VALLIAMMAI ENGEINEERING COLLEGE

(S.R.M.NAGAR, KATTANKULATHUR-603 203)

DEPARTMENT OF MATHEMATICS

QUESTION BANK

I SEMESTER

MA8151-ENGINEERING MATHEMATICS -1

Regulation – 2017

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VALLIAMMAI ENGINEERING COLLEGE

S.R.M.NAGAR, KATTANKULAR

DEPARTMENT OF MATHEMATICS

SUBJECT CODE / NAME: MA8151- ENGINEERING MATHEMATICS –I

SEMESTER / YEAR: I SEMESTER / I YEAR (COMMON TO ALL BRANCHES)

UNIT I DIFFERENTIAL CALCULUS

Representation of functions - Limit of a function - Continuity - Derivatives - Differentiation rules - Maxima and Minima of functions of one variable.

Q.No.	Question	Bloom's Taxonomy Level	Domain
	PART – A		
1.	Show that lim → sin = .	BTL -1	Remembering
2.	Prove that lim → cos = .	BTL -1	Remembering
3.	Evaluate lim → π +c − x x .	BTL -5	Evaluating
4.	Find a x −x .	BTL -2	Understanding
5.	Use the squeeze theorem to show that lim→ √ + =0	BTL -3	Applying
6.	Find lim →∞ 1 x √	BTL -2	Understanding
7.	Calculate e lim →− +	BTL -3	Applying
8.	Evaluate the limit for x+	BTL -5	Evaluating
9.	Find the limits if it exists for lim → + − −	BTL -2	Understanding
10.	Compute the' = ln|cos ln |	BTL -3	Applying
	Point out —	BTL -4	Analyzing
11.	Predict the values of a and b so that the function f given		
12.		BTL -2	Understanding

	by $= \{ \; + \quad < \; <$ $\neq$ is continuous at x=3 and x=5.		
	$= \{ \quad =$ what is the value of c?		
14.	Where the function is $= \| \; \|$ is differentiable?	**BTL -2**	Understanding
15.	Estimate	**BTL -2**	Understanding
16.	Calculate $(\; - \;) \; \sqrt{}$	**BTL -3**	Applying
17.	Compute $(\quad)$	**BTL -3**	Applying
18.	Evaluate $1 \; (\; + \; =$	**BTL -5**	Evaluating
19.	Estimate	**BTL -2**	Understanding
20.	Find the critical numbers of the function $= \; - \; -$	**BTL -3**	Applying

PART – B

1.(a)	Point out the domain where the function f is continuous Also find the number at which the function f is discontinuous when $= \; - \; + \; , - \; / - \; >$	**BTL -4**	Analyzing
1. (b)	function	**BTL -3**	Applying
	Show that the function is continuous an the interval [-1,1]. $= \; - \sqrt{} \; -$	**BTL -1**	Remembering
2.(b)	Estimate the absolute maximum and minimum of the function	**BTL -2**	Understanding
	Where is the function $+ a \; -$ continuous?	**BTL -4**	Analyzing
3.(b)	Calculate the absolute maximum and minimum of the function	**BTL -3**	Applying

