Multiple Choice Questions

[MHT-CET 2022] (online shift)

1. $\int_0^{\frac{\pi}{2}} \frac{dx}{5+4\cos x} =$

a) $2\tan^{-1}\left(\frac{1}{3}\right)$ b) $\tan^{-1}\left(\frac{1}{3}\right)$ c) $\frac{2}{3}\tan^{-1}\left(\frac{1}{3}\right)$ d) $\frac{1}{3}\tan^{-1}\left(\frac{1}{3}\right)$

2. $\int_0^1 \sqrt{\frac{1-x}{1+x}}\, dx =$

a) $\frac{\pi}{2}+1$ b) $\frac{\pi}{2}-1$ c) $\frac{\pi}{4}+1$ d) $\frac{\pi}{4}-1$

3. $\int_2^3 \frac{\log x}{x}\, dx =$

a) $\frac{1}{2}\log 6 \log\frac{3}{2}$ b) $\log 6.\log\frac{3}{2}$ c) $2\log 6.\log\frac{3}{2}$ d) $\frac{1}{2}\log 6.\log 3$

4. $\int_0^{\pi/4} \sec^4 x\, dx =$

a) $\frac{1}{3}$ b) 1 c) $\frac{4}{3}$ d) $\frac{2}{3}$

5. $F : [-1, 2] \longrightarrow [0, \infty)$ be a continuous function such that $f(x) = f(1-x)\ \forall\ x \in [-1, 2]$. If $R_1 = \int_{-1}^{2} x\, f(x)\, dx$ and R_2 is the area of the region bounded by $y = f(x)$, $x = -1$, $x = 2$ and the x – axis then

a) $R_1 = 2R_2$ b) $3R_1 = R_2$ c) $2R_1 = R_2$ d) $R_1 = 3R_2$

6. $\int_0^1 x(1-x)^n\, dx =$

a) $\frac{4}{(n+1)(n+2)}$ b) $\frac{n+3}{(n+1)(n+2)}$ c) $\frac{2n+3}{(n+1)(n+2)}$ d) $\frac{1}{(n+1)(n+2)}$

7. $\int_{-3}^{0} x\sqrt{x+4}\, dx$

a) $\frac{64}{15}$ b) $\frac{-34}{15}$ c) $\frac{94}{15}$ d) $\frac{-94}{15}$

15. The value of $\int_0^1 \tan^{-1}\left(\frac{2x-1}{1+x-x^2}\right) dx$ is

a) 2 b) -1 c) 1 d) 0

16. $\int_0^2 |2x-3|\, dx =$

a) $\frac{3}{10}$ b) $\frac{5}{2}$ c) $\frac{10}{3}$ d) $\frac{2}{5}$

17. $\int_0^{\pi/2} \frac{\cos x}{3\cos x+\sin x}\, dx =$

a) $\frac{3\pi}{20}-\frac{\log 3}{100}$ b) $\frac{3\pi}{10}-\frac{\log 3}{10}$ c) $\frac{3\pi}{20}+\frac{\log 3}{10}$ d) $\frac{3\pi}{20}-\frac{\log 3}{10}$

18. $\int_0^{\pi} \frac{1}{4+3\cos x}\, dx$

a) 1 b) $\frac{\pi}{\sqrt{7}}$ c) 0 d) $\frac{2}{\sqrt{7}}$

19. $\int_0^{\pi/2} \log\left[\frac{4+3\sin x}{4+3\cos x}\right] dx =$

a) 0 b) 4 log 3 c) $\frac{1}{2}$ d) 2 log 4

20. $\int_0^{\pi} x \sin x.\cos^4 x\, dx =$

a) $\frac{\pi}{10}$ b) $\frac{2\pi}{5}$ c) $\frac{\pi}{5}$ d) $\frac{\pi}{8}$

[MHT-CET 2020] (online shift)

21. $\int_0^{\pi/2} \frac{\sin x.\cos x}{1+\sin^4 x}\, dx =$

a) $\frac{\pi}{8}$ b) $\frac{\pi}{2}$ c) $\frac{\pi}{6}$ d) $\frac{\pi}{4}$

22. $\int_0^1 x\,(1-x)^5\, dx =$

a) $\frac{1}{7}$ b) $\frac{1}{6}$ c) $\frac{1}{42}$ d) $\frac{-1}{42}$

60. $\int_0^{11} \frac{(11-x)^2}{x^2+(11-x)^2}\,dx =$

a) 2 b) $\frac{11}{2}$ c) 4 d) $\frac{1}{2}$

[MHT-CET 2009]

