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06MAT21

Second Semester B.E. Degree Examination, June/July 2011

Engineering Mathematics - II

Time: 3 hrs. Max. Marks:100

Note: 1. ***Answer any FIVE full questions, choosing at least two from each part.***
2. ***Answer all objective type questions only in OMR sheet page 5 of the answer booklet.***
3. ***Answer to objective type questions on sheets other than OMR will not be valued.***

PART – A

1 a. Select the correct answer :

i) An expression for the radius of curvature in parametric form is

A) $\rho = \frac{(1+y_1^2)^{\frac{3}{2}}}{y_2}$ B) $\rho = \frac{(1+y_1)^{\frac{3}{2}}}{y_2^2}$ C) $\rho = \left\{\frac{(\dot{x}^2+\dot{y}^2)^{\frac{3}{2}}}{\dot{x}\ddot{y}-\dot{y}\ddot{x}}\right\}$ D) None of these

ii) The curvature of a circle is a

A) constant B) variable C) 1 D) 0

iii) If a function f(x) is continuous in [a, b] then $\phi(x) = f(x) - kx$ is also

A) differentiable B) continuous C) Both A and B D) None of these

iv) If $y = \frac{x}{\sin x}$, then $\frac{dy}{dx}$ at x = 0 is

A) 1 B) 0 C) Both A and B D) 2 **(04 Marks)**

b. Find the radius of curvature for the curve $y^2 = \frac{4a^2(2a-x)}{x}$, where the curve meets the x-axis. **(04 Marks)**

c. State and prove Cauchy's mean value theorem. **(06 Marks)**

d. Obtain the Maclaurin's series expansion of log (1 + e^x), upto 4[th] degree terms. **(06 Marks)**

2 a. Select the correct answer :

i) The value of $\lim_{x \to 0} \frac{\log x}{\operatorname{cosec} x}$ is

A) 0 B) 1 C) −1 D) 2

ii) If f′(a) = 0 and g′(a) = 0, then we have $\lim_{x \to a} \frac{f(x)}{g(x)}$ is equal to

A) $\lim_{x \to a} \frac{f'(x)}{g'(x)}$ B) $\lim_{x \to a} \frac{f''(x)}{g''(x)}$ C) $\lim_{x \to a} \frac{f'(x)}{g''(x)}$ D) None of these

iii) The necessary conditions for f(x, y) = 0 to have extremum are

A) $f_{xy} = 0 = f_{yx}$ B) $f_{xx} = 0 = f_{yy}$ C) $f_x = 0 = f_y$ D) None of these

iv) The point (a, b) is called a stationary point and the value f(a, b) is called

A) stationary point B) stationary value C) maximum value D) minimum value **(04 Marks)**

b. Evaluate : $\lim_{x \to 0} \frac{\tan x - x}{x^2 \tan x}$. **(04 Marks)**

c. Examine the function $f(x,y) = x^4 + y^4 - 2(x-y)^2$ for extreme values. **(06 Marks)**

d. If xyz = 8, find the values of x, y, z for which $u = \frac{5xyz}{x+2y+4z}$ is a maximum. **(06 Marks)**

3 a. Select the correct answer :

i) The value of $\int_0^1 \int_x^{\sqrt{x}} xy\ dydx$ is

A) $\frac{1}{24}$ B) $\frac{1}{48}$ C) $\frac{1}{25}$ D) $\frac{1}{50}$

ii) $I = \int_0^1 \int_0^{1-x} dx\,dy$ represents the area of triangle with vertices.

A) (0, 0) (0, 1) (1, 0) B) (0, 0) (0, 1)
C) Both A and B D) None of these

iii) The function $\sqrt{n+1}$ is defined for all

A) Positive integers
B) Real numbers
C) Both A and B
D) Real numbers except for negative fractions

iv) The value of $\beta\left(\frac{1}{2},\frac{1}{2}\right)$ is

A) 3.1416 B) 1.1416 C) 2.1416 D) None of these

(04 Marks)

b. Change the order of integration and hence evaluate $\int_0^1 \int_0^{\sqrt{1-x^2}} y^2\ dxdy$. (04 Marks)

c. Prove that $\beta(m,n) = \frac{\sqrt{m}\,.\sqrt{n}}{\sqrt{m+n}}$. (06 Marks)

d. Show that $\int_0^1 \frac{x^2}{\sqrt{1-x^4}} \times \int_0^1 \frac{dx}{\sqrt{1+x^4}} = \frac{\pi}{4\sqrt{2}}$. (06 Marks)