4. (a)	Prove that the equation has at most one real root in the interval [-2,2]. − + =	**BTL -1**	Remembering
4.(b)	Find the absolute maximum and minimum of f(x)= -	**BTL -3**	Applying
5. (a)	Show that there is a root of the equation between 1 and 2. − + − =	**BTL -1**	Remembering
5.(b)	Calculate the local maximum and local minimum of (1,2). - -	**BTL -3**	Applying
6. (a)	Show that the function has a root in the interval - + - +	**BTL -1**	Remembering
6.(b)	Point out the local maximum and minimum of by first derivative test.	**BTL -4**	Analyzing
7. (a)	Find the domain at which the function continuous and differentiable. =	**BTL -3**	Applying
7. (b)	Write an equation of the tangent line to a parabola at the point (1,1). =		
7. (b)	Predict the local maximum and minimum of the function	**BTL -2**	Understanding
8. (a)	point (1,1).	**BTL -1**	Remembering
8.(b)	Find where the function is increasing and where it is decreasing. Also find the local maximum and local minimum of f(x). - - - +	**BTL -3**	Applying
9. (a)	Find an equation of the tangent line to the hyperbola − at (3,1)	**BTL -3**	Applying
9.(b)	Show that there is a root of in the interval (1,2) + - - -	**BTL -1**	Remembering
10.(a)	Find the equation of tangent to the curve at the point (2,-4) = −	**BTL -3**	Applying
10.(b)	Use second derivative test to examine the relative maxima for	**BTL -3**	Applying
11.(a)	Find an equation of the tangent to the curve at the point (2,3). = - +	**BTL -3**	Applying
11.(b)	Point out the local maximum and minimum of using second derivative test. = -	**BTL -4**	Analyzing
12.(a)	Find the equation of tangent to the curve − at (1,1)	**BTL -3**	Applying
12.(b)	Examine the local extreme of = + − − + . Also dicuss the concavity and find the inflection points.	**BTL -2**	Understanding
13.(a)	Find the equation of tangent to the curve + at (1,1)	**BTL -3**	Applying
13.(b)	Discuss the curve - - with respect to cancavity , points of inflection and local maxima and minima - +	**BTL -3**	Applying

14.(a)	Find the equation of the tangent to the curve at (i) (1,1) (ii) (4,1/2)	BTL -3	Applying
14.(b)	Evaluate local maximum and minimum values for the function	BTL -5	Evaluating

UNIT II FUNCTIONS OF SEVERAL VARIABLES

Partial differentiation – Homogeneous functions and Euler's theorem – Total derivative – Change of variables – Jacobians – Partial differentiation of implicit functions – Taylor's series for functions of two variables – Maxima and minima of functions of two variables – Lagrange's method of undetermined multipliers

Q.No.	Question	Bloom's Taxonomy Level	Domain
	PART - A		
1.	If $u = \frac{y}{z} + \frac{z}{x} + \frac{x}{y}$, then find $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} + z\frac{\partial u}{\partial z}$.	BTL -1	Remembering
2.	If $u = f(x-y, y-z, z-x)$, then find $\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} + \frac{\partial u}{\partial z}$.	BTL -1	Remembering
4. 3.	If , then find $\frac{dy}{dx}$.	BTL -1	Remembering
	Statement of Euler s Theorem.		
5.	Find the value of $\frac{du}{dt}$, given $u = x^2 + y^2$, $x = at^2$, $y = 2at$.	BTL -1	Remembering
6.	If $u = x^3y^2 + x^2y^3$ where $x = at^2$ and $y = 2at$, then find $\frac{du}{dt}$.	BTL -3	Applying
7.	Find $\frac{du}{dt}$ if $u = \sin\left(\frac{x}{y}\right)$, where $x = e^t$, $y = t^2$.	BTL -3	Applying
8.	Find $\frac{du}{dt}$ if $u = \frac{x}{y}$ where $x = e^t$, $y = \log t$.	BTL -2	Understanding
9.	Find the Jacobian $\frac{\partial(r,\theta)}{\partial(x,y)}$, if $x = r\cos\theta$ & $y = r\sin\theta$.	BTL -3	Applying
10.	Find the Jacobian $\frac{\partial(u,v)}{\partial(r,\theta)}$, if $x = r\cos\theta$ & $y = r\sin\theta$, $u = 2xy$, $v = x^2 - y^2$, without actual substitution.	BTL -4	Analyzing
11.	If $u = \frac{y^2}{2x}$ and $v = \frac{x^2 + y^2}{2x}$, find $\frac{\partial(u,v)}{\partial(x,y)}$.	BTL -3	Applying

