



I B. Tech I Semester Supplementary Examinations, May - 2018 MATHEMATICS-I

| Time: | 3 hours | Max. Marks: 70 | | |
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| | Note: 1. Question Paper consists of two parts (Part-A and Part | t-B) | | |
| | 2. Answer ALL the question in Part-A | | | |
| | 3. Answer any FOUR Questions from Part-B | | | |
| | <u>PART –A</u> | | | |
| 1. a) | Solve the DE y(xy + e^x)dx - e^x dy = 0. | (2M) | | |
| b) | Solve the DE $y^{11} - 2y^1 + 10y = 0$, given y (0) = 4, y ¹ (0) = 1. | (2M) | | |
| c) | If $u = \frac{x^2 y^2}{x + y}$ then find $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y}$ | (2M) | | |
| d) | If f(x, y, z) = e^{xyz} then find $\frac{\partial^3 f}{\partial x \partial y \partial z}$ | (2M) | | |

e) Find $L{\delta(t-3)}$ (2M)

f) Solve
$$z=p(x+1)+q(y+2)$$
. (2M)

g) Classify the nature of the PDE
$$\frac{\partial^2 u}{\partial x^2} + 2\frac{\partial^2 u}{\partial x \partial y} + 4\frac{\partial^2 u}{\partial y^2} = 0$$
 (2M)

PART -B

- 2. a) A body kept in air with temperature $25^{\circ}C$ cools from $140^{\circ}C$ to $80^{\circ}C$ in 20 (7M) minutes. Find when the body cools down to $35^{\circ}C$.
 - b) An R L circuit has an Emf given (in volts) by 10 sin t, a resistance of 90 (7M) ohms, an inductance of 4 henries. Find the current at any time t by assuming zero initial current.

3. a) Solve the DE $(D^2 + 1)y = \cot x$ by the method of variation of parameters (7M)

b) Determine the charge on the capacitor at any time t > 0 in circuit in series having (7M) an emf E(t) = 100 sin 60 t, a resistor of 2 ohms, an inductor of 0.1 henries and capacitor of $\frac{1}{260}$ farads, if the initial current and charge on the capacitor are both zero.

4. a) Evaluate
$$\int_0^\infty \frac{e^{-t} - e^{-2t}}{t} dt$$
 (7M)

b) Using Laplace transform solve $y(t) = sint + \int_0^t u y(t-u) du$ (7M)

5. a) Find the minimum value of
$$x^2 + y^2 + z^2$$
 subject to $ax + by + cz = p$. (7M)

SET - 1

- b) Check whether the following are functionally dependent or not, then find the (7M) relation between $u = \frac{x y}{x + y}, v = \frac{xy}{(x + y)^2}$
- 6. a) Find partial differential equation by eliminating arbitrary function (7M) $f(x^2 + y^2, z xy) = 0$

b) Solve the PDE
$$\frac{p^2}{z^2} = 1 - pq$$
. (7M)

7. a) Solve the PDE
$$(D^2 - 3D - D^{1^2} + 3D^1)z = e^{x-2y}$$
 (7M)

b) Solve the PDE
$$(D-D^{1}-1)(D-D^{1}-2)z = x + e^{3x-y}$$
 (7M)



SET - 1

I B. Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2018 MATHEMATICS-I

| Tir | ne: 3 | 3 hours Max. Ma | ırks: 70 |
|-----|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| | | Note: 1. Question Paper consists of two parts (Part-A and Part-B) 2. Answering the question in Part-A is Compulsory 3. Answer any FOUR Questions from Part-B | |
| | | <u>PART –A</u> | |
| 1. | a) | State Newton's law of cooling. | (2M) |
| | b) | Test whether the functions $e^x \cos x$ and $e^x \sin x$ are linearly independent or not. | (2M) |
| | c) | Write the Laplace transform of y", given that $y(0)=1$ and $y'(0)=1$. | (2M) |
| | d) | Verify whether $u = 2x - y$, $v = x - 2y$ are functionally dependent. | (2M) |
| | e) | Find the general solution of $3p^2 = q$. | (2M) |
| | f) | Find the general solution of $(D^2 - 4DD' + 4D'^2) = 0$. | (2M) |
| | g) | Find Laplace transform of $t \cos at$. | (2M) |
| | | PART -B | |
| 2. | a) | Solve $3e^x \tan y dx + (1 - e^x) \sec^2 y dy = 0$. | (7M) |
| | b) | Find the equation of the system of orthogonal trajectories of the parabolas | (7M) |
| | | $r = \frac{2a}{1 + \cos \theta}$, where <i>a</i> is the parameter. | |
| 3. | a) | Solve $(D^2 - 3D + 2)y = Cos3x$. | (7M) |
| | b) | Solve $(D^2 - 5D + 6)y = e^x Sinx$. | (7M) |
| 4. | a) | Find $L[t^3e^{2t}\sin t]$ | (7M) |
| | | $y'' - 3y' + 2y = 4t + e^{3t}$ when y (0) = 1 and y'(0) = -1. | (7M) |
| 5. | a) | If $x + y + z = u$, $y + z = uv$, $z = uvw$, then evaluate $\frac{\partial(x, y, z)}{\partial(u, v, w)}$. | (7M) |
| | b) | Find the volume of the largest rectangular parallelepiped that can be inscribed in the ellipsoid $\frac{x^2}{4} + \frac{y^2}{9} + \frac{z^2}{25} = 1.$ | (7M) |
| 6. | a) | Form a partial differential equation by eliminating the arbitrary functions <i>f</i> and <i>g</i> from $z = xf(ax+by) + g(ax+by)$. | (7M) |
| | h) | $2 + \frac{2}{2} + \frac{2}{2} + \frac{2}{2} + \frac{2}{2}$ | (7M) |

