Total No. of Printed Pages:03

SUBJECT CODE NO:- H-1184
FACULTY OF SCIENCE AND TECHNOLOGY
S.Y. B. Tech (All)
Engineering Mathematics-III
(Revised)

[Time: Three Hours] **[Max. Marks: 80]**

Please check whether you have got the right question paper.

N.B
1) Q. No. 1 and Q. No. 6 are compulsory.
2) From section A solve any two questions from the remaining Q. No. 2, 3, 4 and 5.
3) From section B solve any two questions from the remaining Q. No. 7, 8, 9 and 10.
4) Assume suitable data, if necessary.

Section A

Q.1 Solve any five. (Each for two marks) 10

a) Find complementary function for: $(3D^2 + 2D)y = 2^x$ $c_1 e^{-2/3x} + c_2$

b) Find particular Integral for: $(D^2 - 2D + 4)y = e^x \cos x$ $\frac{e^x \cos x}{2}$

c) If $X = e^{ax}\phi(x)$, where $\phi(x)$ is any function of x, then $P.I =$ ...e^{ax}.... $\frac{1}{f(D+a)}$ $\phi(x)$

d) In civil application, Beam is fixed at both the ends, then initial conditions are...i) $y=0, x=0$
ii) $y=0, x=l$

e) If $(x+3y)i + (y-2z)j + (az+x)k$ is solenoidal find the value of a. Div $\bar{V} = 0$, $\nabla\cdot\bar{V} = 0$
$a = -2$

f) Write a differential equation for L-R circuit. $L\frac{di}{dt} + Ri$ = applied e.m.f.

g) $\nabla\cdot(\bar{A}\times\bar{B}) =$ ...$\bar{B}$ curl $\bar{A}$ − $\bar{A}$ curl $\bar{B}$
$= \bar{B}\cdot(\nabla\times\bar{A}) - \bar{A}\cdot(\nabla\times\bar{B})$

h) Show that $\bar{F} = (\sin y + z)i + (x\cos y - z)j + (x-y)k$ is irrotational.

Q.2 a) Solve: $(D^2 - 4D + 3)y = e^x \cos 2x$ 05

b) An electric circuit consists of an inductance L, a condenser of capacitance C, and e. m. f. $E = E_0 \sin wt$.
If $w = \frac{1}{\sqrt{LC}}$ and initially at $t = 0$, $q = q_0$, and current $i = i_0$. Find the charge at any time t. 05

c) Find the tangential and normal components of acceleration at any time t of a particle whose position vector at any time t is $x = e^t \cos t, y = e^t \sin t$ 05

Q.3 a) Solve : $(D^4 - 1)y = \cos hx \cos x$ 05

b) A horizontal simply supported beam of length l bends under its own weight w kg/m satisfies $EI\frac{d^2y}{dx^2} = \frac{wx^2}{2} - \frac{wlx}{2}$ where y is deflection. Find maximum deflection. 05

c) Find the radial and transverse components of acceleration at $t = \pi$ for the curve $r = 2 + 3\cos\theta$ and $\theta = \sin t$ 05

$r = 2 + 3\cos t$ & $\theta = \sin t$

$a_r = 4$ $a_t = 0$

Q.4 a) Solve: $(D^2 + 3D + 2)y = e^{e^x}$ 05

b) Solve: $(x^2D^2 + xD)y = \log x$ 05

c) Find the directional derivative of $\phi = e^{2x}\cos yz$ at the origin in the direction of the tangent to the curve $x = a\sin t$, $y = a\cos t$, $z = at$ at $t = \frac{\pi}{4}$ 05