12.	If $x = u(1+v)$, $y = v(1+u)$. Find $\frac{\partial(x,y)}{\partial(u,v)}$.	**BTL -1**	Remembering
13.	If show that $\frac{\partial^2 u}{\partial x \partial y} = \frac{\partial^2 u}{\partial y \partial x}$	**BTL -2**	Understanding
14.	If $u = \frac{x+y}{1-xy}$ and $v = \tan^{-1} x + \tan^{-1} y$, find $\frac{\partial(u,v)}{\partial(x,y)}$	**BTL -3**	Applying

15.	Find the Taylor series expansion of near the point up to first term	**BTL -2**	Understanding
16.	Expand $xy + 2x - 3y + 2$ *in powers of* $(x - 1)$ & $(y + 2)$, using Taylor's theorem up to first degree form	**BTL -3**	Applying
17.	Find the Stationary points of $f(x, y) = x^3 + 3xy^2 - 15x^2 - 15y^2 + 72x$.	**BTL -4**	Analyzing
18.	Find the Stationary points of $x^2 - xy + y^2 - 2x + y$.	**BTL -4**	Analyzing
19.	State the Sufficient condition for $f(x, y)$ to be extremum at a point	**BTL -4**	Analyzing
20.	Find the minimum point of $x^2 + y^2 + 6x + 12$.	**BTL -4**	Analyzing

PART – B

1.(a)	If u = log (x² + y²) + tan⁻¹ (y/x), prove that	**BTL-1**	Remembering
1.(b)	If $u = \frac{yz}{x}, v = \frac{zx}{y}$ and $w = \frac{xy}{z}$, find $\frac{\partial(u, v, w)}{\partial(x, y, z)}$.	**BTL -3**	Applying
2. (a)	If + , Prove that — — (ii) = − + = .	**BTL -2**	Understanding
3.(a)		BTL -4	Analyzing
2.(b)	Find the Jacobian of of the transformation	**BTL -2**	Understanding
	then show that If z is a function of and and		
3.(b)	If $x + y + z = u$, $y + z = uv$, $z = uvw$, prove that $\frac{\partial(x, y, z)}{\partial(u, v, w)} = u^2 v$	**BTL -2**	Understanding
4. (a)	If $u = f(x, y)$ where $x = r\cos\theta, y = r\sin\theta$ prove that $\left(\frac{\partial u}{\partial x}\right)^2 + \left(\frac{\partial u}{\partial y}\right)^2 = \left(\frac{\partial u}{\partial r}\right)^2 + \frac{1}{r^2}\left(\frac{\partial u}{\partial \theta}\right)^2$	**BTL -4**	Analyzing
4.(b)	Verify Euler's theorem	**BTL -3**	Applying
5. (a)	If $z = f(x, y)$ where $x = u^2 - v^2$, $y = 2uv$ prove that $\frac{\partial^2 z}{\partial u^2} + \frac{\partial^2 z}{\partial v^2} = 4(u^2 + v^2)\left(\frac{\partial^2 z}{\partial x^2} + \frac{\partial^2 z}{\partial y^2}\right)$	**BTL -4**	Analyzing
5.(b)	If then find $\frac{\partial(x, y, z)}{\partial(u, v, w)}$	**BTL -3**	Applying

	$w)$			
6. (a)	If , + = Show that $\frac{\partial(u, v, w)}{\partial(x, y, z)}$ + 5 = U		BTL -3	Applying
6.(b)	If = $\log_e$ [+] , h h + = .		BTL -3	Applying