4 a. Select the correct answer :

i) If $\vec{F} = x^2 i + xyj$, then $\int_C \vec{F}.d\vec{r}$, from (0, 0) to (1, 1) along the line y = x is

A) $\frac{3}{2}$ B) $\frac{2}{3}$ C) 2 D) 4

ii) Green's theorem in the plane is applicable to

A) xy - plane B) yz - plane C) xz - plane D) All of these

iii) With usual notations Gauss-divergence theorem state that $\iiint_V \text{div}\,\vec{F}\,dv$ is equal to

A) $\iint_S \vec{F}\cdot\hat{n}\,ds$ B) $\iint_S \vec{F}\times\hat{n}\,ds$ C) $\iint_S \vec{F}\times\hat{n}.ds$ D) None of these

iv) Cylindrical polar coordinates (ρ, φ, z) are given by

A) $x = \rho\cos\phi \quad y = \rho\sin\phi \quad z = 1$ B) $x = \cos\phi \quad y = \rho\sin\phi \quad z = \rho$
C) $x = \rho\cos\phi \quad y = \rho\sin\phi \quad z = z$ D) None of these (04 Marks)

b. Find the total work done by the force represented by $\vec{F} = 3xyi - yj + 2xzk$ in moving a particle around the circle $x^2 + y^2 = 4$. (04 Marks)

c. State and prove Green's theorem on the plane. (06 Marks)

d. Express divergence of $\vec{F}$, where $\vec{F} = xi - yj + zk$ in spherical polar coordinates. (06 Marks)

PART – B

5 a. Select the correct answer :

i) The differential equation $\frac{dy}{dx} = y^3$ is

A) Linear B) Quasi linear C) Non-linear D) None of these

ii) The P.I of $y'' + y = \cos x$ is

A) $\frac{1}{2}\sin x$ B) $\frac{1}{2}\cos x$ C) $\frac{1}{2}x\cos x$ D) $\frac{1}{2}x\sin x$

iii) The P.I. of $(D^2 + 3D + 2)y = 1 + 3x + x^2$ is

A) x^2 B) $\frac{x^2}{2}$ C) $2x^2$ D) $4x^2$

iv) The general solution of an n^{th} order differential equation contains

A) Atleast 'n' independent constants B) Atmost 'n' independent constants
C) Exactly 'n' independent constants D) Exactly 'n' dependent constants

(04 Marks)

b. Solve : $(D^3 - 2D^2 + 4D - 8)y = 0$. **(04 Marks)**

c. Solve : $y'' - 2y' + y = xe^x \sin x$. **(06 Marks)**

d. Solve : $y'' - 4y' + 3y = 20\cos x$, by the method of undetermined coefficients. **(06 Marks)**

6 a. Select the correct answer :

i) The homogeneous linear differential equation whose auxiliary equation has roots 1, 1, and –2 is

A) $(D^3 + D^2 + 2D + 2)y = 0$ B) $(D^3 + 3D - 2)y = 0$
C) $(D^3 - 3D + 2)y = 0$ D) None of these

ii) The general solution of $(x^2D^2 - xD)y = 0$ is

A) $y = C_1 + C_2e^x$ B) $y = C_1 + C_2x$ C) $y = C_1 + C_2x^2$ D) $y = C_1x + C_2x^2$

iii) The equation $a_0(ax+b)^2y'' + a_1(ax+b)y' + a_2y = \phi(x)$ is

A) Legendre's linear equation B) Cauchy's linear equation
C) Both A and B D) None of these

iv) The differential equation $y'' + 5y' + 6y = 0$, $y(0) = 0$ and $y'(0) = 0$ is an

A) Initial value problem B) Boundary value problems
C) Both A and B D) All of these

(04 Marks)

b. Solve by the method of variation of parameters $y'' + a^2y = \sec ax$. **(05 Marks)**

c. Solve $(x+1)^2y'' + (x+1)y' + y = 4\cos\log(1+x)$. **(06 Marks)**

d. Solve $y'' + 4y' + 4y = 8x^2$, given $y(0) = 1$ and $y(1) = 1$. **(05 Marks)**