b) Solve $z^2(p^2+q^2) = x^2 + y^2$. (7M)

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- 7. a) Solve $(4D^2 + 12DD' + 9D'^2)z = e^{3x-2y}$. (7M)
 - b) Classify the nature of the partial differential equation (7M) $x^{2} \frac{\partial^{2} u}{\partial x^{2}} + (1 - y^{2}) \frac{\partial^{2} u}{\partial y^{2}} = 0, -\infty < x < \infty, -1 < y < 1.$

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I B. Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2018 MATHEMATICS-I

Time: 3 hours

Max. Marks: 70

- Note: 1. Question Paper consists of two parts (Part-A and Part-B)
 - 2. Answering the question in **Part-A** is Compulsory
 - 3. Answer any FOUR Questions from Part-B ~~~~~~~

PART –A

| 1. | a) | Write the differential equation for L-R circuit, explain the terms involved in it and write the solution of the differential equation. | (2M) | |
|----|-------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|--|
| | b) | Test whether the functions e^x and xe^x are linearly independent or not. | | |
| | c) | Write the second shifting theorem of Laplace transforms. | (2M) | |
| | d) | If $u = \frac{y}{x}$, $v = xy$, then find $J\left(\frac{u,v}{x,y}\right)$. | (2M) | |
| | e) | Find the general solution of $p^2+q^2=1$. | (2M) | |
| | f) | Find the general solution of $(D^2 + DD' - 2D'^2) = 0$. | (2M) | |
| | g) | Find L [sin 2t sin 3t]. | (2M) | |
| | | PART -B | | |
| 2. | a) | Solve $\frac{dy}{dx} + \frac{y}{x}\log y = \frac{y}{x^2}(\log y)^2$. | (7M) | |
| | b) | Find the orthogonal trajectories of the following family of curves: $r^n = a^n \sin n\theta$. | (7M) | |
| 3. | a) | Solve $(D^2 - p^2)y = Sinh px.$ | | |
| | b) | Solve $(D^2 - 6D + 13)y = 8e^{3x}Sin2x$. | (7M) | |
| 4. | a) | Find $L[(t+3)^3 e^{2t}]$ | (7M) | |
| | b) | Solve $(D^2 + 2D + 1)y = 3te^{-t}$ given that $y(0) = 4, y'(0) = 2$. | (7M) | |
| 5. | a) | Prove that $u = \frac{x^2 - y^2}{x^2 + y^2}$, $v = \frac{2xy}{x^2 + y^2}$ are functionally dependent and find the relation | | |
| | b) | between them. Find the maximum and minimum values $x + y + z$ subject to $\frac{1}{x} + \frac{1}{y} + \frac{1}{z} = 1$. | (7M) | |
| 6. | 6. a) Form a partial differential equation by eliminating the arbitrary function $z = f(x^2 + y^2 + z^2)$. | | (7M) | |
| | b) | z = i(x + y + z). Solve $x^{2}(z - y) p + y^{2}(x - z)q = z^{2}(y - x).$ | (7M) | |
| 7. | a) | Solve $(D^3 + D^2D' - DD' - D'^3)z = 3\sin(x + y)$. | (7M) | |
| | b) | Classify the nature of the partial differential equation $\frac{\partial^2 u}{\partial x^2} + 4 \frac{\partial^2 u}{\partial x \partial y} + (x^2 + y^2) \frac{\partial^2 u}{\partial y^2} = \sin(x + y).$ 1 of 1 | (7M) | |