	If $= \log$ + + − $= -$ ++ show that — — — ———	BTL -3	Applying
7. (b)	If ——, Prove that = — — — ———	BTL -2	Understanding
8. (a)	Expand $e^x \log(1+y)$ in powers of up to terms of third degree terms using Taylor's series &	BTL -1	Remembering
8.(b)	Discuss the maxima and minima of	BTL -5	Evaluating
9. (a)	Expand $\tan^{-1}\frac{y}{x}$ in the neighborhood of (1, 1)	BTL -3	Applying
9.(b)	Find the Maximum value of $x^m y^n z^p$ *when* $x+y+z=a$.	BTL -3	Applying
10.(a)	Find the Taylors series expansion of at the point (-1, $\frac{\pi}{4}$) up to the third degree terms	BTL -4	Analyzing
10.(b)	Find the extreme value of $x^2+y^2+z^2$ subject to the condition $x+y+z=3a$.	BTL -2	Understanding
11.(a)	Expand in powers of and upto third degree terms by Taylor's series − −	BTL -4	Analyzing
11.(b)	Find the minimum value of $x^2 y z^3$ *subject to* $2x+y+3z=a$.	BTL -2	Understanding
12.(a)	Expand Taylor s series of $x^3 \; y^3 \; xy^2$ in powers of and , + + −	BTL -5	Evaluating
12.(b)	Find the volume of the greatest rectangular parallelepiped that can be inscribed in the ellipsoid $\frac{x^2}{a^2}+\frac{y^2}{b^2}+\frac{z^2}{c^2}=1$.	BTL -3	Applying
13.(a)	Find the extreme values of $f(x,y)=x^3+y^3-3x-12y+20$.	BTL -3	Applying
13.(b)	Find the shortest and longest distances from the point (1,2,-1) to the sphere $x^2+y^2+z^2=24$	BTL -4	Analyzing
14.(a)	A rectangular box open at the top is to have volume of 32 cm. Find the dimension of the box requiring least material for its Construction.	BTL -3	Applying
14.(b)	Find the maximum and minimum distances of the point (3,4,12) from the sphere $x^2+y^2+z^2=1$.	BTL -4	Analyzing

UNIT III INTEGRAL CALCULUS

Definite and Indefinite integrals - Substitution rule - Techniques of Integration - Integration by parts, Trigonometric integrals, Trigonometric substitutions, Integration of rational functions by partial fraction, Integration of irrational functions - Improper integrals.

Q.No.	Question	Bloom's Taxonomy Level	Domain

PART - A			
1.	Prove that the following integral by interpreting each in terms of areas	**BTL -1**	Remembering
2.	Show that	**BTL -1**	Remembering
3.	Evaluate interms of areas.	**BTL -5**	Evaluating
4.	Evaluate interms of areas.	**BTL -5**	Evaluating
5.	Evaluate the integral by using Riemann sum method	BTL -5	Evaluating
6.	Calculate dx	**BTL -3**	Applying
7.	Calculate √	**BTL -3**	Applying
8.	Find	**BTL -3**	Applying
9.	Find tan	**BTL -3**	Applying
10.	Evaluate -1 x	**BTL -5**	Evaluating
11.	Calculate	**BTL -3**	Applying
12.	Calculate	**BTL -3**	Applying
13.	Evaluate log	**BTL -2**	Understanding
14.	Evaluate	**BTL -5**	Evaluating
15.	Evaluate	**BTL -5**	Evaluating
16.	Evaluate	**BTL -5**	Evaluating
17.	Estimate	**BTL -5**	Evaluating
18.	improper integral , if possible.	**BTL -5**	Evaluating
19.	Find	**BTL -3**	Applying
20.	Prove that dx is divergent.	**BTL -1**	Remembering

PART -B			
1.(a)	Evaluate the integral using Riemann sum method and verify the answer by fundamental theorem of calculus	**BTL -5**	Evaluating
1. (b)	Calculate , by using trigonometric substitution.Hence use it to	**BTL -3**	Applying
2. (a)	Evaluate by using Riemann sum by taking the right end points as sample points. Hence verify it by using fundamental theorem of calculus	**BTL -5**	Evaluating
2.(b)	Find by trigonometric substitution	**BTL -3**	Applying
3. (a)	Evaluate by using Riemann sum by taking the right end points as sample points. Hence verify it by using fundamental theorem of calculus	**BTL -5**	Evaluating