7 a. Select the correct answer :

i) $L\left[\frac{\sin t}{t}\right] =$

A) $\cot^{-1} s$ B) $\frac{1}{s^2+1}$ C) $\tan^{-1} s$ D) $\cot^{-1}(s-1)$

ii) $L[3\sinh 2t] =$

A) $\frac{6}{s^2-4}$ B) $\frac{6}{s^2+4}$ C) $\frac{36}{s^2+4}$ D) None of these

7 a. iii) $L\left[\frac{1-e^{-at}}{t}\right] =$

A) $\log\left(\frac{s}{s+a}\right)$ B) $\log\left(\frac{s+a}{s}\right)$ C) $\log\left(\frac{s-a}{s}\right)$ D) None of these

iv) If $u(t-a)$ is a unit step function then Laplace transform of $u(t-a)$ is

A) $\frac{e^{as}}{s}$ B) $\frac{e^{-s}}{s}$ C) $\frac{e^{-as}}{s}$ D) $\frac{e^{s}}{s}$ **(04 Marks)**

b. Prove that $L[t^n] = \frac{n!}{s^{n+1}}$. **(04 Marks)**

c. If $f(t) = t^2, 0 < t < 2$, is a periodic function with period 2, then find $L[f(t)]$. **(06 Marks)**

d. Find Laplace transform of $f(t) = \begin{cases} \sin t & 0 < t < \frac{\pi}{2} \\ \cos t & t > \frac{\pi}{2} \end{cases}$ using unit step function. **(06 Marks)**

8 a. Select the correct answer :

i) $L^{-1}\left[\frac{1}{s^2+5}\right] =$

A) $\frac{\sin\sqrt{t}}{5}$ B) $\frac{\sin\sqrt{5t}}{\sqrt{5}}$ C) $\frac{\sin\sqrt{5}t}{\sqrt{5}}$ D) $\sin\sqrt{5}.t$

ii) $L^{-1}\left[\frac{s^3+6s^2+12s+8}{s^6}\right] =$

A) $\frac{t^2}{2!}+t^3+\frac{t^4}{2!}+\frac{t^5}{15}$ B) $\frac{t^2}{2}+t^3+t^4+t^5$

C) $t^2+t^3+t^4+\frac{t^5}{3}$ D) None of these

iii) Convolution of f(t) and g(t) is given by $f(t) * g(t)$ is equal to

A) $\int_0^t f(u)\,g(t-u)du$ B) $\int_0^t f(u)\;g(t+u)du$

C) $\int_0^t f(u)\,du$ D) $\int_0^t g(u)\,du$

iv) $L[y''(t)]$ is equal to

A) $s^2 L[y(t)] - sy(0) - y'(0)$ B) $s^2 - sy(0) - y'(0)$

C) $s^2 L[y(t)] - sy'(0) - y(0)$ D) None of these **(04 Marks)**

b. Find : $L^{-1}\left(\frac{s+2}{(s+1)^4}\right)$ **(04 Marks)**

c. Find $L^{-1}\left(\frac{1}{s(s^2+a^2)}\right)$, by using convolution theorem. **(06 Marks)**

d. Solve by Laplace transform method, given $y'' + k^2y = 0$ and $y(0) = 2$, $y'(0) = 0$. **(06 Marks)**

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10MAT21

Second Semester B.E. Degree Examination, June/July 2011
Engineering Mathematics – II

Time: 3 hrs. Max. Marks:100

Note: 1. ***Answer any FIVE full questions, choosing at least two from each part.***
2. ***Answer all objective type questions only in OMR sheet page 5 of the answer booklet.***
3. ***Answer to objective type questions on sheets other than OMR will not be valued.***

