SIDDHARTH GROUP OF INSTITUTIONS :: PUTTUR
Siddharth Nagar, Narayanavanam Road – 517583

QUESTION BANK (DESCRIPTIVE)

Subject with Code : Engineering Mathematics-I (16HS602) **Course & Branch**: B.Tech Com to all

Year & Sem: I-B.Tech & I-Sem **Regulation:** R16

UNIT – I

1. a) Solve $\left(1+e^{\frac{x}{y}}\right)dx+e^{\frac{x}{y}}\left(1-\frac{x}{y}\right)dy=0.$ [5M]

   b) Solve $x\frac{dy}{dx}+y=logx$ [5M]

2. a) Solve $(1-x^2)\frac{dy}{dx}+xy=a.x$. [5M]

   b) Solve $(D^3-1)y=e^x+\sin 3x+2$ [5M]

3. a) Solve $(1-x^2)\frac{dy}{dx}+2xy=x.\sqrt{1-x^2}$. [5M]

   b) Solve $\frac{dy}{dx}+yx=y^2e^{x^2/2}sinx$ [5M]

4. a) Solve $(1+y^2)+\left(x-e^{tan^{-1}y}\right)\frac{dy}{dx}=0$. [5M]

   b) Show that the family of Confocal conics $\frac{x^2}{a^2+\lambda}+\frac{y^2}{b^2+\lambda}=1$, (where $\boldsymbol{\lambda}$ is a Parameter) , is Self orthogonal . [5M]

5. a) Solve $(D^3+2D^2+D)\,y=e^{2x}+x+\sin 2x$ [5M]

   b) Solve $\frac{dy}{dx}+y\tan x=y^2secx$. [5M]

6. a) A circuit has in series on electromotive force given by $E=100\sin(40t)$volts a resistor of 10 ohms and an inductor of 0.5 H. If the initial current is 0.find the current at time t>0. [5M]

   b) Solve $(D^2+a^2)y=Secax$ [5M]

7. a)Solve $(D^2-4D+4)y=8e^{2x}sin2x$ [5M]

   b) Find the orthogonal trajectories of the family of the parabolas $y^2=4ax$. [5M]

8. a) Find the orthogonal trajectories of the family of curves $r^n=a^n\ cosn\theta$. [5M]

   b) A body is originally at 80^0c and cools down to 60^0c in 20 min. If the temperature of the air is 40^0c, find the temperature of the body after 40 min.,? [5M]

9) a) Solve $(D^2-4D)y=e^x+sin3x\ cos2x$. [5M]

   b) A radioactive substance disintegrates at a rate proportional to its mass. When the mass is 10 mg, the rate of disintegration is 0.051 mg per day. How long will it take for the mass of 10 mg to reduce to its half? [5M]

10) . a) Solve $(D^2+a^2)y=\tan ax$ by the method of variation of parameters.

   b) A body kept in air with temperature 25^0 C cools from 140^0 C to 80^0 C in 20 min. Find when the body cools down to 35^0 C.

UNIT-II

1. Using Maclaurin's series expand $\tan x$ upto the fifth power of x and hence find series for $\log\sec x$. [10M]

2. a)If $u=\frac{yz}{x},v=\frac{zx}{y},w=\frac{xy}{z}$ then show that $\frac{\partial(u,v,w)}{\partial(x,y,z)}=4$. [5M]

   b)If $u=x^2-y^2,v=2xy$ where $x=r\cos\theta, y=r\sin\theta$ then show that $\frac{\partial(u,v)}{\partial(r,\theta)}=4r^3$ [5M]

3. a)S.T. $\sin^{-1}x=x+\frac{x^3}{3!}+\frac{1^2.3^2}{5!}x^5+\frac{1^2.3^2.5^2}{7!}x^7+........$ [5M]

   b)S.T. $\log(1+e^x)=\log 2+\frac{x}{2}+\frac{x^2}{8}-\frac{x^4}{192}+..........$ [5M]

4. a)Expand $\log_e x$ in powers of (x-1) and hence evaluate $\log(1.1)$ correct to 4 decimal places. [5M]

   b) Calculate the approximate value of $\sqrt{10}$ correct to 4 decimal places using Taylor'series. [5M]

5. a) For the cardioid $r=a(1+\cos\theta)$,P.T $\frac{\rho^2}{r}$ is constant where 'ρ'is the radius of curvature. [5M]

   b) Find the stationary points of $u(x,y)=\sin x.\sin y.\sin(x+y), 0<x<\pi, 0<y<\pi$ and find the maximum of u. [5M]

6. (a) Prove that the maximum value of $x^m y^n z^p$ under the condition $x+y+z=a$ is $\frac{m^m n^n p^p a^{m+n+p}}{(m+n+p)^{m+n+p}}$ [5M]

   b) Find the minimum value of $x^2+y^2+z^2$ given $x+y+z=3a$. [5M]

7. a)Find a shortest and longest distance from the point (1,2,-1) to the sphere $x^2+y^2+z^2=24$ [5M]

   b)Find the volume of the largest rectangular parallelopiped that can be inscribed in the ellipsoid $4x^2+4y^2+9z^2=36$ [5M]

8. a)Find the radius of curvature at any point on the curve $y=c\cosh(\frac{x}{c})$ [5M]

   b)Find the radius of curvature of the curve $x^2y=a(x^2+y^2)$ at (-2a,2a).[5M]

9. a)Find the radius of curvature at the origin of the curve $y^2=\frac{x^2(a+x)}{a-x}$.[5M]

   b)Find the radius of curvature at the origin for the curve $y^4+x^3+a(x^2+y^2)-a^2y=0$. [5M]

10. a)Verify whether the following functions are functionally dependent , if so find the relation between them, $u=\frac{x+y}{1-xy}, v=\tan^{-1}x+\tan^{-1}y$. [5M]

    b) Examine the function for extreme values $x^4+y^4-2x^2+4xy-2y^2 (x>0,y>0)$. [5M]

UNIT –III

1. a)Evaluate $\int_0^1 \int_0^{x^2} e^{y/x}\, dydx$ [5M]

 b) Evaluate $\int_{-c}^{c} \int_{-b}^{b} \int_{-a}^{a} (x^2 + y^2 + z^2)\, dx\, dy\, dz$ [5M]

2. a) Evaluate $\int_0^1 \int_x^{\sqrt{x}} (x^2 + y^2) dxdy$ [5M]

 b) Evaluate $\int_0^1 \int_y^1 \int_0^{1-x} x\, dz\, dx\, dy$ [5M]

3. a) Evaluate $\int_0^1 \int_0^1 \frac{dxdy}{\sqrt{(1-x^2)(1-y^2)}}$ [5M]

 b) Evaluate $\int_0^{\pi} \int_0^{a\sin\theta} r\, dr\, d\theta$ [5M]

4. a) Evaluate $\int_0^{\infty} \int_0^{\infty} e^{-(x^2+y^2)} dxdy$ [5M]

 b) Evaluate $\int_1^{e} \int_1^{\log y} \int_1^{e^x} \log z\, dz\, dx\, dy$ [5M]

5. a) Evaluate $\int_0^3 \int_1^2 xy(1 + x + y) dydx$ [5M]

 b) Evaluate $\int_0^{\pi/2} \int_0^{a\sin\theta} \int_0^{\frac{a\ -r^2}{a}} r\, dz\, dr\, d\theta$ [5M]