61. $\int_5^{10} \frac{1}{(x-1)(x-2)}\,dx =$

a) $\log\left(\frac{3}{5}\right)$ b) $\log\left(\frac{37}{32}\right)$ c) $\log\left(\frac{12}{7}\right)$ d) $\log\left(\frac{32}{27}\right)$

62. Which of the following is true ?

a) $\int_0^1 \sqrt{x}\,dx = \frac{2}{3}$ b) $\int_0^1 \sqrt{x}\,dx = \frac{3}{2}$ c) $\int_0^1 \sqrt{x}\,dx = \frac{5}{2}$ d) $\int_0^1 \sqrt{x}\,dx = \frac{1}{2}$

63. $\int_0^{\pi/2} \frac{\sin x - \cos x}{1-\sin x \cos x}\,dx =$

a) 0 b) $\frac{\pi}{3}$ c) $\frac{\pi}{4}$ d) π

[MHT-CET 2008]

64. $\int_{-1}^{1} |x|\,dx =$

a) 0 b) $\frac{1}{2}$ c) 2 d) 1

65. $\int_{-\pi/2}^{\pi/2} \frac{\sin^4 x}{\sin^4 x + \cos^4 x}\,dx =$

a) π b) $\frac{\pi}{4}$ c) 0 d) $\frac{\pi}{2}$

[MHT-CET 2007]

66. The value of $\int_0^{\pi/2} \log(\tan x)\,dx$ is

a) 2 b) 1 c) 0 d) 3

113. Let f and g be continuous functions on $[0, a]$ such that $f(x) = f(a-x)$ and $g(x) + g(a-x) = 4$, then $\int_0^a f(x)g(x)\,dx$ is equal to

a) $\int_0^a f(x)\,dx$ b) $2\int_0^a f(x)\,dx$ c) $-3\int_0^a f(x)\,dx$ d) $4\int_0^a f(x)\,dx$

114. If $\int_{-1}^{1} \frac{\cos ax}{1+3^x}\,dx = \frac{2}{\pi}$, then $a =$

a) $\frac{\pi}{6}$ b) $\frac{\pi}{4}$ c) $\frac{\pi}{3}$ d) $\frac{\pi}{2}$

115. $\int_0^{\pi/4} \frac{x}{\sin^4 2x + \cos^4 2x}\,dx =$

a) $\frac{\sqrt{2}\pi^2}{8}$ b) $\frac{\sqrt{2}\pi^2}{16}$ c) $\frac{\sqrt{2}\pi^2}{32}$ d) $\frac{\sqrt{2}\pi^2}{64}$

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

a) $\frac{\pi^2}{4} - 2$ b) $\frac{\pi^2}{4} + 2$ c) $\pi^2 - e^{\frac{\pi}{2}}$ d) $\pi^2 + e^{\frac{\pi}{2}}$

117. For $0 < a < 1$, $\int_0^{\pi} \frac{dx}{1-2a\cos x + a^2} =$

a) $\frac{\pi}{1+a^2}$ b) $\frac{\pi}{1-a^2}$ c) $\frac{\pi^2}{\pi+a^2}$ d) $\frac{\pi^2}{\pi-a^2}$

118. Let a and b be real constants such that the function f defined by $f(x) = \begin{cases} x^2+3x+a, & x \le 1 \\ bx+2, & x > 1 \end{cases}$ be differentiable on R. Then $\int_{-2}^{2} f(x)\,dx =$

a) 17 b) 21 c) $\frac{15}{6}$ d) $\frac{19}{6}$

119. $\int_{0.2}^{3.5} [x]\,dx = \ldots$, where $[x]$ is greatest integer function

a) 4 b) 4.2 c) 4.4 d) 4.5

120. $\int_0^5 x^2[x]\,dx = \ldots$, where $[x]$ is greatest integer function

a) $\frac{200}{3}$ b) $\frac{244}{3}$ c) $\frac{316}{3}$ d) $\frac{400}{3}$

121. $\int_0^{\pi/4} \log\left(\frac{\sin x + \cos x}{\cos x}\right)dx =$

a) $\frac{\pi}{2}\log 2$ b) $\frac{\pi}{4}\log 2$ c) $\frac{\pi}{6}\log 2$ d) $\frac{\pi}{8}\log 2$