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

PART – A

1 a. Choose your answers for the following :

i) A differential equation of the first order but of second degree (solvable for P) has the general solution as,
A) $F_1(x,y,c)+F_2(x,y,c)=0$ B) $F_1(x,y,c)\times F_2(x,y,c)=0$
C) $F_1(x,y,c)-F_2(x,y,c)=0$ D) $F_1(x,y,c)/F_2(x,y,c)=0$

ii) If the given differential equation is solving for x then it is of the form,
A) $x=f(P/y)$ B) $y=f(x,P)$ C) $x=f(\frac{y}{P})$ D) $x=f(y,P)$

iii) Clairaut's equation of $P=\sin(y-xP)$ is,
A) $y=\frac{P}{x}+\sin^{-1}P$ B) $y=Px+\sin P$ C) $y=Px+\sin^{-1}P$ D) $y=x+\sin^{-1}P$

iv) The differential equation for R, L series circuit is,
A) $\frac{di}{dt}+Ri=E$ B) $L\frac{di}{dt}+i=E$ C) $\frac{di}{dt}+Ri=\frac{E}{L}$ D) $L\frac{di}{dt}+Ri=E$ **(04 Marks)**

b. Solve $P(P+y)=x(x+y)$ by solving for P. **(05 Marks)**

c. Solve $P^3-4xyP+8y^2=0$ by solving for x. **(05 Marks)**

d. Solve $(Px-y)(Py+x)=a^2P$, use the substitution $X=x^2$, $Y=y^2$. **(06 Marks)**

2 a. Choose your answers for the following :

i) Roots of $y''-6y'+13y=0$ are,
A) $2\pm3i$ B) $2\pm i$ C) $3\pm i$ D) $3\pm2i$

ii) The value of $\frac{1}{D}(f(x))$ is,
A) $f'(x)$ B) $\frac{1}{f'(x)}$ C) $\int f(x)dx$ D) $\int\frac{1}{f(x)}dx$

iii) The particular integral of $(D^2-6D+9)y=\log 2$ is,
A) $6\log 2$ B) $\frac{1}{9}\log 2$ C) $9\log 2$ D) $\frac{1}{6}\log 2$

iv) The displacement in the simple harmonic motion $\frac{d^2x}{dt^2}=-\mu^2x$ is,
A) $C_1\cos\mu t+C_2\sin\mu t$ B) $C_1\cos\mu t-C_2\sin\mu t$
C) $C_1\cos\mu t\pm C_2\sin\mu t$ D) $\cos\mu t\pm\sin\mu t$ **(04 Marks)**

b. Solve $(D^3-D)y=2e^x+4\cos x$. **(05 Marks)**

c. Solve $(D^2+2)y=x^2e^{3x}+\cos 2x$ **(05 Marks)**

d. Solve the simultaneous differential equations, $\frac{dx}{dt}+5x-2y=t$, $\frac{dy}{dt}+2x+y=0$. **(06 Marks)**

3 a. Choose your answers for the following :

i) If y_1 and y_2 are the solutions of second order differential equation and u and v are variation of parameters of $y_p = uy_1 + vy_2$ then v = ____________

A) $\int \frac{(y_1X)dx}{y_1y_2' - y_1'y_2}$ B) $\int \frac{(y_2X)dx}{y_1y_2' + y_1'y_2}$ C) $\int \frac{Xdx}{y_1y_2' - y_1'y_2}$ D) $\int \frac{dx}{y_1y_2' - y_1'y_2}$

ii) In $x^2y'' + 4xy' + 2y = e^x$ if $x = e^t$ then we get for x^2y'' as,

A) (D-1)y B) D(D-1)y C) D(D+1)y D) D(D+2)y

iii) To transform $(ax+b)^2y'' + K_1(ax+b)y' + K_2y = X$ into Legendre's linear equation we put ax+b = ________

A) e^{-t} B) $\frac{1}{e^{-t}}$ C) $1+e^t$ D) $1-e^t$

iv) Series solution is a regular singularity of the equation $P_0y'' + P_1y' + P_2y = 0$ when

A) $x < 0$ B) $x > 0$ C) $x = 0$ D) $x \neq 0$ **(04 Marks)**

b. Solve $y'' - 6y' + 9y = \frac{e^{3x}}{x^2}$ using variation of parameters. **(05 Marks)**

c. Solve $x^2y'' + xy' + y = 2\cos^2(\log x)$. **(05 Marks)**

d. Solve $2xy'' + 3y' - y = 0$ by Frobenius method. **(06 Marks)**

4 a. Choose your answers for the following :

i) Partial differential equation by eliminating a and b from the relation $Z = (x^2 + a)(y^2 + b)$ is,

