SELF ASSESSMENT TEST -6

CLASS B.A,B.SC-1

REDUCTION FORMULAE

1.If $I_n = \int (\log x)^n dx$, prove that $I_n + I_{n-1} = x(\log x)^n$.

2. Obtain a reduction formula for $\int \sec^{2n+1} x dx$ .Hence evaluate $\int \sec^5 x dx$.

3.If $I_n = \int_0^\infty e^{-x} \sin^n x dx$, then prove that $I_n = \frac{n(n-1)}{n^2+1} I_{n-2}$. Hence evaluate $\int_0^\infty e^{-x} \sin^4 x dx$.

4.If $I_n = \int_0^{\frac{\pi}{2}} x \cos^n x dx$, x>1, prove that $I_n = \left(\frac{n-1}{n}\right) I_{n-2} - \frac{1}{n^2}$. Hence evaluate I_4 .

5.If $I_n = \int_0^{\frac{\pi}{2}} x^n \sin x dx$, and n >1 prove that $I_n + n(n-1) I_{n-2} = n\left(\frac{\pi}{2}\right)^{n-1}$.

Hence evaluate I_4 .

6.If $I_{m,n} = \int \cos^m x \cos nx dx$, show that $I_{m,n} = \frac{m}{n+m} I_{m-1,n-1}$. Hence $I_{5,3}$.

7.Connect $\int \sin^m x \cos^n x dx$ with $\int \sin^{m-2} x \cos^n x dx$ .Hence evaluate $I_{4,2}$

8.Evaluate $\int_0^{\frac{\pi}{2}} \cos^n x dx$ where n is a positive integer.

9.Show that $\int_0^{\frac{\pi}{6}} \cos^7 3x dx = \frac{16}{105}$.

10. Show that $\int_0^{\infty} \frac{dx}{\left(1+x^2\right)^5} = \frac{7.5.3.1}{8.6.4.2}\frac{\pi}{2}$.

11.Show that $\int_0^a \frac{x^6}{\sqrt{a^2-x^2}} dx = \frac{5\pi a^6}{32}$.

12.Write down the values of $\int_0^{\pi} \sin^4 \frac{x}{2} \cos^6 \frac{x}{2} dx$

13.Evaluate $\int_0^1 x^5 \left(1-x^2\right)^{\frac{5}{2}} dx$.

14.Evaluate $\int_0^{2a} x\sqrt{2ax-x^2} dx$