Q.5 a) Solve: $(D^2 - 4D + 4)y = \frac{e^{2x}}{x}$ by variation of parameter method. 05

b) Solve: $(1 + 2x)^2\frac{d^2y}{dx^2} - 6(1 + 2x)\frac{dy}{dx} + 16y = 8(1 + 2x)^2$ 05

c) Find $div\bar{F}$ and $curl\bar{F}$ if $\bar{F} = grad\,(x^2 + xy + z^2)$. 05

Section B

Q.6 Solve any five (Each for two marks) 10

a) $L[f(t-a)u(t-a)] = \ldots\ldots\ldots$

b) If $L[F(t)] = F(s)$ then $L[t^n f(t)] = \ldots\ldots$

c) If $L^{-1}[F(s)] = f(t)$ then $L^{-1}[\int_s^\infty F(s)ds] = \ldots\ldots$

d) $L^{-1}\left[\frac{1}{(3s+1)^2}\right] = \ldots\ldots$

e) Find Fourier cosine transform of $f(x) = e^x,\ 0 < x < \pi$

f) Write a formula for Fourier sine transform.

14

g) Find mode of the following data:

Age	0-6	6-12	12-18	18-24	24-30	30-36	36-42
Freq.	6	11	25	35	18	12	6

h) If data is not standard, then mode =........

Q.7

a) Find the Laplace transform of: $\frac{\cos at - \cos bt}{t}$ 05

b) Find Fourier transform of: $f(x) = 1, \quad 0 < x < a$
$= 0, \quad otherwise$ 05

c) Calculate the coefficient of variation for the following data: 05

class	1-10	11-20	21-30	31-40	41-50	51-60
frequency	3	16	26	31	16	8

Q.8

?

a) Find Laplace transform of: $\int_0^\infty e^{-2t} t^2 \sin 3t\, dt$ 05

b) Find the Fourier sine transform of $e^{-|x|}$ hence deduce that $\int_0^\infty \frac{x \sin mx}{1+x^2} dx = \frac{\pi}{2} e^{-m}$ 05

c) Find: $L^{-1}\left[\frac{1}{2}\log\left(\frac{s^2+36}{s^2+16}\right)\right]$ 05

Q.9

a) Express $f(t)$ in terms of Heaviside unit step function hence find its Laplace Transform: 05
$f(t) = \cos t \quad ; 0 < t < \pi$
$= \cos 2t \quad ; \pi < t < 2\pi$
$= \cos 3t \quad , t > 2\pi$

b) Find Fourier cosine transform of: $f(x) = 1, \quad 0 \le x \le a$
$= 0, \quad x > a$ 05

c) Find the median for the data: 05

No. days absent	5	10	15	20	25	30	35	40	45
No. of student	2	10	13	18	20	25	30	33	35

Q.10

a) Solve: $\frac{d^2y}{dt^2} + 2\frac{dy}{dt} + y = 3t\, e^{-t}$ if $y(0) = 4,\ y'(0) = 2$ 05

b) Find inverse Laplace transform of: $log\sqrt{\frac{s-1}{s+1}}$ 05

c) Find the Fourier transform of: $f(x) = \frac{\pi}{2}\cos x, \quad |x| \le \pi$
$= 0\ ,\ |x| \ge \pi$ 05

Dr. Suhas Patil
Asst. Prof
MIT(T)

Total No. of Printed Pages:3

SUBJECT CODE NO:- H-1184
FACULTY OF SCIENCE AND TECHNOLOGY
S.Y. B.Tech. (All)
Engineering Mathematics-III
(REVISED)

[Time: Three Hours] **[Max.Marks: 80]**

N.B Please check whether you have got the right question paper.

1) Q.No.1 and Q.No.6 are compulsory.
2) From Section A, solve any two questions from the remaining Q.No.2, 3, 4 and 5.
3) Form Section B; solve any two questions from the remaining Q.No.7, 8, 9 and 10.
4) Figures to the right indicate full marks.
5) Assume suitable data, if necessary.

Section A

Q.1 Solve any five(Each for two marks) 10

a) If X=x.v then P.I= ....
b) Convert Cauchy's differential equation to linear differential equation $x^2\frac{d^2y}{dx^2} = 2y + \frac{1}{x}$.
c) CF= .... if $(D^3 - D^2 - 18)y = 0$.
d) A vector $\bar{F} = (x + 2y + az)i + (bx - 3y - z)j + (4x + cy + 2z)k$ is irrotational then find a, b, c.
e) Find the velocity of a particle moving along the curve $x = 2\sin 3t,\ y = 2\cos 3t,\ z = 8t$ & also their magnitudes.
f) Define scalar point function.
g) Write a differential equation for R-C circuit.
h) In civil application, Beam is fixed at one end then initial conditions are..........