122. $\int_0^1 \left(2x^3 - 3x^2 - x + 1\right)^{\frac{1}{3}}\,dx =$

a) -1 b) 0 c) 1 d) 2

133. $\int_1^e \frac{e^x}{x}(1+x\log x)\,dx =$

a) e^e b) $e^e - e$ c) $e^e + e$ d) e

134. $\int_0^1 \log\left(\frac{1}{x}-1\right)dx =$

a) 0 b) 1 c) 2 d) $\frac{1}{2}$

135. $\int_{1/2}^{2} \frac{1}{x}\,\text{cosec}^{101}\left(x-\frac{1}{x}\right)dx =$

a) 0 b) 1 c) $\frac{1}{4}$ d) $\frac{101}{2}$

136. $\int_0^{\pi/2} \frac{300\sin x+100\cos x}{\sin x+\cos x}\,dx =$

a) 100π b) 150π c) 200π d) 300π

137. $\int_1^3 \frac{\log x^2}{\log\left(16x^2-8x^3+x^4\right)}\,dx =$

a) 1 b) 3 c) $\log 2$ d) $\frac{1}{2}$

138. $\int_{\pi/3}^{2\pi/3} \frac{x}{1+\sin x}\,dx =$

a) $\pi\left(\sqrt{3}-2\right)$ b) $\pi\left(2-\sqrt{3}\right)$ c) $\pi\left(\sqrt{3}+2\right)$ d) $\frac{\pi}{2}\left(2-\sqrt{3}\right)$

139. $\int_0^1 x\left|x-\frac{1}{2}\right|dx =$

a) $\frac{1}{2}$ b) $\frac{1}{12}$ c) $\frac{1}{8}$ d) $\frac{1}{16}$

140. The value of $\int_{-2}^{2} \left|x^2-x-2\right|dx$ is

a) $\frac{19}{3}$ b) $\frac{38}{3}$ c) $\frac{22}{3}$ d) $\frac{44}{3}$

141. The value of $\int_1^4 \log[x]\,dx$, where $[x]$ is the greatest integer less than or equal to x, is

a) $\log 2$ b) $\log 5$ c) $\log 6$ d) $\log 3$

142. $\int_{-1}^{1} \left(\sqrt{1+x+x^2}-\sqrt{1-x+x^2}\right)dx =$

a) -1 b) 0 c) 1 d) 2

143. $\int_{-8}^{8} \frac{x^5+x^3}{4-x^2}\,dx =$

a) 16 b) 8 c) 0 d) -8

94. $\int_0^4 |2x-5|\,dx =$

a) $\frac{13}{2}$ b) $\frac{15}{2}$ c) $\frac{17}{2}$ d) $\frac{17}{4}$

95. $\int_0^{\pi} \left|\sin x - \frac{2x}{\pi}\right| dx =$

a) $\frac{\pi}{4}$ b) $\frac{\pi}{2}$ c) π d) 2π

96. $\int_0^{\pi/2} |\sin x - \cos x|\,dx =$

a) 0 b) $\sqrt{2}-1$ c) $2\sqrt{2}-2$ d) $2\sqrt{2}+2$

97. Let [.] denotes the greatest integer function. The value of $\int_{-2}^{1} |[x-1]|\,dx$ is

a) -6 b) -3 c) 3 d) 6

98. If $\int_0^{\pi/2} \log(\sin x)\,dx = -\frac{\pi}{2}\log 2$, then $\int_0^{\pi} \log(1+\cos x)\,dx =$

a) $-\pi \log 2$ b) $\pi \log 2$ c) $-3\pi \log 2$ d) $3\pi \log 2$

99. $\int_0^1 \frac{\log(1+x)}{1+x^2}\,dx =$

a) $\frac{\pi}{2}\log 2$ b) $\frac{\pi}{4}\log 2$ c) $\frac{\pi}{8}\log 2$ d) $\frac{\pi}{16}\log 2$

[MHT - CET 2024]

100. The value of $k \in N$ for which the integral $I_n = \int_0^1 (1-x^k)^n\,dx$, $n \in N$ satisfies $147I_{20} = 148I_{21}$ is

a) 7 b) 8 c) 10 d) 14

101. $\int_0^a \frac{x-a}{x+a}\,dx =$

a) $a - a\log 2$ b) $a + a\log 2$ c) $a - 2a\log 2$ d) $a + 2a\log 2$

102. If $\int_0^{\pi/3} \frac{\tan x}{\sqrt{2k\sec x}}\,dx = 1-\frac{1}{\sqrt{2}}$, $(k>0)$, then $k =$

a) $\frac{1}{2}$ b) 1 c) 2 d) 4

103. $\int_{\pi/3}^{\pi/2} \frac{\sqrt{1+\cos x}}{(1-\cos x)^{\frac{5}{2}}}\,dx =$

a) $-\frac{3}{2}$ b) $-\frac{1}{2}$ c) $\frac{1}{2}$ d) $\frac{3}{2}$

104. $\int_0^{\pi/4} \frac{\cos^2 x \sin^2 x}{(\cos^3 x + \sin^3 x)^2}\,dx =$

a) $\frac{1}{3}$ b) $\frac{1}{6}$ c) $\frac{1}{9}$ d) $\frac{1}{12}$