A) $Z_xZ_y = xyz$ B) $Z_{xy} = xyz$ C) $Z_{xy} = 4xyz$ D) $Z_xZ_y = 4xyz$

ii) The solution of $Z_{yy} = \sin xy$ is Z = ___________

A) $\sin xy + f(x) + g(y)$ B) $-\frac{1}{x^2}\cos xy + f(x) + g(y)$

C) $-\frac{1}{x^2}\sin xy + yf(x) + g(y)$ D) $-\sin xy + f(x) + xg(y)$

iii) For the Lagrange's linear partial differential equation, Pp+Qq = R, the subsidiary equations are ________

A) $\frac{dx}{P} = \frac{-dy}{Q} = \frac{dz}{R}$ B) $\frac{-dx}{P} = \frac{-dy}{Q} = \frac{dz}{R}$

C) $\frac{dx}{P} = \frac{dy}{Q} = \frac{dz}{R}$ D) $\frac{dx}{P^2} = \frac{dy}{Q^2} = \frac{dz}{R^2}$

iv) In the method of separation of variables to solve $u_{xx} - 2u_x + u_t = 0$, the trial solution is u = ________

A) X(x)T(t) B) $\frac{X(x)}{T(t)}$ C) $\sqrt{\frac{X(x)}{T(t)}}$ D) $X(x)\sqrt{T(t)}$

(04 Marks)

b. Solve $Z_{xy} = \sin x \sin y$ for which $Z_y = -2\sin y$ when x = 0 and z = 0 when y is an odd multiple of $\frac{\pi}{2}$. **(05 Marks)**

c. Solve $(x^2 - y^2 - z^2)P + 2xyq = 2xz$. **(05 Marks)**

d. Solve $3u_x + 2u_y = 0$, $u(x, 0) = 4e^{-x}$ by the separation of variables. **(06 Marks)**

PART – B

5 a. Choose your answers for the following :

i) The value of $\int_0^1\int_0^6 xydxdy$ is ________.

A) 6 B) 7 C) 8 D) 9

ii) The integral $\int_0^1\int_0^{\sqrt{1-y^2}}(x+y)dydx$ after changing the order of integration is________

A) $\int_0^2\int_0^{\sqrt{1-y^2}}(x+y)dxdy$ B) $\int_0^1\int_0^{\sqrt{1-y^2}}(x+y)dxdy$ C) $\int_0^1\int_0^{\sqrt{1+y^2}}(x+y)dxdy$ D) $\int_0^1\int_0^{\sqrt{1-y^2}}(x+y)dxdy$

iii) The value of $\int_0^\infty e^{-x^2}dx$ is ________

A) $\pi\sqrt{2}$ B) $2\sqrt{\pi}$ C) $\sqrt{2\pi}$ D) $\frac{\sqrt{\pi}}{2}$

iv) The value of $\Gamma(\frac{1}{4})\Gamma(\frac{3}{4})$ = ______

A) $2\sqrt{\pi}$ B) $\frac{2}{\sqrt{\pi}}$ C) $\pi\sqrt{2}$ D) $\frac{\sqrt{\pi}}{2}$ **(04 Marks)**

b. Evaluate $\int_0^b\int_0^{\frac{a}{b}\sqrt{b^2-y^2}} xydxdy$ by changing the order of integration. **(05 Marks)**

c. Evaluate $\int_{-1}^1\int_0^z\int_{x-z}^{x+z}(x+y+z)dydxdz$ **(05 Marks)**

d. Show that $\int_{-1}^1(1+x)^{m-1}(1-x)^{n-1}dx = 2^{m+n-1}\beta(m,n)$. **(06 Marks)**

6 a. Choose your answers for the following :

i) If $\int_C F.d\vec{r} = 0$ then F is called

A) Rotational B) Solenoidal C) Irrotational D) Dependent

ii) If f is the vector field over a region of volume V in three dimensional space then $\int_V f.dV$ is called

A) Scalar volume integral B) Vector volume integral

C) Scalar surface integral D) Vector surface integral

iii) In Green's theorem in the plane $\iint_A\left(\frac{\partial N}{\partial x}-\frac{\partial M}{\partial y}\right)dxdy$ is ________

A) $\int_C(Mdx - Ndy)$ B) $\int_C(Mdx)\times(Ndy)$ C) $\int_C(Ndx - Mdy)$ D) $\int_C(Mdx + Ndy)$

iv) If C be a simple closed curve in space and S be the open surface, f be the vector field then $\int_C f.dr$ =_______