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SET - 3

I B. Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2018 MATHEMATICS-I

| Time: 3 hour | MATHEMATICS-I M | ax. Marks: 70 |
|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| Time: 5 nou | 5 11 | ax. What KS. 70 |
| | Note: 1. Question Paper consists of two parts (Part-A and Part-B) 2. Answering the question in Part-A is Compulsory 3. Answer any FOUR Questions from Part-B | |
| | <u>PART –A</u> | |
| write th | the differential equation for C-R circuit, explain the terms involved in the solution of the differential equation. hether the functions $\sin x$ and $x \sin x$ are linearly independent or not. | it and (2M) (2M) |
| | onvolution theorem in Laplace transforms. | (2M) |
| d) Find t | he stationary points of $f(x, y) = xy + (x - y)$. | (2M) |
| e) Find th | the general solution of $pq=1$. | (2M) |
| f) Find th | the general solution of $(D^2 + 7DD' + 12D'^2) = 0$. | (2M) |
| g) Find L | aplace transform of $t^2 e^{-2t}$. | (2M) |
| | PART -B | |
| 2. a) Solve | $(x+2y^3)\frac{dy}{dx} = y.$ | (7M) |
| b) Find t | he orthogonal trajectories of the family $r = 2a(\cos\theta + \sin\theta)$ | (7M) |
| 3. a) Solve | $(D^2 - 4D + 3)y = Sin3xCos2x.$ | (7M) |
| b) Solve | $(D^2 - 2D + 1)y = xe^x Sinx$ | (7M) |
| 4. a) Find L | $[t^2 \sin at].$ | (7M) |
| b) Solve(| $D^{2} + 6D + 9)y = \sin t$ given that $y(0) = 1, y'(0) = 0.$ | (7M) |
| 5. a) If $u = \frac{y}{2}$ | $\frac{yz}{x}$, $\mathbf{v} = \frac{xz}{y}$, $\mathbf{w} = \frac{xy}{z}$ find $\frac{\partial(u, v, w)}{\partial(x, y, z)}$. | (7M) |
| | the stationary points of $u(x, y) = \sin x \sin y \sin (x + y)$ where $x = \pi, 0 < y < \pi$ and find the maximum u. | (7M) |
| | a partial differential equation by eliminating the arbitrary function f from $f(x^2 + y^2 + z^2)$. | (7M) |
| b) Solve(| $(x^{2} - yz)p + (y^{2} - zx)q = z^{2} - xy.$ | (7M) |
| '. a) Solve | $(D^3 - 4D^2D' + 4DD'^2)z = 6\sin(3x + 6y).$ | (7M) |
| b) Classif | Ty the nature of the partial differential equation $\frac{\partial^2 u}{\partial x^2} + 2\frac{\partial^2 u}{\partial x \partial y} + \frac{\partial^2 u}{\partial y^2} = 0.$ | (7M) |

