SAMPLE QUESTIONS SET

Subject: Applied Mathematics III

Course: CBCGS H

SE E&TC Branch

Q.1 If f(t) be a function, $t \geq 0$, then L[f(t)] defined as

(a) $\int_{-\infty}^{\infty} e^{st} f(t)dt$ (b) $\int_{-\infty}^{\infty} e^{st} f(t)dt$

(c) $\int_{0}^{\infty} e^{st} f(t)dt$ (d) $\int_{0}^{\infty} e^{-st} f(t)dt$

Q.2 Find L $[1+e^{-2t} + \sin 2t]$

(a) $\frac{1}{s}+\frac{1}{s-2}+\frac{1}{s^2-2^2}$ (b) $\frac{1}{s}+\frac{1}{s+2}+\frac{s}{s^2-2^2}$

(c) $\frac{1}{s}+\frac{1}{s-2}+\frac{2}{(s^2+2^2)}$ (d) $\frac{1}{s}+\frac{1}{s+2}+\frac{2}{s^2+2^2}$

Q.3 If L{f(t)} = F(s), then L{f(at)} = $\frac{1}{a}F\left(\frac{s}{a}\right)$ known as

(a) First shifting theorem (b) Second shifting theorem

(c) Change of scale property (d) Multiplication theorem

Q.4 If f(t) be a periodic function with period T>0, then L(f(t)) is

(a) $\int_{0}^{T} e^{-st} f(t)dt$ (b) $\frac{\int_{0}^{T} e^{-st} f(t)dt}{1+e^{sT}}$

(c) $\frac{\int_{0}^{T} e^{-st} f(t)dt}{1-e^{sT}}$ (d) $\frac{\int_{0}^{T} e^{-st} f(t)dt}{1-e^{-sT}}$

Q.5 . If $L^{-1}[F(s)] = f(t)$ and $L^{-1}[G(s)] = g(t)$ then $L^{-1}[F(s).G(s)]$ is

(a) $\int_0^t f(x)g(t+x)dx$ (b) $\int_0^x f(x)g(t-x)dt$

(c) $\int_0^t f(x)g(t-x)dx$ (d) $\int_0^x f(x)\,g(t+x)dt$

Q.6 Find the Fourier transform of f(x) = e^{-2x}

(a) $\frac{1}{\sqrt{2\pi}}\int_{-\infty}^{\infty} e^{-2x}\,e^{-is\,x}dx$ (b) $\frac{1}{\sqrt{2\pi}}\int_{-\infty}^{\infty} e^{-2x}\,e^{-2is\,x}dx$

(c) $\frac{1}{\sqrt{2\pi}}\int_{-\infty}^{\infty} e^{-2x}\,e^{is\,x}dx$ (d) $\frac{1}{\sqrt{2\pi}}\int_{-\infty}^{\infty} e^{-2i\,x}\,e^{-is\,x}dx$

Q.7 Fourier Transform of f(x) reduces to Fourier Cosine transform of f(x) when

(a) f(x) is even function (b) f(x) is odd function

(c) f(x) is neither even nor odd function (d) not depends on function

Q. 8 If $\{f(k)\}=\begin{cases}4^k & for\ k<0\\ 3^k & for\ k\geq 0\end{cases}$, find $Z\{f(k)\}$

(a) $\frac{z}{(4-z)(z-3)}$ *if* $3<|z|<4$ (b) $\frac{z-2}{(4-z)(z-3)}$ *if* $0<|z|<4$

(c) $\frac{1}{(4-z)(z-3)}$ *if* $3<|z|<4$ (d) $\frac{1}{(4-z)(z-3)}$ *if* $0<|z|<\infty$

Q.9. If from the function $f(t)$ one forms of the function $\psi(t)=f(t)+f(-t)$ then $\psi(t)$ is

(a) Even (b) Odd

(c) Neither even nor odd (d) Both even and odd.

Q.10. The trigonometric Fourier series of an even function does not have

(a) Constant (b) Cosine terms

(c) Sine terms (d) Odd.

Q.11. The function $f_3(x)=-1+a\,x+bx^2$ is orthogonal to functions $f_1(x)=1$ and $f_2(x)=x$ in the interval (-1, 1). The value of b will be

(a) 3 (b) -3

(c) 0 (d) 1

Q.12. Fourier series of odd function only have

(a) Constant (b) Cosine terms

(c) Sine terms (d) Odd.

Q.13. For standard Fourier series $\frac{1}{2l}\int_{c}^{c+2l} f(x)\,dx =$

(a) a0 (b) an

(c) bn (d) None of these.