6. a) Evaluate $\iint (x^2 + y^2)\, dx\, dy$ over the area bounded by the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ [5M]

 b) Evaluate $\iint (x^2 + y^2)\, dx\, dy$ over the positive quadrant for which $x + y \le 1$ [5M]

7. a) Evaluate the integral by changing the order of integration $\int_0^1 \int_x^{\sqrt{2-x^2}} \frac{x}{\sqrt{x^2 + y^2}} dydx$ [5M]

b) Evaluate the following integral by changing to polar coordinates $\int_0^\infty\int_0^\infty e^{-(x^2+y^2)}dxdy$ [5M]

8. a) Evaluate the integral by changing the order of integration $\int_0^a\int_{x/a}^{\sqrt{x/a}}(x^2+y^2)dxdy$ [5M]

b) Evaluate $\iint_R xydxdy$ where R is the domain bounded by x-axis ordinate $x=2a$ and the curve $x^2=4ay$ [5M]

9. a) Evaluate the integral by changing the order of integration $\int_0^{4a}\int_{x^2/4a}^{2\sqrt{ax}}dydx$ [5M]

b) Evaluate $\int\int r\sin\theta\, dr\, d\theta$ over the cardioids $r=a(1+\cos\theta)$ above the initial line [5M]

10.a). Evaluate the integral by changing the order of integration $\int_0^1\int_{x^2}^{2-x}xy\, dydx$ [5M]

b) Show that the double integration, the area between the parabolas

$y^2=4ax \text{ and } x^2=4ay \text{ is } \frac{16}{3}a^2$ [5M]

UNIT –IV

1. a) Find the Laplace transform of $\sin at \,\&\, \cos at$ [5 M]
   b). Find the Laplace transform of $3\cos 3t.\cos 4t$ [5 M]
2. a) Find the Laplace transform of $\left(\sqrt{t}+\frac{1}{\sqrt{t}}\right)^3$. [5 M]
   b) State and prove first shifting theorem. [5 M]
3. a) Find the Laplace transform of $e^{-3t}\left(2\cos 5t-3\sin 5t\right)$ [5M]
   b) Find the Laplace transform of $f(t)=2\cosh at.\sin bt$ [5M]
4. a) find Laplace transform of $f(t)=e^{-3t}\sinh 3t$ using change of scale property [5 M]
   b) To prove $L\left(f^n(t)\right)=s^n\overline{f}(s)-s^{n-1}f(0)-s^{n-2}f^1(0)-------f^{n-1}(0)$ [5 M]
5. a) Find $L\left\{\frac{Cos\sqrt{t}}{\left(\sqrt{t}\right)}\right\}$, if $L\left\{Sin\sqrt{t}\right\}=\frac{\sqrt{\pi}}{2s^{3/2}}e^{\frac{-1}{4s}}$ [5 M]
   b) Find the Laplace transform of $f(t)=\int_0^t e^{-t}\cos t\, dt$. [5 M]
6. a) To prove $L\left(t^n f(t)\right)=(-1)^n\frac{d^n}{ds^n}\left[\overline{f}(s)\right] where\, n=1,2,3----$ [5 M]
   b) Find the Laplace transform of $f(t)=t^2\sin 3t$ [5 M]
7. a) Find the Laplace transform of $f(t)=t\sin 3t.\cos 2t$ [5M]

b) Find the Laplace transform of $f(t) = \frac{1-\cos at}{t}$ [5M]

8. a) Show that $\int_0^\infty t^2 e^{-4t}.\sin 2t\, dt = \frac{11}{500}$, Using Laplace transform [5 M]

b) Find the Laplace transform of $f(t) = \{(t^2 - 3t + 2)\sin 3t\}$ [5M]

9. a) Using Laplace transform, evaluate $\int_0^\infty \frac{\cos at - \cos bt}{t} dt$. [5 M]

b) Find Laplace Transform of Square-wave function of periodic 2a,defined as

$$f(t) = \begin{cases} k & 0 < t < a \\ -k, & a < t < 2a \end{cases}$$ [5 M]

10. Find Laplace Transform of periodic function $f(t)$ with period T, where

$$f(t) = \begin{cases} \frac{4Et}{T} - E & 0 \le t \le T/2 \\ 3E - \frac{4E}{T}t, & T/2 \le t \le T \end{cases}$$ [10M]

UNIT –V

1. a) Find the Inverse Laplace transform of $\frac{5s-2}{s^2(s+2)(s-1)}$ [5 M]

b). Find $L^{-1}\left\{\frac{2s-5}{4s^2+25} + \frac{4s-18}{9-s^2}\right\}$ by using linear property. [5 M]

2. a) Find $L^{-1}\left\{\frac{3s-2}{s^2-4s+20}\right\}$ by using first shifting theorem [5 M]

b) State and prove change of scale property. [5 M]

3. Use transform method to solve $y^{11} - 3y^1 + 2y = 4t + e^{3t}$ where $y(0) = 1, y^1(0) = 1$ [10M]

4. a) find the inverse Laplace transform of $\frac{s}{s^4+4a^4}$ [5 M]

b) Find $L^{-1}\left\{\frac{1}{2}\log\left(\frac{s^2+b^2}{s^2+a^2}\right)\right\}$ [5 M]

5. a) Evaluate $L^{-1}\left\{\int_s^\infty \log\left(\frac{(u-1)}{(u+1)}\right) du\right\}$ [5 M]

b) Find the inverse Laplace transform of $\log\left(1 - \frac{a^2}{s^2}\right)$. [5 M]

6. a) State and Prove Convolution theorem [5 M]

b) Using Convolution theorem, find $L^{-1}\left\{\frac{s}{(s^2+a^2)^2}\right\}$ [5 M]

7. Use transform method to solve $y^{11} + 2y^1 + 5y = e^{-t}\sin t$, where $y(0) = 1, y^1(0) = 1$ [10M]

8. Find $L^{-1}\left\{\frac{1}{(s^2+9)\,(s^2+1)}\right\}$, using Convolution theorem. [10 M]

9. a) Find $L^{-1}\left\{\frac{1+e^{-\pi s}}{(s^2+1)}\right\}$ using second shifting theorem. [5 M]

b) Find $L^{-1}\left\{\frac{1}{(s^2+5^2)^2}\right\}$, using Convolution theorem. [5 M]

10. Using Laplace Transform method solve $(D^2+n^2)x = a\sin(nt+2)$ when $x = Dx = 0 \ at \ t = 0$ [10M]

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QUESTION BANK (OBJECTIVE)

Subject with Code : Engineering Mathematics-I (16HS602) **Course & Branch :** B.Tec Common to all
Year &Sem : I-B.Tech& I-Sem **Regulation : R16**

UNIT – I

1) Which of the following is condition for exact differential equation --- [ ]

A) $\frac{\partial N}{\partial y} = \frac{\partial M}{\partial x}$ B) $\frac{\partial N}{\partial x} = -\frac{\partial M}{\partial x}$

C) $\frac{\partial M}{\partial y} = \frac{\partial N}{\partial x}$ D) $\frac{\partial M}{\partial y} = -\frac{\partial N}{\partial x}$

2) Which of the suitable form of $\frac{ydx-xdy}{y^2}$ ----- [ ]

A) $d\left(\frac{x}{y}\right)$ B) $d\left(\frac{-x}{y}\right)$

C) $d\left(log\frac{x}{y}\right)$ D) $d\left(\frac{y}{x}\right)$

3) Integrating factor of $x\frac{dy}{dx} + y = logx$--- [ ]