3.(b)	Using trigonometric substitution evaluate	BTL -3	Applying
4. (a)	Evaluate sum by taking the right end points	BTL -5	Evaluating
4.(b)	Obtain dx using trigonometric substitution	BTL -3	Applying
5. (a)	Evaluate the following integrals by interpreting interms of areas	BTL -5	Evaluating
5.(b)	Calculate using partial fraction	BTL -3	Applying
6. (a)	Evaluate by interpreting interms of areas.	BTL -5	Evaluating
6.(b)	Find	BTL -3	Applying
7. (b)			
7. (a)	Evaluate by interpreting interms of areas.	BTL -5	Evaluating
	Use the substitution t = tan, totransform the integral as a rational function of t and then evaluate	BTL -3	Applying
8. (a)	Evaluate by interpreting interms of areas.	BTL -5	Evaluating
8.(b)	Calculate by partial fraction dx.	BTL -3	Applying
9. (a)	Evaluate	BTL -5	Evaluating
9.(b)	Compute partial faction.	BTL -3	Applying
10.(a)	Evaluate	BTL -5	Evaluating
10.(b)	Estimate by using an appropriate substitution.	BTL -2	Understanding
11.(a)	Evaluate	BTL -5	Evaluating
11.(b)	Determine whether the integrals are convergent or divergent evaluate if the integral is convergent (i) (ii) ∞	BTL -6	Creating
12.(a)	Prove the reduction formula . Hence by using it evaluate and	BTL -1	Remembering
12.(b)	For what values of p is the integral ∞ convergent?	BTL -6	Creating
13.(a)	Prove the reduction formula and use it to	BTL -1	Remembering

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	evaluate / . . / and		
13.(b)	Determine whether the integral ∞ ∞ is convergent or divergent.	BTL -6	Creating
14.(a)	Prove that - (n≠1)	BTL -1	Remembering
14.(b)	Evaluate the integral (i) (ii) Show that is convergent. + + ∞ -	BTL -5	Evaluating

UNIT IV MULTIPLE INTEGRALS

Double integrals – Change of order of integration – Double integrals in polar coordinates – Area enclosed by plane curves – Triple integrals – Volume of solids – Change of variables in double and triple integrals

Q.No.	Question	Bloom's Taxonomy Level	Domain
	PART - A		
1.	Evaluate	BTL -5	Evaluating
2.	Estimate	BTL -2	Understanding
3.	Compute the area bounded by the lines	BTL -3	Understanding
4.	Calculate = , = =	BTL -2	Understanding
5.	Compute +	BTL -3	Applying
6.	Estimate √	BTL -2	Understanding
7.	Compute	BTL -3	Applying
8.	Evaluate	BTL -5	Evaluating
9.	Evaluate	BTL -5	Evaluating
10.	Evaluate over the region bounded by = , = ,	BTL -5	Evaluating
11.	Change the order of integration	BTL -3	Applying
12.	Change the order of integration ,	BTL -3	Applying
13.	Change the order of integration ∞ ∞ ,	BTL -3	Applying
14.	Evaluate + + over the region bounded by	BTL -5	Evaluating
15.	Write down the double integral to find the area of the circles	BTL -1	Remembering
16.	Evaluate √	BTL -5	Evaluating
17.	Evaluate +	BTL -5	Evaluating
18.	Evaluate +	BTL -5	Evaluating