Q.2

a) Solve $(D^2 - 2D + 4)y = \cosh x + e^{3x}$. 05

b) The differential equation satisfied by a beam uniformly loaded (W kg/m) with one end fixed & the second end subjected to tensile force P, is given by $EI\frac{d^2y}{dx^2} = PY - \frac{1}{2}wx^2$. Show that the elastic curve for the beam with condition$Y = 0 = \frac{dy}{dx}$ at $x = 0$ is given by $Y=\frac{W}{pn^2}(1-\cosh nx)+\frac{wx^2}{2P}$, where $n^2=\frac{P}{EI}$. 05

c) Find the radial and transverse components of a particle describing with angular velocity ω for the curve $r = ae^{b\theta}$. 05

Q.3

a) Solve $(D^2 - 6D + 9)y = \frac{e^{3x}}{\sec x}$. 05

b) An electric circuit consists of an inductance of 0.1 henry, a resistance of 20ohms & a condenser of capacitance 25 micro-farads. Find the charge q and the current i at any time t, given that at t=0, q=0.05 coulomb, $i = \frac{dq}{dt} = 0$ when t=0. 05

52388D92876A0608FECBA23B4A469ED0

Examination NOV/DEC 2018

H-1184

c) Find tangential and normal component of acceleration of a particle whose position is given by $x = a\cos t, y = a\sin t$. 05

Q.4

a) Solve $(D^2 + D)y = \frac{1}{1+e^x}$. By using method of variation of parameter. 05

b) Find the directional derivative of $\phi = e^{2x-y+z}$ at (1, 1,-1) in the direction towards the point (-3, 5, 6). 05

c) Solve $(2x+1)\frac{d^2y}{dx^2} - \frac{dy}{dx} + \frac{y}{(2x+1)} = \frac{3x+4}{(2x+1)}$. 05

Q.5

a) Solve $r^2\frac{d^2\theta}{dr^2} + r\frac{d\theta}{dr} - \theta = r\log r$. 05

b) Find $\nabla^2\left[\nabla\left(\frac{\bar{r}}{r^2}\right)\right]$. 05

c) Solve $(D^2 - 5D + 6)y = e^{3x}\sec^2 x(1 + 2\tan x)$. 05

Section B

Q.6 Solve any five(Each for two marks) 10

a) $L\{f(t)f(t-a)\} = \ldots\ldots\ldots\ldots$

b) If $L^{-1}\{\bar{f}(s)\} = f(t)$ then $L^{-1}\{\int_s^\infty \bar{f}(s)ds\} = \ldots\ldots\ldots$

c) Find $L\{e^{-2t}(3\cos 6t - 5\sin 6t)\}$.

d) Find $L^{-1}\left\{\frac{s}{4s^2-25}\right\}$.

e) Find mode for the following data

Class	0-5	5-10	10-15	15-20	20-25	25-30	30-35
frequency	7	11	9	21	16	15	8

f) Write a formula for furrier cosine transform.

g) In a moderately asymmetrical distribution if the mean & median values are 78 and 72 respectively, find the mode.

h) Find Fourier sine transform of $f(x) = x, 0 < x < \pi$.

Q.7

a) Find $L\{t^2\cosh 3t\}$. 05

b) Find Fourier sine transform of $f(x) = \frac{1}{x}$. 05

c) Calculate coefficient of variation for the following. 05

Marks(more than)	0	10	20	30	40	50	60	70
No of student	100	90	75	50	20	10	5	0

Examination NOV/DEC 2018

H-1184

Q.8

a) Find $L\left\{e^{-t}\int_0^t \sin(2t+3)dt\right\}$. 05

b) Find the Fourier sine integral for $f(x) = e^{-Bx}(B > 0)$. Hence show that 05