A) y B) $\frac{y}{x}$

C) $\frac{x}{y}$ D) x

4) Which of the suitable form of $xdx + ydy =$------- [ ]

A) $d\left(\frac{x^2+y^2}{2}\right)$ B) $d\left(\frac{x^2-y^2}{2}\right)$

C) $d(x+y)$ D) $d(x-y)$

5) The equation $Mdx + Ndy = 0$ is of the type yf(xy)dx+xg(xy)dy=0 then the I.F is ------ [ ]

A) $\frac{1}{Mx+Ny}$ B) $\frac{1}{Mx-Ny}$

C) $e^{\int f(x)dx}$ D) None

6) The equation $Mdx + Ndy = 0$ is not exact but is homogeneous in x and y then the I.F is – [ ]

A) $\frac{1}{Mx+Ny}$ B) $\frac{1}{Mx-Ny}$

C) $e^{\int f(x)dx}$ D) None

7) Given that $(x-y)dx - dy = 0$ is not an exact, then I.F is ---------------- [ ]

A) $\frac{1}{x}$ B) x

C) e^x D) None

8) The general solution of $\frac{ydx-xdy}{y^2}$= 0 is -------------------------- [ ]

A) $xy = c$ B) $x = cy$

C) $y = xc$ D) None

9) The order of $x^3\frac{d^3y}{dx^3}+2x^2\frac{d^2y}{dx^2}-3y=x$is ____________________ [ ]

A)2 B)3

C)1 D)None

10) The differential equation $\frac{d^2y}{dx^2}+\frac{dy}{dx}+siny=0$ is ----------------------- [ ]

A) linear B) non-linear

C) homogeneous D) None

11) An integrating factor of $\frac{dy}{dx}-\frac{y}{x}=x$ $is----$ [ ]

A) $\frac{1}{-x}$ B) $\frac{1}{-2x}$

C) $\frac{1}{2x}$ D) $\frac{1}{x}$

12) The I.F of $(1-x^2)\frac{dy}{dx}+2xy=x\sqrt{1-x^2}$ is ----------------------- [ ]

A) $1-x^2$ B)$\frac{1}{1-x^2}$

C)$\log(1-x^2)$ D) None

13) The Integrating Factor of $\frac{dr}{d\theta}+(2cot\theta)r=-sin2\theta$ is --------------------- [ ]

A)$sin2\theta$ B) $2sin\theta$

C) $sin^2\theta$ D) None

14) An integrating factor of $\frac{dy}{dx}-(tanx)y=x^2$ $is----$ [ ]

A) cosx B) sinx

C) $-$cosx D) – sinx

15) An equation of the form $x\frac{dy}{dx}+y=x^2$----- ` [ ]

A) Linear B) Exact

C) Bernoulli D) none

16) The differential equation $x\frac{dy}{dx}+y=x^5y^6$ $is\ a----$ [ ]

A) homogeneous D.E B) Leibnitz's linear equation

C) Bernoulli's D.E D) Non linear D.E

17) The differential equation of orthogonal trajectories of the family of curves $y^2=4ax$, where 'a' is the parameter is --------------- [ ]

A) $y\frac{dy}{dx}=2x$ B) $y\frac{dx}{dy}=-2x$

C) $x\frac{dy}{dx}=2$ D) None

18) The family of straight lines passing through the origin is represented by the differential equation --- [ ]

A) $y\frac{dy}{dx}=x+y$ B)$y=\frac{dy}{dx}x$

C)$x=\frac{dy}{dx}y$ D) $x=\frac{dy}{dx}$

19) The equation $y-2x=c$ represents the orthogonal trajectories of the family -------------- [ ]

A) $y=ae^{-2x}$ B) $x^2+2y^2=a$

C) xy=a D) $x + 2y = a$

20) A curve which cuts every member of a given family of curves at a right angle is called------[ ]

A) trajectory B) orthogonal trajectory

C) Oblique trajectory D) cardiods

21) The orthogonal trajectories of the circles $x^2 + y^2 = a^2$ are --------- [ ]

A)straight lines B) elllipses

C) hyperbolas D) None

22) If the differential equation of the family of given curves is same as the D.E of their orthogonal trajectories then the family is called ----------------- [ ]

A) isogonal B) isothermal

C) self-orthogonal D) isotropic

23) The orthogonal trajectories of the curves $r = a\theta$ is ------- [ ]

A) $re^{\frac{\theta^2}{2}} = c$ B) $r\theta = c$

C) r=c D) None

24) An orthogonal trajectories in polar co-ordinates replace $\frac{dr}{d\theta}$=---- [ ]

A) $\theta^2 \frac{d\theta}{dr}$ B)$-r^2 \frac{d\theta}{dr}$

C) $-\theta^2 \frac{d\theta}{dr}$ D) $r^2 \frac{d\theta}{dr}$

25) If the C.F. is $C_1 \cos bx + C_2 \sin bx$ then the roots are--- [ ]

A) Complex B) Exact

C) Real &equal D) Real &distinct

26) If an Auxiliary equation has the values $m = \pm a$ then the roots are ------ [ ]

A) Complex B) Exact

C) Real &equal D) Real &distinct

27) Auxiliary equation of differential equation $\frac{d^2y}{dx^2} - 6y = \cos 2x$ ----- [ ]

A) $m^2 - 6 = 0$ B) $m^2 - m = 0$

C) $m - 6 = 0$ D) $m - 6 = \cos 2x$

28) The Particular Integral of the differential equation $(D+1)y = \sin x$ is ---- [ ]

A) $\frac{1}{2}(\sin x - \cos x)$ B) $-\frac{1}{2}(\cos x + \sin x)$

C) $\frac{1}{2}(\cos x - \sin x)$ D) $-\frac{1}{2}\cos x$

29) The Auxiliary Equation of the differential equation $y'' + 6y' + 9y = 2$ is---- [ ]

A) $m^2 + 6m = 0$ B) $m^2 + 6m + 9 = 0$

C) $m^2 + 6m + 9 = 2$ D) $m^3 + 6m^2 + 9m = 0$

30) The Particular Integral of the differential equation $(D^2 + 5D + 6) = e^{-2x}$ is ------ [ ]

A) $\frac{1}{20}e^{-2x}$ B) $\frac{1}{5}xe^{2x}$

C) $\frac{1}{6}xe^{2x}$ D) xe^{-2x}

31) Find the general solution of $y''-2y'=0$---------- [ ]

A) $C_1+C_2e^{2x}$ B) $(C_1+C_2x)e^{2x}$

C) $(C_1x+C_2x^2)e^{2x}$ D) None

32) The unit for Capacitance (C) is ----- [ ]

A) Farad B) henry

C) Ohm D) coulomb

33) If $f(-b^2)=0$ then P.I of $\frac{1}{D^2+b^2}\sin bx$ is ----- [ ]

A) $\frac{-x\cos bx}{2b}$ B) $\frac{-b\cos bx}{2b}$

C) $\frac{-b\cos bx}{2x}$ D) none

34) Let i be the current and q be the charge in the condenser plate at time t. Then Voltage drop across the resistance V = ------------ [ ]

A) qi B) Ri C) $\frac{q}{c}$ D) None

35) Which of the following is a solution to the differential equation $\frac{dy}{dx}+3y=0$ -------[ ]

A) $y=-3e^{x}$ B) $y=Ce^{x}$

C) $y=ce^{-3x}$ D) $y=ce^{3x}$

36) The value of $\frac{1}{D^2+D+1}e^{x}$ is ------------ [ ]

A) $\frac{1}{6}e^{x}$ B) $\frac{1}{2}e^{x}$

C) $\frac{1}{3}e^{x}$ D) None

37) The differential equation of L-C circuit with electro motive force (e.m.f) is -------- [ ]

A) $L\frac{di}{dt}-\frac{q}{c}=0$ B) $L\frac{di}{dt}+\frac{q}{c}=0$

C) $L\frac{di}{dt}+\frac{q}{t}+i=0$ D) $\frac{d^2q}{dt^2}+\frac{q}{LC}=\frac{E}{L}$.

