
170. Evaluate $\int_0^4 \frac{x^2}{1+x} dx$	[TS J 15]	$4 + \log 5$
171. Evaluate $\int_0^a \frac{dx}{x^2 + a^2}$		$\frac{\pi}{4a}$
172. Evaluate $\int_0^a \sqrt{a^2 - x^2} dx$	[TS M 16]	$\frac{\pi a^2}{4}$

173. Evaluate  $\int_0^{\pi/4} \sec^4 \theta \, d\theta$

[IPE 14]

$\frac{4}{3}$

174. Evaluate  $\int_{-\pi/2}^{\pi/2} \frac{\cos x}{1+e^x} \, dx$

[TS J 17]

1

175. Evaluate  $\int_0^{16} \frac{x^{\frac{1}{4}}}{1+x^{\frac{1}{2}}} \, dx$

$4\left(\frac{2}{3} + \text{Tan}^{-1}2\right)$

176. Prove that  $\int_0^{\pi/2} \sin^n x \, dx = \int_0^{\pi/2} \cos^n x \, dx$

177. Find  $\int_0^{\pi/2} \cos^7 x \sin^2 x \, dx$

[AP M 22]

$\frac{16}{315}$

178. Find  $\int_0^{\pi/2} \sin^4 x \cos^4 x \, dx$

$\frac{3\pi}{256}$

179. Find  $\int_0^{\pi/2} \sin^6 x \cdot \cos^4 x \, dx$

[AP J 16][AP 19, 23]

$\frac{3\pi}{512}$

180. Find  $\int_0^{\pi/2} \sin^5 x \cos^4 x \, dx$

$\frac{8}{315}$

181. Evaluate  $\int_0^{\pi} \sin^3 x \cos^6 x \, dx$

$4/63$

182. Find  $\int_0^{2\pi} \sin^2 x \cos^4 x \, dx$

[IPE 14] [TS M 15][AP J 18]

$\pi/8$

183. Evaluate  $\int_{-\pi/2}^{\pi/2} \sin^2 \theta \cos^7 \theta \, d\theta$

$\frac{32}{315}$

184. Evaluate  $\int_{-\pi/2}^{\pi/2} \sin^3 \theta \cos^3 \theta \, d\theta$

[IPE 14]

0

185. Evaluate  $\int_0^{\pi/2} \tan^5 x \cos^8 x \, dx$

$1/24$

AREAS

186. Find the area bounded by  $y=x^3+3$ , x-axis and  $x=-1$ ,  $x=2$  [TS J 17][TS M 20] 5 1/4 sq.units
187. Find the area enclosed by  $y=e^x$ ,  $y=x$ ,  $x=0$ ,  $x=1$ . [IPE 09]  $e - \frac{3}{2}$  sq.units
188. Find the area under the curve  $f(x)=\sin x$  in  $[0,2\pi]$  [IPE 09] 4 sq.units
189. Find the area under the curve  $f(x)=\cos x$  in  $[0,2\pi]$  [IPE 95] 4 sq.units
190. Find the area enclosed between  $y=x^2$  and the line  $y=2x$ . [IPE 13] 4/3 sq.units
191. Find area enclosed between curve  $y=x^2$ , x-axis,  $x=-1$ ,  $x=2$  [TS J 18] [AP J 15] 3 sq.units
192. Find the area cut off between the line  $y=0$  and the parabola  $y=x^2-4x+3$  4/3 sq.units
193. Find the area enclosed by the curves  $y=x^2$  and  $y=x^3$ . [TS J 19] 1/12 sq.units
194. Find the area enclosed between  $|x|+|y|=1$  2 sq.units

LIMIT AS A SUM

195. Evaluate  $\lim_{n \rightarrow \infty} \sum_{r=1}^n \frac{r^3}{r^4 + n^4}$   $\frac{1}{4} \log_e 2$
196. Evaluate  $\lim_{n \rightarrow \infty} \left[ \frac{1}{n+1} + \frac{1}{n+2} + \dots + \frac{1}{6n} \right]$   $\log_e 6$
197. Evaluate  $\lim_{n \rightarrow \infty} \frac{1^4 + 2^4 + 3^4 + \dots + n^4}{n^5}$  [AP M 20] 1/5
198. Find  $\lim_{n \rightarrow \infty} \left( \frac{n!}{n^n} \right)^{1/n}$  1/e

DIFFERENTIAL EQUATIONS

199. Find the order and degree of  $\left( \frac{d^2y}{dx^2} + \left( \frac{dy}{dx} \right)^3 \right)^{6/5} = 6y$  [AP M 16][AP, TS J 15] 2, 1
200. Find the order & degree of the D.E  $\left( \frac{d^3y}{dx^3} \right)^2 - 3 \left( \frac{dy}{dx} \right)^2 - e^x = 4$  [IPE 14][TS 23] 3, 2
201. Find order, degree of the D.E  $x^{1/2} \left( \frac{d^2y}{dx^2} \right)^{1/3} + x \frac{dy}{dx} + y = 0$  [TS M 15][AP M 18] 2, 1

202. Find the order, degree of the D.E  $\left[ \left( \frac{dy}{dx} \right)^{1/2} + \left( \frac{d^2y}{dx^2} \right)^{1/3} \right]^{1/4} = 0$

2,2

203. Form the D.E corresponding to  $y = A \cos 3x + B \sin 3x$  [TS J 16]  
[TS M 20] [AP M 15]

$$\frac{d^2y}{dx^2} + 9y = 0$$

204. Form the D.E corresponding to  $y = cx - 2c^2$ , (c) [AP M 19]

$$2 \left( \frac{dy}{dx} \right)^2 - x \left( \frac{dy}{dx} \right) + y = 0$$

205. Find the order of the D.E  $y = c(x-c)^2$ , (c) [TS M 16]

1

206. Find the order of the D.E obtained by eliminating the arbitrary constants a and b from  $xy = ae^x + be^{-x} + x^2$ .

2

207. Find the order of the D.E  $y = Ae^x + Be^{3x} + Ce^{5x}$

3

208. Find the order of the differential equation of the family of all circles with their centres at the origin. [TS M 17]

1

209. Find the D.E corresponding to the rectangular hyperbolas which have the coordinate axes as asymptotes.

$$x \frac{dy}{dx} + y = 0$$

210. Find the D.E corresponding to the the ellipses which centres at the origin and with coordinate axes as axes.

$$xy \frac{d^2y}{dx^2} + x \left( \frac{dy}{dx} \right)^2 - y \frac{dy}{dx} = 0$$

211. Form the D.E of  $y = ae^{3x} + be^{4x}$

$$y_2 - 7y_1 + 12y = 0$$

212. Find the general solution of  $x + y \frac{dy}{dx} = 0$  [AP J 16]

$$x^2 + y^2 = c.$$

213. Find the integrating factor of the D.E  $(2x - 10y^3) \frac{dy}{dx} + y = 0$

$y^2$

214. Find the integrating factor of the D.E  $x \frac{dx}{dy} - y = 2x^2 \sec^2 2x$

$1/x$

215. Find the integrating factor of the D.E  $y \frac{dx}{dy} - x = 2y^3$

$1/y$

216. Find the integrating factor of the D.E  $(\cos x) \frac{dy}{dx} + y \sin x = \tan x$

$\sec x$