19. **20.**	Find + + Compute ++	**BTL -1** BTL -3	Remembering Applying
PART B			
1.(a)	Find over the positive quadrant of the circle	**BTL -1**	Remembering
1. (b)	Change the order of integration and hence evaluate it √ –	**BTL -3**	Applying
2. (a)	Evaluate √ – – √ – – .	**BTL -5**	Evaluating
2.(b)	By change the order of integration and evaluate –	**BTL -3**	Applying
3. (a)	Using double integral find the area of the Ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$.	**BTL -4**	Analyzing
3.(b)	Change the order of integration . √ and hence evaluate it	**BTL -3**	Applying
4. (a)	By changing in to polar Co – ordinates , evaluate ∞ ∞ - + . Hence find the value of ∞ –	**BTL -3**	Applying
4.(b)	Change the order of integration - and hence evaluate it	**BTL -3**	Applying
5. (a)	Evaluate √ – + by changing into polar co – ordinates	**BTL -5**	Evaluating
5.(b)	Change the order of integration and hence evaluate it √ - +	**BTL -3**	Applying
6. (a)	Using the transformation , Prove that + - = , taken over the area of triangle bounded by the lines x=0, y=0, y=x	**BTL -4**	Analyzing
6.(b)	Find the area of the cardioids x+	**BTL -1**	Remembering
7. (a)	polar coordinates taken throughout the sphere + +	**BTL -5**	Evaluating
7. (b)	Find the volume of the tetrahedron bounded by the coordinate planes and – – – = 1.	**BTL -1**	Remembering
8. (a)	Evaluate the integral where R is the trapezoidal region with vertices (1,0) (2,0) (0,-2) (0,-1). –	**BTL -5**	Evaluating
8.(b) **9. (a)**	Calculate where V is the region bounded by and +++	**BTL -3** **BTL -3**	Applying Applying
	= , = , = + + = = and		

9.(b)	Evaluate	BTL -5	Evaluating
10.(a)	Change the integral into polar coordinates and hence evaluate it	BTL -3	Applying
10.(b)	Find the volume of the ellipsoid	BTL -1	Remembering
11.(a)	Find the area which is inside the circle and outside the cardioids	BTL -1	Remembering
11.(b)	Evaluate	BTL -5	Evaluating
12.(a)	Find the area that lies inside the cardioids and outside the circle by double integral	BTL -1	Remembering
12.(b)	Find the value of through the positive spherical octant for which .	BTL -1	Remembering
13.(a)	Evaluate by converting into polar coordinates where R is the first quadrant part of the region bounded by two circles	BTL -5	Evaluating
13.(b)	Formulate the volume bounded by the cylinder	BTL -6	Creating
14.(a)	Evaluate	BTL -5	Evaluating
14.(b)	Find the area enclosed by the curves and	BTL -1	Remembering

UNIT V DIFFERENTIAL EQUATIONS

Higher order linear differential equations with constant coefficients - Method of variation of parameters – Homogenous equation of Euler's and Legendre's type – System of simultaneous linear differential equations with constant coefficients - Method of undetermined coefficients.

Q.No.	Question	Bloom's Taxonomy Level	Domain
	PART – A		
1.	Find the P.I of $(D-1)^2 y = \sinh 2x$.	BTL-1	Remembering
2.	Find the P.I of $(D^2+1)y = \cos 2x$.	BTL-1	Remembering
3.	Find the P.I of .	BTL-1	Remembering
	Find the particular Integral for $D^2 \quad D \quad y \quad x$	BTL-1	Remembering
	Find the P.I of $D^2 \quad y \quad x^2$	BTL-1	Remembering
6.	Find the P.I of $(D^2+4D+5)y = e^{-2x}$	BTL-1	Remembering
7.	Estimate the P.I of .	BTL-2	Understanding
8.	Estimate the P.I of + + = .	BTL-2	Understanding
9.	Estimate the P.I of	BTL-2	Understanding
10.	Find the complementary function of	BTL-2	Understanding