38) The C. F of the equation $(D^3-D)y=x$ is------------------- [ ]

A) c_1+c_{2x} B) $c_1+c_2e^{x}+c_3e^{-x}$

C) c_1x+c_2 D) None

39) The complementary function of $(D^2-a^2)y=0$ ------ [ ]

A) $y=c_1e^{ax}$ B) $y=c_1+c_2e^{ax}$

C) y=c_1+c_2x D) $y=c_1e^{ax}+c_2e^{-ax}$

40) The P.I of the equation $(D^2+4)y=cos2x$ is------------------- [ ]

A) $\frac{x}{2}cos2x$ B) $\frac{x}{4}sin2x$

C) $\frac{x}{2}sin2x$ D) None

UNIT – II

1. If $f(x) = f(0) + f^{'}(0).x + f^{''}(0).\frac{x^2}{2!} + ... + f^{n}(0).\frac{x^n}{n!}$ then the series is called [ ]
   A) Maclaurin's series B)Taylor's series C)Cauchy's series D) Lagrange's series
2. If $f(0) = 0, f^{'}(0) = 1, f^{''}(0) = 1, f^{'''}(0) = -1$ then the Maclaurin's series expansion of $f(x)$ is given by [ ]
   A) $x + \frac{x^2}{2} + \frac{x^3}{3} + ...$ B) $x + \frac{x^2}{2} - \frac{x^3}{6} + ...$ C) $-x - \frac{x^2}{2} - \frac{x^3}{6} + ...$ D) $x - \frac{x^2}{2} + \frac{x^3}{6} + ...$
3. If $x = r\cos\theta$, $y = r\sin\theta$, then $\frac{\partial x}{\partial r}, \frac{\partial y}{\partial \theta}$ are [ ]
   A) $\cos\theta, r\cos\theta$ B) $\cos\theta, \sin\theta$ C) $\cos\theta, \sec\theta$ D) $\cos\theta, r\cos ec\theta$
4. In Taylor's series expansion,the third term is ___________. [ ]
   A) f(a) B) $(x-a)f^{'}(a)$ C) $\frac{(x-a)^2}{2!}f^{''}(a)$ D) $\frac{(x-a)^3}{3!}f^{'''}(a)$
5. Maclaurin's series expansion for $\log(1+x) =$ [ ]
   A) $x - \frac{x^2}{2} + \frac{x^3}{3} - ...$ B) $x - \frac{x^2}{2} - \frac{x^3}{2} - ....$ C) $x + \frac{x^2}{2} + \frac{x^3}{2} + ...$ D) $1 + x + x^2 + ..$
6. The first term of Taylor's series of Sin$x$ about $x = \pi/4$ is ___________. [ ]
   A) $\frac{1}{\sqrt{2}}$ B) $\left(x - \frac{\pi}{4}\right)\left(\frac{1}{\sqrt{2}}\right)$ C) $\frac{(x-\pi/4)^2}{2!}\left(\frac{1}{\sqrt{2}}\right)$ D) $\frac{(x-\pi/4)^3}{3!}\left(\frac{1}{\sqrt{2}}\right)$
7. The second term of Maclaurin's series of Cos x about $x = 0$ is ___________. [ ]
   A) 1 B) ∞ C)-1 D) 0
8. If $u = x^y$ $then$ $\frac{\partial u}{\partial x}$ = --------- [ ]
   A)yx^y B) yx^{y-1} C)$\frac{x^y}{y}$ D) $\frac{x^{y-1}}{y}$
9. If $u = J\left(\frac{u,v}{x,y}\right)$ $then$ $J\left(\frac{x,y}{u,v}\right)$ = ------- [ ]
   A) u B) 1 C)$\frac{1}{u^2}$ D)$\frac{1}{u}$
10. The maximum or minimum value of a function is called its ______ [ ]
    A) extreme value B)saddle point C)exact value D)critical point
11. If $\ln - m^2 > 0$ & $l < 0$ then the function $f(x,y)$ is [ ]
    A) No conclusion B) Neither Max nor Min C) Maximum D) Minimum
12. If $\ln - m^2 < 0$ at a point (a,b) then (a,b) is called [ ]

A) a point of maximum B) a point of minimum C) a saddle point D) extreme value

13. If $l = f_{xx}(a,b)$ m= $f_{xy}(a,b)$, $n = f_{yy}(a,b)$ then $f(x,y)$ has maximum value then [ ]
A) $ln - m^2 < 0$ B) $\ln - m^2 > 0, l < 0$ C) $\ln - m^2 > 0, l > 0$ D) $ln - m^2 = 0$
14. If $rt - s^2 > 0$ & $r > 0$ then the function $f(x,y)$ is ---------- [ ]
A) Minimum B) Maximum C) Neither Max nor Min D) Undecided
15. Jacobian is a ___________. [ ]
A) rank B) constant C) function D) determinant value
16. If $x = r\cos\theta; y = r\sin\theta$, then $\frac{\partial(x,y)}{\partial(r,\theta)}$ =_______________ [ ]
A) -r B) 1/r C) r D) -1/r
17. The radius of curvature in Cartesian co-ordinates is $\rho =$ [ ]
A) $1 + \frac{(1+y_1^2)^2}{y_2}$ B) $\frac{(1+y_1^2)^{3/2}}{y_2}$ C) $\frac{(1+y_1^2)^{2/3}}{y_2}$ D) $\frac{(1-y_1^2)^{3/2}}{y_2}$
18. The polar form formula for the radius of curvature is $\rho =$ ---------- [ ]
A) $\frac{(r^2+r_1^2)^{3/2}}{r^2+2r_1^2-r}$ B) $\frac{(r^2+r_1^2)^{3/2}}{r^2+2r_1^2-rr_2}$ C) $\frac{(r^2-r_1^2)^{2/3}}{r^2+2r_1^2-rr_2}$ D) $\frac{(r^2+r_2^2)^{3/2}}{r_1^2+2r_2^2-rr_2}$
19. Curvature at any point on the straight line is __________ [ ]
A) 0 B) ∞ C) 1 D) constant
20. If y-axis is the tangent at the origin to the curve then the radius of curvature at $(0,0)$ is [ ]
A) $\underset{(x,y)\to(0,0)}{lt} \frac{x^2}{2y}$ B) $\underset{y\to 0}{lt} \frac{x^2}{2y}$ C) $\underset{(x,y)\to(0,0)}{lt} \frac{y^2}{2x}$ D) None
21. Radius of curvature at (0,0) of the curve $2x^4 + 2y^4 + 4x^2y + xy - y^2 + 2x$=0 is [ ]
A) 3 B) 1 C) 2 D) 4
22. The rate of change of bending of curves at any point is called_____ [ ]
A) length B) volume C) curvature D) area
23. The stationary values of the function f(x)=$x^5 - 5x^4$ are ________ [ ]
A) 0,4 B) 0,5 C) 0,0 D) 1,-1
24. Find the point on the plane $x + 2y + 3z = 10$ which is nearest to the origin for this write the Lagrangian function ___________. [ ]
A) $(x + y + z) + \lambda\ (x + 2y + 3z - 10)$ B) $(x^2 + y^2 + z^2) + \lambda(x + 2y + 3z - 10)$
C) $(xyz) + \lambda(x + zy + 3z - 10)$ D) none
25. If l=2, m=4,n=10, then the function has ___________. [ ]
A) either max (or) min B) max C) min D) undecided
26. If u =$\frac{x}{y}$, v =$\frac{x+y}{x-y}$ are functional dependence, then find the relation ___________. [ ]
A) v = u B) v = $\frac{u+1}{u-1}$ C) u = $\frac{v+1}{v-1}$ D) $\frac{u}{v}$
27. If u=$x + y + z$, $v = x^2 + y^2 + z^2$, $w = xy + yz + zx$ are functional dependence, then find relation between them ___________. [ ]
A) u^2=v+2w B) v^2=u^2+2w C) w^2=v+u D) uv=w
28. If l=2, m=2,n=0, then the function has ___________. [ ]
A) max B) min C) no extreme value C) no conclusion
29. If $f(x,y) = xy + (x - y)$ the stationary points are [ ]
A) (1,2) B) (0,0) C) (1,-1) D) (1,1)
30. If $u = x^2 + y^2$ then $\frac{\partial^2 u}{\partial x \partial y}$ is equal to [ ]

