MA 8251 ENGINEERING MATHEMATICS-II
Unit –IV (Complex Integration)

Part-A		Unit	Regulation	year
1.	State Cauchy's integral formula.	3	8	Nov /Dec 14
2.	Evaluate $\int \frac{e^z dz}{(z-2)}$,where C is the unit circle with centre as origin.	3	13	Apr/May 17
3.	Evaluate $\int_c \frac{e^z}{z-1} dz$, where C is $\|z+3\|=1$	3	8	Dec/Jan 16
4.	Evaluate $\int_c \frac{z}{z-2} dz$, where c is $(a)\|z\|=1,(b)\|z\|=3$	3	13	May /June 13/17
5.	Classify the singularities of the function $f(z)=\frac{z-\sin z}{z}$	3	8	Apr /May 17
6.	What is meant by essential singularity ? Give an example	3	8	Dec/Jan 16
7.	Define and give an example of essential singular points.	3	13	Dec/Jan 16
8.	Find the singular points of f(z)=$\frac{\sin z}{z}$.	3	13	Nov/ Dec 17
9.	State Cauchy's residue theorem	3	8	Dec/Jan 16
10.	Determine the residue of $f(z)=\frac{z+1}{(z-1)(z+2)}$ at z=1.	3	13	Dec/Jan 16
11.	Find the residue of $f(z)=\frac{z^2}{(z-2)(z+1)^2}$ at z = 2	3	13	Nov/Dec 17
12.	Evaluate the residue of f(z)=tanz at its singularities.	3	13	May/June 16
13.	Find the residue of $\left\{\frac{\sin 3z}{z^6}\right\}$ at z=0.	3	8	Dec/Jan 14
14.	Expand $f(z)=\frac{1}{z^2}$ as a Taylor series about the point z=2.	3	13	May/June 16
15.	Expand $\frac{z-1}{z+1}$ about z=1.	3	13	Nov/ Dec 17
16.	Find the residue of $f(z)=\tan z$ at $z=\frac{\pi}{2}$	3	13	Nov/Dec 16
17.	Express $\int_0^{\pi} \frac{d\theta}{2\cos\theta+\sin\theta}$ as a complex integration.	3	13	Dec/Jan 16
PART-B				
1.	Evaluate $\int \frac{(z+1)dz}{(z-1)(z-2)^2}$, where C is the circle $\|z-2\|=\frac{1}{2}$ using Cauchy's integral formula.	3	13	Apr/May 17
2.	By using Cauchy's integral formula ,evaluate $\int_c \frac{zdz}{(z-2)(z-3)^2}$ where C is $\|z-3\|=\frac{1}{2}$	3	8	Apr/May 17

3.	Use Cauchy's integral formula to evaluate $\int \frac{\sin \pi z^2 + \cos \pi z^2}{(z-2)(z-3)} dz$, where C is the circle $\|z\| = 4$	3	8	Dec/Jan 16
4.	Using Cauchy's integral formula evaluate $\oint_c \frac{e^{2z}}{(z+1)^4} dz$ where C is $\|z\| = 2$.	3	13	Dec/Jan 16
5.	Evaluate using Cauchy's integral formula: $\int_C \frac{(z+1)}{(z-3)(z-1)} dz$ where C is the circle $\|z\| = 2$.	3	13	May/June 16
6.	Evaluate $\int_C \frac{z+1}{z^2+2z+4}, dz$ where C is the circle $\|z+1+i\| = 2$ Using Cauchy's integral formula,	3	13	Nov/Dec 14
7.	If $F(a) = \oint_c \frac{3z^2+7z+1}{z-a} dz$ where $C: \|z\| = 2 \,\&\, \|a\| \neq 2,$ find F(3) and F''(1-i)	3	8	Nov/Dec 14
8.	Using Cauchy's integral formula, evaluate $\int \frac{zdz}{(z-1)^2(z+2)}$, where C is the circle $\|z-1\| = 1$	3	13	Noc /Dec 17
9.	Evaluate $\int_C \frac{z^3 dz}{(z-1)^4(z-2)(z-3)}$ where C is $\|z\| = 2.5;$ using residue theorem.	3	13	May/June 16
10.	Using Cauchy's residue Theorem, evaluate $\int_c \frac{z-1}{(z-1)^2(z-2)}$ dz where C is $\|z-i\| = 2$.	3	13	May/June 14
11.	Evaluate $\int \frac{zdz}{(z^2+1)^2}$, where C is the circle $\|z-i\| = 1$ using Cauchy's residue theorem.	4	13	Nov /Dec 16
12.	Find the Laurent series expansion of $f(z) = \frac{1}{z^2+5z-6}$ valid in the region 1 < Iz+1I< 2.	3	13	Nov /Dec 16
13.	Obtain the Laurent's expansion of $f(z) = \frac{z^2-4z+2}{z^3-2z^2-5z+6}$, in $3 < \|z+2\| < 5$.	3	13	May/ June 14
14.	Find the Laurent's expansion of $f(z) = \frac{7z-2}{(z-1)z(z-2)}$ in the region $1 < \|z+1\| < 3$	3	8	Dec/Jan 16
15.	Obtain the Laurent's series expansion of f(z) = $\frac{z^2-1}{(z+2)(z+3)}$ in 2< $\|z\|$ <3	3	13	May/June 14
16.	Expand as a Laurent's series the function $f(z) = \frac{z}{(z^2-3z+2)}$ in the regions (1) $\|z\| < 1$ (2) $1 < \|z\| < 2$ (3) $\|z\| > 2$	3	13	May/June 16
17.	Find the Laurent's series of $f(z) = \frac{3z-2}{z(z^2-4)}$ valid in the region $2 < \|z+2\| < 4$.	3	8	Nov/Dec 14
18.	Find the Laurent series expansion of $f(z) = \frac{1}{(z-1)(z-2)}$ valid in the regions $\|z\| > 2$ and $0 < \|z-1\| < 1$	3	13	Nov/Dec 14