A) $\int_S(\text{curl}f).nds$ B) $\int_S(\nabla\times f).ds$ C) $\int_S(\nabla^2 f).nds$ D) $\int_S(\nabla.f).nds$ **(04 Marks)**

b. Evaluate $\iint_S f.nds$ where $f = yzi + 2y^2j + xz^2k$ and S is the surface of the cylinder $x^2+y^2=9$ contained in the first octant between z = 0 and z = 2. **(05 Marks)**

c. Verify Green's theorem for $\int_C(xy+y^2)dx + x^2dy$ where C is the closed curve made up of the line y = x and the parabola $y = x^2$. **(05 Marks)**

6 d. Verify Stoke's theorem for $f = (2x - y)i - yz^2 j - y^2 zk$ for the upper half of the sphere $x^2 + y^2 + z^2 = 1$. **(06 Marks)**

7 a. Choose your answers for the following :

i) $L\{\cosh at\} =$ __________

A) $\frac{a}{s^2 + a^2}$ B) $\frac{s}{s^2 - a^2}$ C) $\frac{a}{s^2 - a^2}$ D) $\frac{s}{s^2 + a^2}$

ii) $L\{t^2 e^{-3t}\} =$ ______

A) $\frac{1}{(s+3)^3}$ B) $\frac{2}{(s+3)^2}$ C) $\frac{3}{(s+3)^3}$ D) $\frac{2}{(s+3)^3}$

iii) Transform of unit function $L\{(u(t-a))\} =$ ________

A) $\frac{e^{aS}}{s}$ B) $\frac{e^{-aS}}{s^2}$ C) $\frac{e^{-aS}}{s}$ D) $\frac{e^{aS}}{s^2}$

iv) Unit impulse function $\delta(t-a)$ is $\delta(t-a) = \infty$ for $t = a$; 0 for $t \neq a$ such that $\int_0^\infty \delta(t-a)dt =$ _________

A) 1 B) 0 C) -1 D) $\frac{1}{2}$ **(04 Marks)**

b. Find $L\{t(\sin^3 t - \cos^3 t)\}$. **(05 Marks)**

c. Find $L\{f(t)\}$ when $f(t) = \begin{cases} E, & 0 \le t \le a \\ -E, & a \le t \le 2a \end{cases}$ where the period is 2a. Sketch the graph also. **(05 Marks)**

d. Express f(t) in terms of unit step function and hence find the Laplace transform given that $f(t) = \begin{cases} t^2, & 0 < t < 2 \\ 4t, & 2 < t < 4 \\ 8, & t > 4 \end{cases}$ **(06 Marks)**

8 a. Choose your answers for the following :

i) $L^{-1}\left\{\frac{1}{(s-a)^2 + b^2}\right\} =$ ________

A) $\frac{e^{at}}{b}\cos bt$ B) $\frac{1}{a}e^{at}\sin bt$ C) $\frac{1}{b}\cos bt$ D) $\frac{1}{b}e^{at}\sin bt$

ii) $L^{-1}\left\{\frac{s^2 - 3s + 4}{s^4}\right\} =$ ________

A) $1 - 3t + 2t^3$ B) $1 + \frac{t^2}{3}$ C) $t - \frac{3}{2}t^2 + \frac{2}{3}t^3$ D) $t + \frac{3}{2}t^2 + 1$

iii) In convolution theorem, $L\left\{\int_0^t f(u)g(t-u)du\right\} =$ ______

A) F(t)G(t) B) $F(S) \times G(S)$ C) $\frac{F(S)}{G(S)}$ D) $F(t) - G(t)$

iv) The expression $S^4 L\{x(t)\} - S^3 x(0) - S^2 x'(0) - Sx''(0) - x'''(0)$ is due to,

A) $L\{y'''(t)\}$ B) $L\{x'''(t)\}$ C) $L\{y''(t)\}$ D) $L\{x^{IV}(t)\}$. **(04 Marks)**

b. Find the inverse Laplace transform of $\tan^{-1}\left(\frac{2}{S^2}\right)$. **(05 Marks)**

c. Find $L^{-1}\left\{\frac{s}{(S-1)(S^2+4)}\right\}$ using convolution theorem. **(05 Marks)**

d. Solve $y''(t) + 4y'(t) + 4y(t) = e^t$ with y(0)=0 and $y'(0) = 0$ using Laplace transform method. **(06 Marks)**