A)2 B) 0 C) 2x+2y D) x+y

31. $\frac{\partial(u,v)}{\partial(x,y)}\cdot\frac{\partial(x,y)}{\partial(u,v)}$ equals to [ ]

A)1 B) -1 C) 0 D)none of these

32. The curvature at any point of a circle at any point on it is a [ ]

A)0 B) 1 C) constant D)does not exit

33. The radius of curvature of the curve $r = a\theta$ at the point (a,θ) is [ ]

A) $\frac{(r^2+a^2)^{3/2}}{r^2+2a^2}$ B) $\frac{(r^2-a^2)^{3/2}}{r^2+2a^2}$ C) $\frac{(r^2+a^2)}{r^2+2a^2}$ D) $\frac{(r^2+a^2)^{1/2}}{r^2+2a^2}$

34. The radius of curvature of the curve $y = e^x$ at (0,1) is [ ]

A)1 B) 4 C)0 D)∞

35. .If $x = r\cos\theta; y = r\sin\theta$,then [ ]

A) $\frac{\partial x}{\partial r} = 1\Big/\frac{\partial r}{\partial x}$ B) $\frac{\partial x}{\partial r} = \frac{\partial r}{\partial x}$ C) $\frac{\partial x}{\partial r} = 0$ D $\frac{\partial x}{\partial r} = \frac{-\partial r}{\partial x}$

36. If $u = x^y$ then $\frac{\partial u}{\partial y}$ = --------- [ ]

A)0 B) yx^{y-1} C) $x^y \log x$ D) $\frac{x^{y-1}}{y}$

37. The fourth derivative of e^{-x} is [ ]

A) e^{-x} B) e^x C) $-e^{-x}$ D) e^{-x^2}

38. $D^{101}(x^{100}) =$ [ ]

A)100! B) 99 C)1 D)0

39. If the curvature of the curve is K , the radius of curvature is…….. [ ]

A) k B)1/k ^{2} C) $\frac{1}{k}$ D)0

40. Reciprocal of curvature at a point is called [ ]

A) Radius of curvature B) curvature C) tangent D) curve

UNIT – III

1. $\int_0^2\int_0^x y\,dy\,dx$ [ ]

A) $\frac{4}{3}$ B) $\frac{8}{3}$ C) 4 D) 1

2. $\int_0^1 e^x dx =$ [ ]

A) $e+1$ B) $e-1$ C) e D) $e+2$

3. $\int_0^a\int_0^{\sqrt{ay}} xy\,dy\,dx$ [ ]

A) $\frac{a^4}{6}$ B) $\frac{a^4}{5}$ C) $\frac{a^4}{4}$ D) $\frac{a^4}{3}$

4. The value of double integral $\int_0^1 \int_1^2 xydydx$ is [ ]

A) $\frac{4}{3}$ B) $\frac{3}{4}$ C) 0 D) 1

5. The value of double integral $\int_0^{\pi/2} \int_0^1 drd\theta$ [ ]

A) π B) π/2 C)2π D) None

6. The value of the triple integral $\int_0^1 \int_1^2 \int_2^3 dz\ dy\ dx$ is-------- [ ]

A)2 B) 3 C)1 D) 0

7. The value of double integral $\int_{-1}^{2} \int_{x^2}^{x+2} dydx$ [ ]

A) $\frac{9}{4}$ B) $\frac{9}{2}$ C) $\frac{3}{2}$ D) 3

8. The value of the triple integral $\int_0^1 \int_0^1 \int_0^1 e^{x+y+z} dx\ dy\ dz$ is-------- [ ]

A) $(e-1)^2$ B) $(e-1)$ C) $(e-1)^3$ D) None

9. $\int_0^1 \int_1^2 xy\ dy\ dx$ [ ]

A) $\frac{4}{3}$ B) $\frac{3}{4}$ C) $\frac{5}{3}$ D) $\frac{5}{4}$

10. $\int_0^2 \int_0^x (x+y)\ dxdy$ [ ]

A) 2 B) 5 C)4 D) None

11. The value of the triple integral $\int_0^1 \int_0^2 \int_{0\backslash}^3 dx\ dy\ dz$ is-------- [ ]

A) 3 B) 5 C)8 D) 6

12. The value of double integral $\int_0^2 \int_0^1 dydx$ [ ]

A) 2 B) 1 C) 4 D) 3

13. The value of double integral $\int_0^3 \int_0^2 (4-y)^2\ dydx$ [ ]

A) 16 B) 15 C)8 D) 3

14. The value of double integral $\int_0^2 \int_0^x dydx$ [ ]

A) x B) 4 C)1 D) 2

15. The value of $\int_{-a}^{a} |x| dx =$ [ ]

A) a B) a^2 C) 0 D) 2a

16. If f(x) = f (2a – x) then $\int_0^{2a} f(x)dx =$ [ ]

A) $\int_0^a f(x)dx$ B) $2\int_0^a f(x)dx$ C) $-2\int_0^{2a} f(x)dx$ D) $\int_0^a f(2a-x)dx$

17. $\int_0^\infty e^{-x^2}dx =$ [ ]

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

18. $\int_0^2 \int_0^x (x+y)dydx$ [ ]

A) 3 B) 4 C) 5 D) 6

19. The area of a region R bounded by the given curves is [ ]

A) $\iint_R dxdy$ B) $\iint_R xdxdy$ C) $\iint_R x^2dxdy$ D) None

20. If the region is represented in polar coordinates then the area is given by [ ]

A) $\iint_R rdrd\theta$ B) $\iint_R r^2drd\theta$ C) $\iint_R drd\theta$ D) None

21. If the region R is bounded by $x = 0$, $y = 0$ $x + y = 1$ and if the vertical strip is considered first then the limits of Y are ……. [ ]

A) $0, 1-x$ B) $0, 1+x$ C) $0, 1-y$ D) $0, 1+y$

22. If the region R is bounded by $x = 0$, $y = 0$ $x + 2y = 2$ and if the vertical strip is considered first then the limits of X are ……. [ ]