19.	Find the Laurent's series expansion for the function $f(z)=\frac{7z-2}{z(z+1)(z+2)}$ in the annular region $1<\|z+1\|<3$	3	8	Apr/May 17
20.	Find the Laurent series expansion of $f(z)=\frac{1}{z^2+4z+3}$ valid in the region I z I < 1 and 0 < Iz+1I< 2 .	3	13	Apr /May 17,
21.	Expand $\frac{1}{(z-1)(z-2)}$ in a Laurent series valid for (i)$\|z\|<1$, (ii)$1<\|z\|<2$.	3	13	Nov /Dec 17
22.	Evaluate $\int_0^{\infty}\frac{d\theta}{1-2x\cos\theta+x^2}$ (0<x<1) using contour integration.	3	13	Apr/May 17
23.	Evaluate $\int_0^{\infty}\frac{x^2dx}{(x^2+4)(x^2+9)}$ using contour integration.	3	8	Apr/May 17
24.	By using contour integration evaluate $\int_0^{2\pi}\frac{d\theta}{2+\sin\theta}$	3	8	Apr/May 17
25.	Evaluate $\int_0^{2\pi}\frac{1}{2+\cos\theta}\,d\theta$ using contour integration.	3	13	Nov /Dec 17
26.	Evaluate $\int_0^{2\pi}\frac{d\theta}{13+5\sin\theta}$	3	13	May/June 14 / Nov14
27.	Evaluate $\int_0^{2\pi}\frac{d\theta}{13+12\cos\theta}$ by using contour integration.	3	13	May/June 16
28.	Using contour integration method show that $\int_0^{2\pi}\frac{d\theta}{a+b\cos\theta}=\frac{2\pi}{\sqrt{a^2-b^2}}$.	3	8	Nov/Dec 14
29.	Evaluate $\int_0^{2\pi}\frac{\sin^2\theta}{5-3\cos\theta}d\theta$	3	8	Dec/Jan 16
30.	By using contour integration evaluate $\int_{-\infty}^{\infty}\frac{x^2dx}{(x^2+a^2)(x^2+b^2)}$	3	8	Apr/May 17 Nov/Dec 14
31.	Use calculus of residues to find $\int_0^{\infty}\frac{1}{(x^2+a^2)(x^2+b^2)}\,dx$ where a,b>0.	3	13	Nov /Dec 17
32.	Evaluate $\int_0^{\infty}\frac{x^2dx}{(x^2+9)(x^2+4)}$ using contour integration.	3	8	Nov/Dec 14
33.	Evaluate $\int_0^{\infty}\frac{dx}{x^4+a^4}$ using contour integration.	3	13	Dec/Jan 16
34.	Evaluate by using contour integration, $\int_0^{\infty}\frac{dx}{(1+x^2)^2}$	3	13	May/June 14
35.	Evaluate $\int_0^{\infty}\frac{x\sin mx}{x^2+a^2}dx$ where a>0, m>0.	3	13	May/June 16
36.	Using contour integration evaluate $\int_0^{\infty}\frac{\cos mxdx}{x^2+\alpha^2}$.	3	13	Nov/Dec 16
36.	Evaluate $\int_c\frac{\cos\pi z}{z^2-1}\,dz$ around a rectangle with vertices at $2\pm i$, $2\pm i$.	3	13	Nov /Dec 17