$$\int_0^{\infty} \frac{\lambda \sin dx}{B^2+\lambda^2} d\lambda = \frac{\pi}{2} e^{-Bx}.$$

c) Find quartile deviation and its coefficient for the following data 05

Class	11-15	16-20	21-25	26-30	31-35
Frequency	10	17	22	31	42

Q.9

a) Find the Laplace Transform of half wave rectified sine wave defined as: 05

$$f(t) = a \sin pt \quad , o < t < \frac{\pi}{p}.$$

$$= 0 \quad , \frac{\pi}{P} < t < \frac{2\pi}{P}.$$

b) Find inverse Laplace transform by using convolution theorem of $\frac{s}{(S^2+a^2)^2}$. 05

c) Using Fourier integral representation, show that $\int_0^{\infty} \frac{\lambda \sin \lambda x}{\lambda^2+a^2} d\lambda = \frac{\pi}{2} e^{-ax}, \; x > 0.$ 05

Q.10

a) Find the Fourier transformer of $f(x) = e^{\frac{-x^2}{2}}, -\infty < x < \infty.$ 05

b) Find $L\{e^{-t}[1 - H(t-2)]\}$. 05

c) For a cantilever with uniform load ω per unit length $EI\frac{d^2y}{dx^2} = \frac{\omega}{2}(l-x)^2$ given that $y(0) = 0, y'(0) = 0$. Find deflection. 05

Dr. Suhas Patil
Asst. Prof
MIT(T)

Scanned by CamScanner

May/ June- 2018

Revised.
May | June 2018

Dr. Suhas Patil.
MIT(T)

Total No. of Printed Pages:3

SUBJECT CODE NO:- H-1184
FACULTY OF ENGINEERING AND TECHNOLOGY
S. Y. B. Tech. (All)
Engineering Mathematics-III
(REVISED)

[Time: Three Hours] [Max.Marks: 80]

Please check whether you have got the right question paper.

N.B
1) Q.No.1 and Q.No.6 are compulsory.
2) From Section A solve any two questions from the reaming Q.No. 2, 3, 4 and 5
3) From Section B solve any two questions from the reaming Q.No. 7, 8, 9 and 10.
4) Figures to the right indicate full marks.
5) Assume suitable data, if necessary.

Section A

Q.1 Solve any Five (Each for two marks)

a) CF= ....if $(D^4-1)\theta=0$.

b) Convert Cauchy's differential equation to linear differential equation.
$$r^2\frac{d^2\theta}{dr^2}+r\frac{d\theta}{dr}-\theta=r\log r.$$

c) Find P.I. for $(D^2+2)y=e^{2x}\cos 3x$.

d) If $\bar{A}=(ax+3y+4z)i+(x-2y+3z)j+(3x+2y-z)k$ is solenoidal, then determine the constant a.

e) Find the acceleration of a particle moving along the curve $x=2\sin 3t$, $y=2\cos 3t$, $z=8t$& also their magnitudes.

f) Define Scalar point function.

g) If $L\frac{di}{dt}+\frac{1}{c}\int i\,dt=E\sin pt$ then CF= ....

h) In civil application, Beam is fixed at two ends then initial conditions are.........

Q.2 a) Solve $(D^2+13D+36)y=e^{-4x}+\sinh x$.

b) A light horizontal struct of length l, is freely pinned at both the end. It is under the action of equal & opposite compressive forces p at its ends and it carries a load ω at its centre, then for $0<x<\frac{l}{2}$, $EI\frac{d^2y}{dx^2}+py+\frac{\omega}{2}x=0$. Also $y=0$ at $x=0$ & $\frac{dy}{dx}=0$ at $x=\frac{l}{2}$. Prove that $y=\frac{\omega}{2p}\left[\frac{\sin nx}{n\cos\frac{nl}{2}}-x\right]$, when $n^2=\frac{P}{EI}$.

c) Find radial & transverse component of velocity and acceleration of a particle
$$r=a(1-\cos\theta)\left(\omega=\frac{d\theta}{dt}\right).$$