11.	Solve (D -1) y = 0. + =	**BTL-3**	**Applying**
12.	Solve = ; =	**BTL-3**	**Applying**

13.	Find the 2 . . of Solve Dx + y = 2 , .	BTL-3	Applying
14.	complementary function ″ ′	BTL-4	Analyzing
15.	Solve (D +a)y=0 − + =	BTL-3	Applying
16.	Convert in to differential equations with constant coefficients	BTL-6	Creating
17.	Test whether the equation ″ ′ is linear equation with constant coefficients if not convert. =	BTL-5	Evaluating
18.	Solve	BTL-5	Evaluating
19.	Rewrite the equation = into the linear equation with constant coefficients. + =	BTL-6	Creating
20.	Rewrite the equation into the linear equation with constant coefficients + =	BTL-6	Creating

PART-B

1.(a)	Identify the solution of	BTL-1	Remembering
1. (b)	Using the method of variation of parameter to Evaluate .	BTL-2	Understanding
2. (a)	Identify the solution of 2 2x 2	BTL-1	Remembering
2.(b)	Using the method of variation of parameter to Evaluate $(D^2 + 25)\, y = \sec 5x$.	BTL-2	Understanding
3. (a)	Identify the solution of $(D^3 - 7D - 6)y = (1 + x)e^{2x}$	BTL-1	Remembering
3.(b)	Solve $y'' - 2y' + y = e^{x} \log x$, Using the method of variation of parameters.	BTL-3	Applying
4. (a)	Give the complimentary function and particular integral of $(D^2 - 3D + 2)y = x \cos x$.	BTL-2	Understanding
4.(b)	Using the method of variation of parameters find the solution of = [redacted]	BTL-4	Analyzing
5. (a)	Solve $x^2D^2 - xD + 1)y = x \sin \log x + \frac{1}{x}$.	BTL-3	Applying
5.(b)	Evaluate the simultaneous equations $\frac{dx}{dt} + 2x - 3y = 5t$, $\frac{dy}{dt} - 3x + 2y = 2e^{2t}$ given that $x(0) = 0$, $y(0) = -1$.	BTL-5	Evaluating
6. (a)	Give the general solution of $x^2 \frac{d^2y}{dx^2} + x\frac{dy}{dx} + y = \sin(\log x)^2$.	BTL-1	Remembering
6.(b)	Solve: $\frac{dx}{dt} + 2y = \sin 2t$, $\frac{dy}{dt} - 2x = \cos 2t$.	BTL-3	Applying
7. (a)	Find the solution of $(2x + 3)^2 \frac{d^2y}{dx^2} - (2x + 3)\frac{dy}{dx} - 12y = 6x$	BTL-1	Remembering

$(x^2D^2 - 2xD + 4)y = 0$

7. (b)	Formulate the ODE and hence solve —	**BTL-6**	**Creating**

8. (a)	Solve by method of variation of parameters	**BTL-3**	**Applying**
8.(b)	Identify the solution of D x- 5x + 3y = sin t, D^2y +5y -3x = t	**BTL-1**	**Remembering**
9. (a)	Solve the differential equation by method of variation of parameters ' + =	**BTL-3**	**Applying**
10.(a)	Evaluate the general solution of − + y =	**BTL-5**	**Evaluating**
9.(b)	Solve the differential equation ' − ′ + = by method of variation of parameters	**BTL-3**	**Applying**
10.(b)	Formulate the ODE and hence solve + ' − +	**BTL-6**	**Creating**
11.(a)	Solve the equation	**BTL-3**	**Applying**
11.(b)	Using method of undetermined coefficients solve + + =	**BTL-1**	**Remembering**
12.(a)	Solve — , —	**BTL-3**	**Applying**
12.(b)	Using method of undetermined coefficients solve + = − =	**BTL-3**	**Applying**
13.(a)	Solve (D -2D+1)y =	**BTL-3**	**Applying**
13.(b)	Solve (+3) + − + + =	**BTL-3**	**Applying**
14.(a)	Solve —+x= , —+y=t	**BTL-3**	**Applying**
14.(b)	Using method of undetermined coefficients	**BTL-3**	**Applying**