A) 0,1 B)0,2 C)0,x D) 1,x

23. If the region R is bounded by $x = 0$, $y = 0$ $x + 2y = 2$ and if the vertical strip is considered first then the limits of Y are ……. [ ]

A) $0, x$ B) $0, \frac{x}{2}$ C) $0, \frac{2-x}{2}$ D) 0, 1

24. $\iint r^3 drd\theta$ over the region included between the circles $r = 2\sin\theta$, $r = 4\sin\theta$ is [ ]

A) $\int_0^{\pi} \int_{2\sin\theta}^{4\sin\theta} r^3 drd\theta$ B) $\int_0^{\pi/2} \int_{2\sin\theta}^{4\sin\theta} r^3 drd\theta$ C) $\int_{-\pi}^{\pi} \int_{2\sin\theta}^{4\sin\theta} r^3 drd\theta$ D) None

25. If the region R is bounded by $x = 0, y = 0, x + y = 1$ and if vertical strip is consider first then the limits of x are [ ]

A)1,1 B)0,1 C)0,1-y D) 0,1-x

26. The area enclosed by the parabolas $x^2 = y$ and $y^2 = x$ is … [ ]

A) $\frac{1}{3}$ B) $\frac{2}{3}$ C) $\frac{1}{4}$ D) $\frac{\sqrt{2}}{3}$

27. $\int_{-1}^{1} \int_{-2}^{2} \int_{-3}^{3} dz\, dy\, dx$ [ ]

A) 12 B)24 C) 48 D) 36

28. $\int_0^1 \int_0^1 \int_0^1 xyzdx\, dy\, dz$ [ ]

A) $\frac{1}{3}$ B) $\frac{1}{5}$ C) $\frac{1}{8}$ D) $\frac{1}{12}$

29. $\int_{0}^{\pi}\int_{0}^{a\cos\theta} r\sin\theta dr d\theta$ [ ]

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

30. Using the Double integral we can find ___________. [ ]

A) Length B)Area C)Volume D) None

31. Using the Triple Integral we can find ________________. [ ]

A) Length B) Area C)Volume D) None

32. Suppose the region of integration is $x = 0, x = a, y = 0, y = \sqrt{a^2 - x^2}$ then the region lies in--------- [ ]

A) 2nd quadrant B) 3rd quadrant C) 4nd quadrant D) 1nd quadrant

33. By change of variables method, $dx\,dy = =$ [ ]

A) $dr\,d\theta$ B) $r\,dr\,d\theta$ C) $2dr\,d\theta$ D) None

34. Using the single Integral we can find ___________ [ ]

A) Length B)Area C)Volume D) None

35. Suppose the region of integration is $x = 0, x = a, y = 0, y = \sqrt{a^2 - x^2}$ then by change of order of integration method y varies from [ ]

A) 0 to 1 B) 0 to a C) 0 to $\sqrt{a^2 - x^2}$ D) 0 to 2

36. To get y limits in 'x', draw the strip parallel to ______________ $axis$ [ ]

A) X B) Y C) Any D) none

37. Evaluate $\int_{x=1}^{2}\int_{y=3}^{4}(x+y)dxdy$ [ ]

A) 5 B) 2 C) 1 D) 3

38. The limits of integration of $\iint(x^2+y^2)dxdy$ over the domain bounded by $y = x^2 \& y^2 = x$ are ----- [ ]

A) $x = 0\ to\ 1; y = 0\ to\ 1$ B) $x = y\ to\ \sqrt{y}; y = 0\ to\ 1$

C) $x = 0\ to\ 1, y = x^2 to\ \sqrt{x}$ D) None

39. To get x limits in 'y' draw the strip parallel to ______________ $axis$ [ ]

A) X B) Y C) Any D) none

40. Find the value of $\int_0^{\pi}\int_0^{a\sin\theta} r dr\, d\theta =$__________ [ ]

A) $3\pi a^2$ B) $\frac{\pi a^2}{4}$ C) πa^2 D) None

UNIT – IV

1. $L\{e^{-at}\} =$ [ ]

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

2. $L\{Cosat\}=$ [ ]

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

3. $L\{2\}=$ [ ]

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

4. $L\{Coshat\}=$ [ ]

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

5. $L\{e^{at}\sin bt\}=$ [ ]

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

6. If $L\{f(t)\}=\bar{f}(s)$ then $L\{e^{-at}f(t)\}=$ [ ]

A) $\bar{f}(s+a)$ B) $\bar{f}(s-a)$ C) $\bar{f}(as)$ D) $(s+a)$

7. The Laplace transform of $f(t)$ is defined as [ ]

A) $\int_0^\infty e^{-st}f(t)dt$ B) $\int_0^\infty e^{-st}\bar{f}(s)dt$ C) $\int_0^\infty e^{st}f(t)dt$ D) None

8. $L\{\sin at\}=$ [ ]

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

9. $L\{\sinh at\}=$ [ ]

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

10. $L\left\{\frac{e^{-at}-e^{-bt}}{t}\right\}=$ [ ]

A) $\log\left(\frac{s+b}{s+a}\right)$ B) $\frac{1}{2}\log\left(\frac{s-a}{s-b}\right)$ C) $\frac{1}{2}\log\left(\frac{s-a}{s+b}\right)$ D) $\log\left(\frac{s+a}{s+b}\right)$

11. $L\{k\}=$ [ ]

A) $\frac{k}{s}$ B) $\frac{1}{s}$ C) $\frac{1}{s^2}$ D) k

12. If $H(t-a)$ is a unit step function then $L\{H(t-a)\}=$ [ ]

A) $\frac{e^{-as}}{s}$ B) $\frac{3e^{-at}}{s}$ C) $4e^{3s}$ D) $\frac{e^{-at}}{s}$

13. $L\{e^{at}\} =$ [ ]

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

14. $L\{e^{at}t^2\} =$ [ ]

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

15. $L\{e^{at}\cos at\} =$ [ ]

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

16. If $L\{f(t)\} = \bar{f}(s)$, then $L\left\{\frac{f(t)}{t}\right\} =$ [ ]

A) $\int_s^\infty \bar{f}(s)ds$ B) $\int_{-\infty}^\infty \bar{f}(s)ds$ C) $\int_{-\infty}^\infty \bar{f}(t)ds$ D) $\int_0^\infty \bar{f}(s)ds$

17. If $L\{f(t)\} = \bar{f}(s)$,then $L\{e^{at}f(t)\}$ ____________. [ ]

A) $\bar{f}(s)$ B) $\bar{f}(s-a)$ C) $\bar{f}(s+a)$ D) None

18. When $|s| > k, L\{\sinh kt\} =$ ___________ [ ]

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

19. Find the value of $L\{t^2+3t+10\}$=____________. [ ]

A) $\frac{2}{s^3}+\frac{3}{s^2}+\frac{10}{s}$ B) $\frac{2}{s^3}+\frac{10}{s}$ C) $\frac{3}{s^2}+\frac{10}{s}$ D) None

20. If $L\{f(t)\} = \bar{f}(s)$,then $L\{f(at)\}$ ____________. [ ]

A) $a\bar{f}(s)$ B) $\frac{1}{a}\bar{f}\left(\frac{s}{a}\right)$ C) $\bar{f}\left(\frac{s}{a}\right)$ D) None

21. $L\{\cosh 3t\} =$ [ ]