Q.3	a) Solve $(D^2+5D+4)y = x^2+7x+9$.	05
	b) Solve $\frac{d^2q}{dt^2}+10^6q = 100\sin 500t$. It $q=0, \frac{dq}{dt}=0$. When $t=0$. Find the value of i when. $t=\frac{1}{100}$.	05
	c) Find tangential and normal component of acceleration of a particle whose position is given by $\bar{r} = 3\cos t i + 3\sin t j + 4 + k$.	05
Q.4	a) Solve $(D^2-1)y = e^{-x}\sin e^{-x} + \cos e^{-x}$ by using method of variation of parameter.	05
	b) Find the directional derivative of $\phi = e^{2x}\cos yz$ at $(0,0,0)$ in the direction tangent to the curve $\bar{r} = a\sin t i + a\cos t j + a + k$ at $t=\frac{\pi}{4}$.	05
	c) Solve $(x+3)^2\frac{d^2y}{dx^2} - 4(x+3)\frac{dy}{dx} + 6y = \log(2x+3)$.	05
Q.5	a) Solve $x^2\frac{d^2y}{dx^2} - x\frac{dy}{dx} + 4y = \cos(\log x) + x\sin(\log x)$.	05
	b) Show that $(\bar{a}.\nabla)\bar{r} = \bar{a}$.	05
	c) Solve $(D^2+3D+2)y = e^{e^x}$ by using General method.	05

Section B

Q.6 Solve any Five(Each for two marks) — 10

a) If $L\{f(t)\} = f(s)$ then $L\left\{\int_0^t f(t)dt\right\} =$ ………………

b) $L^{-1}\left\{\frac{e^{-as}}{s}\right\} =$ ……………………

c) Find $L\{t^3e^{-3t}\}$.

d) Find $L^{-1}\left\{\frac{s}{(s+1)^3}\right\}$.

e) Find mode for the following data

Class	0-5	5-10	10-15	15-20	20-25	25-30	30-35
frequency	7	11	9	21	16	15	8

f) Write a formula for integral transform.

g) In a moderately asymmetrical distribution if the mean & median values are 69 and 61 respectively, find the mode.

h) Find Fourier cosine transform of
$f(x) = x, \quad a < x < \infty$.

Q.7

a) Find $L\left\{\frac{\sinh t}{t}\right\}$. — 05

b) Find the Fourier sine transform of $f(x) = 2e^{-5x} + 5e^{-2x}$. — 05

c) Find the value of coefficient of variation from the following data — 05

Class	5	10	15	20	25	30	35	40	45
frequency	29	224	465	582	634	644	650	653	655

Q.8 a) Find $L\left\{\sinh t \int_0^t t^2 e^{-t} dt\right\}$. 05

b) Find the Fourier integral transform of 05

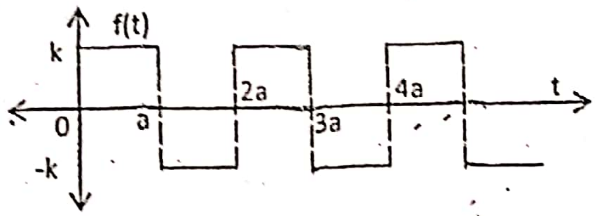
$$f(x) = 1, \quad |x| < 1$$
$$= 0, \quad |x| > 1.$$

And hence evaluate $\int_0^{\infty} \frac{\sin\lambda}{\lambda} d\lambda$.

c) Compute the quartile deviation for the following data. 05

Group	4-8	8-12	12-16	16-20	20-24	24-28	28-32	32-36	36-40
Frequency	6	10	18	30	15	12	10	6	2

Q.9 a) Find Laplace transform of square wave function given in figure. 05



$f(t) = k \quad 0 < t < a$

$= -k \quad a < t < 2a$

b) Find inverse Laplace transform of $\frac{1}{(s+1)(s^2+1)}$ by using convolution theorem. 05

c) Using Fourier integral representation, show that 05

$$\int_0^{\infty} \frac{\sin\pi\lambda \sin\lambda x}{1-\lambda^2} d\lambda = \frac{\pi}{2}\sin x, 0 < x < \pi$$
$$= 0 \qquad , x > \pi.$$

Q.10 a) Find the cosine transform of $f(x) = e^{-x^2}$. 05

b). Find $L\{e^{-t}H(t-\pi)\}$. 05

c) Solve $\frac{d^2y}{dt^2} + y = 6\cos 2t$. 05

Given $Y(0) = 3, Y'(0) = 1$.