Q.14. In Fourier expansion of f(x)=x^2 for the interval (0, 2 π) find bn =

(a) $2\pi/n$ (b) $4\pi^2/3$

(c) $4\pi/n$ (d) $4/n^2$

Q.15 Function cannot be expressed as Fourier series if it is

(a) Single valued (b) multiple valued

(c) Positive valued (d) negative valued

Q.16. Find $\boldsymbol{a_0}$ the Fourier series for $f(x) = 0, \quad -\pi < x < 0$

$= \sin x, \; 0 < x < \pi$.

(a) $1/\pi$ (b) 0

(c) $\pi/n(n+1)$ (d) $\frac{1}{4n^2}$

Q.17 Find $\boldsymbol{b_n}$ (for n is even)half range sine series of $f(x) = 2x - x^2$ in the interval 0 < x < 2

(a) $32/n^3\pi^3$ (b) 0

(c) $\frac{16}{n^3\pi^3}$ [1- cos n π] (d) $\frac{-16}{n^3\pi^3}$ [1- cos n π]

Q.18 The inner product of u = (-2, 4, 0, -3) and v = (3, 4, 6, -4) are

a) 20 b) 22 c) 16 d) 0

Q.19 If $\|u+v\|$ =6 and $\|u-v\|$ =4, u .v is

a) 0 b) 2 c) 5 d) 1

Q.20 The angle between the vectors u = (6, 2, 2) and v = (3, 0, -9) are

a) 0 b) $\pi/2$ c) π d) 1

Q.21. Find L(y) of differential Equation $(D^2+2D+5)y = e^{-t}\sin t, with\ y(0)=0, y'(0)=1$

(a) $\frac{(s^2+2s+3)}{(s^2+2s+5)(s^2+2s+2)}$ (b) $\frac{(s^2-2s+5)}{(s^2+2s+3)(s^2+2s+2)}$

(c) $\frac{(s^2-2s+3)}{(s^2-2s+5)(s^2-2s+2)}$ (d) $\frac{(s^2+2s+3)}{(s^2+5)(s^2+2)}$

Q.22. Find $L^{-1}\left[\frac{s+2}{s^2-4s+13}\right]$

(a) $e^{2t}\cos 3t + 4\,e^{2t}\sin 3t$ (b) $3\,e^{2t}\cos 3t + 4\,e^{2t}\sin 3t$

(c) $e^{2t}\cos 3t + \frac{4}{3}\,e^{2t}\sin 3t$ (d) $e^{-2t}\cos 3t + \frac{4}{3}\,e^{-2t}\sin 3t$

Q.23. Find $L[te^{3t}\sin 4t]$

(a) $\frac{8(s-3)}{(s^2-6s+25)^2}$ (b) $\frac{(2s-6)}{(s^2-6s+10)^2}$

(c) $\frac{2(s+3)}{(s^2-6s+25)^2}$ (d) $\frac{8(s-3)}{(s^2-6s+10)^2}$

Q.24 Find the Z-Transform of {ke^{-ak}}, k≥ 0.

(a) $\frac{a\,e^{a}.z}{(e^{a}.z-1)^2}$ (b) $\frac{e^{a}.z-1}{(e^{a}.z-1)^2}$

(c) $\frac{k\,e^{a}.z}{(e^{a}.z-1)^2}$ (d) $\frac{e^{a}.z}{(e^{a}.z-1)^2}$

Q.25 Find the inverse Z-transform of

$F(z)=\frac{1}{(z-3)(z-2)}$ if R.O.C. is $|z|<2$

(a) $Z^{-1}[F(z)]=-3^{k-1}+2^{k-1}\ ,\ \ k\le 0$

(b) $Z^{-1}[F(z)]=3^{k-1}+2^{k-1}\ ,\ \ k\le 0$

(c) $Z^{-1}[F(z)]=-3^{k-1}-2^{k-1}\ ,\ \ k\le 0$

(d) $Z^{-1}[F(z)]=-3^{k-1}+2^{k-1}\ ,\ \ k\ge 0$

Q.26 Let u=(4,1,2,3), v=(0,3,8,-2) and w=(3,1,2,2), Find $\|3u-5v+w\|$

(a) $\sqrt{1811}$ (b) $\sqrt{77}$

(c) $\sqrt{1801}$ (d) $\sqrt{1411}$

Q.27 Find Euclidean distance between u=(3,-5,4) and v=(6,2,-1).

(a) $\sqrt{83}$ (b) $\sqrt{77}$

(c) $\sqrt{183}$ (d) 1

Q.28 L [sin at], s>0 is

(a) $\frac{a}{s^2 - a^2}$ (b) $\frac{a}{s^2 + a^2}$

(c) $\frac{s}{s^2 + a^2}$ (d) $\frac{s}{s^2 - a^2}$

Q.29. Which property is not follow by WAVELET transfrm

(a) Convert signal from Time domain to frequency domain

(b) Gives complete 3-dimenstion information about any signal

(c) high time resolution

(d) high frequency resolution

Q.30 How many types of Wavelet transforms are

a) 0 b) 2 c) 5 d) 3