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

22. Find $L\{e^t\cos t\}$=________________. [ ]

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

23. Find the value of $L\{t^3+6\}$=____________. [ ]

A) $\frac{3}{s^2}+\frac{6}{s}$ B) $\frac{6}{s^4}+\frac{6}{s}$ C) $\frac{3}{s^2}-\frac{6}{s}$ D) None

24. If $L\{f(t)\} = \bar{f}(s)$,then $L\{f(3t)\}$ ____________. [ ]

A) $\frac{1}{3}\bar{f}\left(\frac{s}{3}\right)$ B) $\bar{f}\left(\frac{s}{3}\right)$ C) $3f(t)$ D) $\overline{3f}\left(\frac{s}{3}\right)$

25. $L\{t\sin at\} =$ [ ]

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

26. Find $L\{t\cos t\} =$ [ ]

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

27. Find $L\{t\,e^t\}=$ [ ]

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

28. If $L\{f(t)\}=\bar{f}(s)$ then $L\{f^1(t)\}=$ [ ]

A) $s\bar{f}(s)-f(0)$ B) $s\bar{f}(s)+f(0)$ C) $\bar{f}(s)-f(0)$ D) $s\bar{f}(s)-f'(0)$

29. $L\{c_1 f_1(t)+c_2 f_2(t))=c_1 L\{f_1(t)\}+c_2 L\{f_{21}(t)\}$ This property in respect of Laplace transforms Is called [ ]

A) Shifting property B) Distributive property C) Symmetric property D) Linearity property

30. $L\{1\}=$ [ ]

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

31. $L\left\{\frac{1}{\sqrt{t}}\right\}=$ [ ]

A) $\sqrt{\frac{\pi}{s}}$ B) $\sqrt{\frac{1}{s}}$ C) $\sqrt{\frac{2\pi}{s}}$ D) $\sqrt{\frac{s}{\pi}}$

32. $L\{t^2\}=$ [ ]

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

33. $L\left\{\frac{\sinh t}{t}\right\}=$ [ ]

A) $\log\left(\frac{s+1}{s-1}\right)$ B) $\frac{1}{2}\log\left(\frac{s+1}{s-1}\right)$ C) $\frac{1}{2}\log\left(\frac{s-1}{s+1}\right)$ D) $\log\left(\frac{s-1}{s+1}\right)$

34. $L\{t\cos at\}$ [ ]

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

35. $L\{e^{-at}t^2\}=$ [ ]

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

36. $L\left\{\frac{1-e^t}{t}\right\}=$ [ ]

A) $\log\left(\frac{s+1}{s}\right)$ B) $\frac{1}{2}\log\left(\frac{s+1}{s-1}\right)$ C) $\frac{1}{2}\log\left(\frac{s-1}{s+1}\right)$ D) $\log\left(\frac{s-1}{s}\right)$

37. $L\{5-3t-2e^{-t}\}=$ [ ]

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

38. $L\{t^3\}=$ [ ]

A) $\frac{6}{s}$ B) $\frac{6}{s^3}$ C) $\frac{6}{s^2}$ D) $\frac{6}{s^4}$

39. $L\{\sin 3t.\cos t\}=$ [ ]

A) $\frac{1}{2}\left[\frac{4}{s^2+16}+\frac{2}{s^2+4}\right]$ B) $\left[\frac{4}{s^2+16}+\frac{2}{s^2+4}\right]$

C) $\frac{1}{2}\left[\frac{4}{s^2+16}-\frac{2}{s^2+4}\right]$ D) $\frac{1}{2}\left[\frac{2}{s^2+16}+\frac{4}{s^2+4}\right]$

40. $L\{\sin^3 2t.\}=$ [ ]

A) $\frac{3}{2}\left[\frac{4}{s^2+36}+\frac{2}{s^2+4}\right]$ B) $\left[\frac{4}{s^2+36}+\frac{2}{s^2+4}\right]$

C) $\frac{3}{2}\left[\frac{1}{s^2+4}-\frac{1}{s^2+36}\right]$ D) $\frac{3}{2}\left[\frac{1}{s^2+36}+\frac{1}{s^2+16}\right]$

UNIT – V

1. The value of $L^{-1}\left\{\frac{1}{s}\right\}=$ [ ]

(A) 1 B) 0 C) -1 D) None

2. If $L^{-1}\left\{\frac{1}{s-2}\right\}=$ [ ]

A) $\frac{e^{-at}}{s}$ B) $\frac{3e^{-at}}{2}$ C) e^{2t} D) $\frac{e^{-2s}}{2}$

3. If $L^{-1}\left\{\bar{f}(s)\right\}=f(t)$, then $L^{-1}\{f(as)\}=$ [ ]

(A) $\frac{1}{a}f\left(\frac{t}{a}\right)$ B) $\frac{1}{a}\bar{f}\left(\frac{s}{a}\right)$ C) $\frac{1}{a}f(at)$ D) None

4. If $L^{-1}\left\{\frac{4}{s-3}\right\}=$ [ ]

A) $\frac{e^{-at}}{s}$ B) $\frac{3e^{-at}}{s}$ C) $4e^{3t}$ D) $\frac{e^{-as}}{s}$

5. If $L^{-1}\{\bar{f}(s)\}=f(t)$ then $L^{-1}\{\bar{f}(s-a)\}=$________________. [ ]

A) $e^{-at}f(t)$ B) $e^{at}f(t)$ C) e^{at} D) None

6. $L^{-1}\left\{\frac{1}{s^n}\right\}$ is possible only when 'n' is ______________ [ ]

A) Positive integer B) zero C) Negative integer D) No

7. Find $L^{-1}\left\{\frac{(s-a)}{(s-a)^2+b^2}\right\} =$ ____________ [ ]

A) $e^{at}\cosh bt$ B) $e^{-at}\sin bt$ C) $e^{at}\cos bt$ D) $e^{t}\cos bt$

8. If $L^{-1}\{\overline{f}(s)\} = f(t)$ and f(0) = 0, then $L^{-1}\{s\overline{f}(s)\} =$ ______________ [ ]

A) $(-1)^n f^n(t)$ B) $(-1)^n f(t)$ C) $(-1)^n \frac{f^n(t)}{t}$ D) $f'(t)$

9. Find the value of $L^{-1}\left\{\frac{1}{(s-a)^5}\right\} =$ ___________. [ ]

A) $e^{at}t^4$ B) $e^{at}t^4/4$ C) $e^{at}\frac{t^4}{4!}$ D) $\frac{t^4}{4!}$

10. Find the value of $L^{-1}\left\{\frac{s^2+3s+7}{s^3}\right\} =$ ___________. [ ]

A) $1-3t-\frac{7}{2}t^2$ B) $1-3t+\frac{7}{2}t^2$ C) $1 \quad 3t \quad 7t^2$ D) None

11. If $L^{-1}\{\overline{f}(s)\} = f(t)$ and $f(0) = 0$, then $L^{-1}\{s\,\overline{f}(s)\} =$ [ ]

A) $f''(t)$ B) $f(s)$ C) $f'(t)$ D) $f^1(s)$

12. If $L^{-1}\left\{\frac{1}{s^n}\right\}$ is a possible only when n is [ ]

A) Positive integer B) Zero C) Negative integer D) All of these

13. If n is a positive integer ,then $L^{-1}\left\{\frac{1}{(s)^{n+1}}\right\} =$ _________ [ ]

A) t^n B) $t^{n \quad 1}$ C) $t^n/n!$ D) None

14. If $L^{-1}\{\overline{f}(s)\} = f(t)$ and then $L^{-1}\left\{\int_s^\infty \overline{f}(s)ds\right\} =$ [ ]

A) tf(t) B) $\frac{f(t)}{t}$ C) $e^{at}f(t)$ D)None

15. If $L^{-1}\left\{\frac{1}{s^2+a^2}\right\} =$ [ ]

(A) $\frac{1}{a}\sin at$ B) $\frac{1}{a}\cos at$ C) $\sin at$ D) $\cos at$

16. If $L^{-1}\{\overline{f}(s)\} = f(t)$ and $n = 1,2,3,---$then $L^{-1}\left\{\frac{d^n}{ds^n}\left[\overline{f}(s)\right]\right\} =$ [ ]