N/D-2017 Revised. N/D-2017.

Dr. Suhas Patil.
MIT (T).

Total No. of Printed Pages:4

SUBJECT CODE NO: E-1235
FACULTY OF ENGINEERING AND TECHNOLOGY
S.Y.B.Tech. (All) Examination Nov/Dec 2017
Engineering Mathematics-III
Revised

[Time: Three Hours] [Max. Marks:80]

Please check whether you have got the right question paper.

N.B
1) Q.no. 1 and Q.no.6 are compulsory
2) From section A solve any two question from the remaing Q.no.2, 3, 4 and 5
3) From section B, solve any two questions from the remaining Q.no.7, 8, 9 and 10
4) Figures to the right indicate full marks.
5) Assume suitable data if necessary.

Section A

Q.1 Solve any five (each for two marks) 10

a) If $\frac{d^2x}{dt^2} + 3a\frac{dx}{dt} - 4a^2x = 0$ *then*
CF = -----------

b) If $r^2\frac{d^2\theta}{dr^2} + r\frac{d\theta}{dr} - \theta = r\ logr\ is\ a$
Cauchy's linear differential equation then it get converted into linear differential equation-
------

c) Find P.I for $(D2 + 1)\,y = x\,coshx$

d) If $(x+3y)i + (y-2z)j + (az+x)k$ is solenoidal find the value of a

e) Find the velocity and acceleration of a particle moving along the curve x = a cost,
y = b sin t, and $Z = ct$

f) Define vector point function

g) Write a differential equation for R-C circuit

h) In civil application Beam is free at both ends then initial conditions are ---------

Q.2 a) Solve $(D^4 + 2D^3 + 3D^2 + 2D + 1)y = e^{-2x+4}$ 05

b) A uniform beam of length l is supported at its ends & bends under its own weigth and end trust P, the support being at the same horizontal level , the equation of the bending moment is given by 05

$$EI\frac{d^2y}{dx^2} + py = \frac{w}{2}(x^2 - lx)$$

The origin being at one end of the beam obtain the solution of this equation given that y=o when x =0 , x = l when $n^2 = \frac{P}{EI}$

c) Find the radial and transverse components of a particle describing with angular velocity w for the curve $r = ae^{b\theta}$ 05

Q.3 a) Solve $(D^2 + 2D + 2)y = e^{-x}\sin x$ 05

b) An e.m.f E sinpt is applied at t=o to a circuit containing a condenser C and inductance L in series the current i satisfies the equation $L\frac{di}{dt} + \frac{1}{c}\int i\,dt = E\sin pt$. if $P^2 = \frac{1}{LC}$ & initially the current i and charge q are zero show that the current at any time t is given by $\frac{E}{2L} + \sin pt$ (Where $i = -\frac{dq}{dt}$) 05

c) Find tangential and normal component of acceleration of a particle whose position is given by $x = t^3 + 1, y = t^2$ and $z = t$ at $t = 1$ 05

Q.4 a) Solve $(D^2 + 3D + 2)y = e^{e^x}$ by using method of variation of parameter 05

b) Find the directional derivative if $\phi = xy^2 + yz^2$ at $(2, -1, 1)$ in the direction normal to the surface $x \log z - y^2 = -4$ at $(-1, 2, 1)$ 05

c) Solve $(2x+3)^2 \frac{d^2y}{dx^2} + (2x+3)\frac{dy}{dx} - y = 4x + 5$ 05

Q.5 a) Solve $x^2\frac{d^2y}{dx^2} = 2y + \frac{1}{x}$ 05

b) Prove that $\nabla(\bar{a} - \bar{r}) = a$ 05

c) Solve $(D^2 - D - 2)y = 2\log x + \frac{1}{x} + \frac{1}{x^2}$ by using general method 05

