BSS CLASS 5

Q Evaluate :-

① $\int_{-3}^{\infty} (t+1)\,\delta t\,dt$

② $\int_{-3}^{-5} (t^2+1)\,\delta(t)\,dt$

③ $\int_{-\infty}^{-3} e^{-at}\,u(t)\,dt$

④ $\int_{-\infty}^{\infty} e^{(2-t)}\,\delta(t-2)\,dt$

① Sol^n

$$\int_{-3}^{\alpha} (t+1)\,\delta t \; dt$$

$$= \{ t+1 \Big|_{t=0}$$

$$= 1$$

NB. When you are having an unit impulse function, the integration limits must contain zero

② Sol^n

$$\int_{-3}^{-5} (t^2+1)\,\delta(t)\,dt$$

$$= 0$$

(3) $$\int_{-\alpha}^{-3} e^{-at}\, u(t)\, dt$$

$= 0$

u(t) have value from 0 to α

∵ all '−'ve value

∴ '0'.

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$$\int_{-\infty}^{\infty} e^{(2-t)}\,\delta(t-2)\,dt$$

$$= e^{2-t}\Big|_{t=2}$$

$$= e^{0} = 1$$

Q. Find the following summations:—

(a) $\sum_{n=-\infty}^{\infty} e^{3n} \delta(n-3)$

Sol^n:- we know $\delta(n-3) = \begin{cases} 1, & n=3 \\ 0, & \text{elsewhere} \end{cases}$

~~Given~~

$\therefore \sum_{n=-\infty}^{\infty} e^{3n} \delta(n-3) = \left[e^{3n}\right]_{n=3} = e^{9}$

(b) $\sum_{n=-\infty}^{\infty} \delta(n-2) \cos 3n$

(c) $\sum_{n=-\infty}^{\infty} n^2 \delta(n+4)$

(d) $\sum_{n=-\infty}^{\infty} \delta(n-2) e^{n^2}$

(e) $\sum_{n=0}^{\infty} \delta(n+1) 4^n$

(b) $$\sum_{n=-\infty}^{\infty} \delta(n-2)\cos 3n = \left[\cos 3n\right]_{n=2} = \cos 6.$$

(c) $$\sum_{n=-\infty}^{\infty} n^2 \delta(n+4) = \left[n^2\right]_{n=-4} = 16$$

(d) $$\sum_{n=-\infty}^{\infty} \delta(n-2) e^{n^2} = \left[e^{n^2}\right]_{n=2} = e^{2^2} = e^4$$

(e) $\cancel{\delta(n+1)}$

$$\sum_{n=0}^{\infty} \delta(n+1) 4^n = 0.$$

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Q. Evaluate.

ⓐ $\int_{-\infty}^{\infty} (t-1)^2 \delta(t-1)\, dt$

ⓑ $\sum_{n=-\infty}^{\infty} \delta(n) \sin 2n$

ⓒ $\sum_{n=-\infty}^{\infty} n^2 \delta(n-3)$

ⓓ $\int_{0}^{\infty} t^3 \delta(t-2)\, dt$

ⓔ $\int_{-\infty}^{\infty} \delta(t+3)\, e^{-2t}\, dt$

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