(A) $-t^n f(t)$ B) $(-1)^n t^n f(t)$ C) $(1)^n t^n f(t)$ D) $t^n f(t)$

17. If $L^{-1}\left\{\frac{s}{s^2-2^2}\right\} =$ [ ]

(A) $\frac{1}{2}\sinh 2t$ B) $\frac{1}{2}\cos 2t$ C) $\sin 2t$ D) $\cosh 2t$

18. If $L^{-1}\{\overline{f}(s)\} = f(t)$ then $L^{-1}\{\overline{f}^1(s)\} =$ [ ]

(A) $(t)^n f(t)$ B) $t\,f(t)$ C) $-t^2 f(t)$ D) $-t\,f(t)$

19. If $L^{-1}\left\{\frac{s^2-4}{(s^2+4)^2}\right\} =$ [ ]

(A) $\frac{t}{2}\sin 2t$ B) $\frac{t}{2}\cos 2t$ C) $t\sin 2t$ D) $t\cos 2t$

20. If $L^{-1}\{\overline{f}(s)\} = f(t)$ then $L^{-1}\{\overline{f}(s+a)\} =$ _______________. [ ]

A) $e^{-at}f(t)$ B) $e^{at}f(t)$ C) e^{at} D) None

21. If $L^{-1}\left\{\frac{1}{2s-5}\right\} =$ [ ]

(A) $\frac{1}{2}e^{\frac{5t}{2}}$ B) $-\frac{1}{2}e^{\frac{5t}{2}}$ C) $e^{\frac{5t}{2}}$ D) $\frac{1}{2}e^{\frac{2t}{5}}$

22. If $L^{-1}\left\{\frac{2as}{(s^2+a^2)^2}\right\} =$ [ ]

(A) $\frac{t}{a}\sin at$ B) $\frac{t}{a}\cos at$ C) $t\sin at$ D) $t\cos at$

23. The value of $L^{-1}\left\{\frac{1}{(S-a)^5}\right\}$ is [ ]

A) $e^{-at}\frac{t^4}{24}$ B) $e^{at}t^4$ C) $e^{at}\frac{t^4}{24}$ D) $e^{-at}t^4$

24. Find the value of $L^{-1}\left\{\frac{1}{(s+2)^2}\right\} =$ ____________. [ ]

A) $t.e^{-2t}$ B) $t.e^{2t}$ C) $t.e^{t}$ D) e^{2t}

25. If $L^{-1}\left\{\frac{s}{s^2+2^2}\right\} =$ [ ]

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

26. If $L^{-1}\left\{\frac{s^2-a^2}{(s^2+a^2)^2}\right\} =$ [ ]

(A) $\frac{t}{a}\sin at$ B) $\frac{t}{a}\cos at$ C) $t\sin at$ D) $t\cos at$

27. If $L^{-1}\{e^{-as}\overline{f}(s)\} =$ [ ]

A) $f(t+a)H(t-a)$ B) $f(t-a)H(t-a)$ C) $f(t-a)H(t+a)$ D) None

28. If $\overline{f}(s) = \tan^{-1}s$ then $L^{-1}\{\overline{f}(s)\} =$ [ ]

(A) $\frac{\sin 2t}{t}$ B) $\frac{\cos t}{t}$ C) $\frac{-\sin t}{t}$ D) $\frac{\sin t}{t}$

29. If $\overline{f}(s) = \log\left(\frac{s+1}{s-1}\right)$ then $L^{-1}\{\overline{f}(s)\} =$ [ ]

(A) $\frac{2}{t}\sin 2t$ B) $\frac{t}{2}\cosh t$ C) $\frac{2}{t}\sinh t$ D) $\frac{t}{2}\cos 2t$

30. If $L^{-1}\left\{\frac{2s}{(s^2+1^2)^2}\right\} =$ [ ]

(A) $\frac{t}{2}\sin t$ B) $\frac{t}{2}\cos t$ C) $t\sin t$ D) $t\cos t$

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

(A) $\frac{t}{3}\sin 3t$ B) $\frac{t}{3}\cos 3t$ C) $t\sin 3t$ D) $t\cos 3t$

32. If $L^{-1}\{\bar{f}(s)\}=f(t)$ then $L^{-1}\{\bar{f}^{n}(s)\}=$ [ ]

(A) $(-1)^n f(t)$ B) $(-1)^n t^n f(t)$ C) $t^n f(t)$ D) None

33. If $L^{-1}\{\bar{f}(s)\}=f(t)$ then $L^{-1}\{\bar{f}(as)\}=$ [ ]

(A) $\frac{1}{a}f\left(\frac{t}{a}\right)$ B) $f\left(\frac{t}{a}\right)$ C) $\frac{1}{a}f(t)$ D) None

34. If $\bar{f}(s)=\cot^{-1}s$ then $L^{-1}\{\bar{f}(s)\}=$ [ ]

(A) $\frac{\sin 2t}{t}$ B) $\frac{\cos t}{t}$ C) $\frac{-\sin t}{t}$ D) $\frac{\sin t}{t}$

35. If $\bar{f}(s)=\log\left(\frac{1+s}{s^2}\right)$ then $L^{-1}\{\bar{f}(s)\}=$ [ ]

(A) $\frac{2-e^{2t}}{t}$ B) $\frac{2+e^{2t}}{t}$ C) $\frac{e^{2t}-2}{t}$ D) None

36. If $L^{-1}\{\bar{f}(s)\}=f(t)$, then $L^{-1}\left\{\int_s^\infty \bar{f}(s)\,ds\right\}=$ [ ]

(A) $f(t)$ B) $\frac{f(t)}{t}$ C) $\frac{f(s)}{s}$ D) None

37. If $L^{-1}\{\bar{f}(s)\}=f(t)$ and $f(0)=0$, then $L^{-1}\{s\bar{f}(s)\}=$ [ ]

(A) $f(t)$ B) $\frac{f(t)}{t}$ C) $\frac{f^1(s)}{s}$ D) $f^1(t)$

38. If $L^{-1}\{\bar{f}(s)\}=f(t)$ and $L^{-1}\{\bar{g}(s)\}=g(t)$, then $L^{-1}\{\bar{f}(s).\,\bar{g}(s)\}=$ [ ]

(A) $f(t)*g(t)$ B) $f(s)*g(s)$ C) $\frac{f(t)}{g(t)}$ D) None

39. If $L^{-1}\left\{\frac{1}{s+2}\right\}=$ [ ]

A) e^{2t} B) $\frac{3e^{-2t}}{2}$ C) e^{-2t} D) $\frac{e^{-2s}}{2}$

40. Find the value of $L^{-1}\left\{\frac{1}{s^2-5s+6}\right\}$ – ____________. [ ]

A) $e^{-3t}-e^{-2t}$ B) $e^{3t}+e^{-2t}$ C) $e^{3t}-e^{2t}$ D) None