Section –B

Q.6 Solve any five (each for two marks) 10

a) If $L\{f(t)\} = \bar{f}(s)$ then $L\{f(at)\}$ = ---------

b) If $L^{-1}\{\bar{f}(s)\} = f(t)$ then $L^{-1}\left\{\frac{d}{ds}\bar{f}(s)\right\}$ = ---------

c) Find $L\{(t+2)^2\}$

d) Find $L^{-1}\left\{\frac{e^{-\pi s}}{sta}\right\}$

e) Find mode for the following data

Class	0-5	5-10	10-15	15-20	20-25	25-30	30-35
Frequency	7	11	9	21	16	15	28

f) Write a formula for Fourier cosine integral transform

2017

g) In a moderately asymmetrical distribution if the mean of median values are 87, and 80 respectively find the mode

h) Find Fourier sine transform of

$f(x) = e^{x} \quad 0 < x < \pi$

Q.7 a) Find $L\left\{\frac{\cos at - \cos bt}{t}\right\}$ 05

b) Find Fourier cosine transform of 05

$$f(x) = 1, \quad 0 \le x \le a$$
$$= 0, \quad x > a$$

c) Calculate standard deviation of coefficient of variation for the following data 05

Class	10-30	30-50	50-70	70-90	90-110	110-130	130-150
F	14	59	101	61	28	17	4

Q.8 a) Find $L\{\int_0^t t.e^{-4t} \cos 3t \ dt\}$ 05

b) Find fourier integral representation for 05

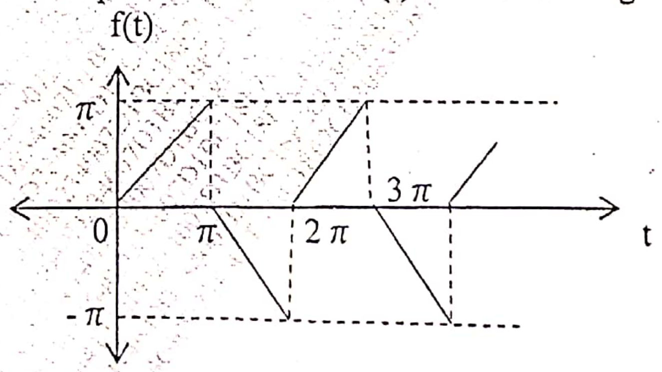
$$f(x) = 1 - x^2 \quad , |x| < 1$$
$$= 0 \quad , \quad |x| > 1$$

And hence evaluate $\int_0^{\infty} \frac{(x\cos x - \sin x)}{x^3} \cos\frac{x}{2} dx$

c) Calculate the quartile deviation for the following data 05

Marks	0-10	10-20	20-30	30-40	40-50
No .of student	5	7	10	16	11

Q.9 Find Laplace transform of f(t) as shown in figure 05



14414640D234007D1BC18F2CD30B5D28

a) Find inverse Laplace transform of $\frac{1}{s(s^2+a^2)}$ by using convolution theorem 05

b) Using fourier integral representation show that $\int_0^\infty \frac{\cos\frac{\pi}{2}\lambda \cos dx}{1-\lambda^2} d\lambda = \frac{\pi}{2}\cos x, \; |x| \le \frac{\pi}{2}$ 05

$= 0 \quad , \quad x$

Q.10 a) Find the complex Fourier transform of $e^{-|x|}$ 05

b) Express the following function in terms of Heaviside unit step function hence find Laplace transform 05

$$\begin{aligned} f(t) &= \sin t & 0 < t < \pi \\ &= \sin 2t & \pi < t < 2\pi \\ &= \sin 3t & t > 2\pi \end{aligned}$$

c) A particle is moving along x – axis decounding to the law $\frac{d^2x}{dt^2} + 6\frac{dx}{dt} + 25x = 0$ 05

If the particle is started at x =0 with an initial velocity 12m/sec to the left determine x in terms of t.