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SET - 4

I B. Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2018 MATHEMATICS-I

| Note: 1. Question Paper consists of two parts (Part-A and Part-B)2. Answering the question in Part-A is Compulsory3. Answer any FOUR Questions from Part-BPART -A 1. a) State law of natural growth or decay and write the corresponding differential (2N equations and their solutions.b) Test whether the functions e^{2x} and e^{5x} are linearly independent or not.(2N)(2N)(2N)(2N)(2N)(2N)(2N)(2N)(2N)(2N)(2N)(2N)(2N)(2N)(2N)(2N)(2N)(2N)(2N)(2N)(2N)(2N)(2N)(2N)(2N)(2N)(2N)(2N)(2N)(2N)(2N)(2N)(2N)(2N)(2N)(2N)(2N)(2N)(2N)(2N)(2N)(2N)(2N)(2N)(2N)(2N)(2N)(2N)(2N)(2N)(2N)(2N)(2N)(2N)(2N)(2N)(2N)(2N)(2N)(2N)(2N)(2N)(2N)(2N)(2N)(2N)(2N)(2N)(2N)(2N) </th <th>Time</th> <th>3 hours MATHEMATICS-I Max. Ma</th> <th>arks: 70</th> | Time | 3 hours MATHEMATICS-I Max. Ma | arks: 70 |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|----------------------------------------------------------------------------------------------------------------|----------|
| 2. Answer any FOUR Questions from Part-B 3. Answer any FOUR Questions from Part-B PART -A 1. a) State law of natural growth or decay and write the corresponding differential (2M equations and their solutions. b) Test whether the functions e^{2x} and e^{5x} are linearly independent or not. (2M c) Find the Laplace transform of Heaviside's unit function. (2M d) Expand $e^x \cos y$ near $(1, \frac{\lambda}{4})$ (2M f) Find the general solution of $p+q=1$. (2M f) Find the general solution of $(D^2 - 4DD' + 4D'^2) = 0$. (2M g) If $L\left(\frac{\sin t}{t}\right) = \tan^{-1} \frac{1}{s}$, find $L\left(\frac{\sin at}{t}\right)$. (2M Find the orthogonal trajectories of $r^2 = a \sin 2\theta$. (7M 3. a) Solve $(D^2 + 3D + 2)y = e^{-x} + Cosx$. (7M b) Solve $(D^2 + 2D - 3)y = x^2e^{-3x}$. (7M 4. a) Find $L\left[e^{-3t} \int_{0}^{t} \frac{1 - \cos t}{t^2} dt\right]$ (7M 5. a) Determine whether the functions $U = \frac{x}{y-z}$, $V = \frac{y}{z-x}$, $W = \frac{z}{x-y}$ are dependent. If dependent find the relationship between them. b) Examine the function for extreme values $f(x, y) = x^4 + y^4 - 2x^2 + 4xy - 2y^2$. (7M 6. a) Form a partial differential equation by eliminating a and b from (7M log(az-1) = x+ay+b. | Time. | | arks. 70 |
| 1. a) State law of natural growth or decay and write the corresponding differential (2M equations and their solutions. b) Test whether the functions e^{2x} and e^{5x} are linearly independent or not. (2M c) Find the Laplace transform of Heaviside's unit function. (2M d) Expand $e^x \cos y$ near $(1, \frac{\lambda}{4})$ (2M e) Find the general solution of $p+q=1$. (2M f) Find the general solution of $(D^2 - 4DD' + 4D'^2) = 0$. (2M g) If $L\left(\frac{\sin t}{t}\right) = \tan^{-1}\frac{1}{s}$, find $L\left(\frac{\sin at}{t}\right)$. (2M b) Find the orthogonal trajectories of $r^2 = a\sin 2\theta$. (7M b) Find the orthogonal trajectories of $r^2 = a\sin 2\theta$. (7M b) Solve $(D^2 + 3D + 2)y = e^{-x} + Cosx$. (7M b) Solve $(D^2 + 2D - 3)y = x^2e^{-3x}$. (7M c) Solve $y'' - 3y'' + 3y' - y = t^2e^t$ given that $y = 1, y' = 0, y'' = -2$ at $t = 0$. (7M c) The dependent find the relationship between them. b) Examine the function for extreme values $f(x, y) = x^4 + y^4 - 2x^2 + 4xy - 2y^2$. (7M c) a) Form a partial differential equation by eliminating <i>a</i> and <i>b</i> from (7M log($az - 1$) = $x + ay + b$. | | 2. Answering the question in Part-A is Compulsory | |
| equations and their solutions. b) Test whether the functions e^{2x} and e^{5x} are linearly independent or not. (2N c) Find the Laplace transform of Heaviside's unit function. (2N d) Expand $e^x \cos y$ near $(1, \frac{\lambda}{4})$ (2N e) Find the general solution of $p+q=1$. (2N f) Find the general solution of $(D^2 - 4DD' + 4D'^2) = 0$. (2N g) If $L\left(\frac{\sin t}{t}\right) = \tan^{-1}\frac{1}{s}$, find $L\left(\frac{\sin at}{t}\right)$. (2N Example 2. a) Solve $\cosh x \frac{dy}{dx} + y \sinh x = 2\cosh^2 x \sinh x$. (7N b) Find the orthogonal trajectories of $r^2 = a \sin 2\theta$. (7N b) Solve $(D^2 + 3D + 2)y = e^{-x} + Cosx$. (7N b) Solve $(D^2 + 2D - 3)y = x^2e^{-3x}$. (7N 4. a) Find $L\left[e^{-3t}\int_{0}^{t}\frac{1-\cos t}{t^2}dt\right]$ (7N 5. a) Determine whether the functions $U = \frac{x}{y-z}$, $V = \frac{y}{z-x}$, $W = \frac{z}{x-y}$ are dependent. If dependent find the relationship between them. b) Examine the function for extreme values $f(x, y) = x^4 + y^4 - 2x^2 + 4xy - 2y^2$. (7N 6. a) Form a partial differential equation by eliminating a and b from (7N $\log(az-1) = x + ay + b$. | | <u>PART –A</u> | |
| c) Find the Laplace transform of Heaviside's unit function. (2N d) Expand $e^x \cos y$ near $(1, \frac{\lambda}{4})$ (2N e) Find the general solution of $p+q=1$. (2N f) Find the general solution of $(D^2 - 4DD' + 4D'^2) = 0$. (2N g) If $L\left(\frac{\sin t}{t}\right) = \tan^{-1}\frac{1}{s}$, find $L\left(\frac{\sin at}{t}\right)$. (2N PART -B 2. a) Solve $\cosh x \frac{dy}{dx} + y \sinh x = 2\cosh^2 x \sinh x$. (7N b) Find the orthogonal trajectories of $r^2 = a \sin 2\theta$. (7N b) Solve $(D^2 + 3D + 2)y = e^{-x} + Cosx$. (7N b) Solve $(D^2 + 2D - 3)y = x^2e^{-3x}$. (7N c) Solve $(D^2 + 2D - 3)y = x^2e^{-3x}$. (7N c) Solve $(y'' - 3y'' + 3y' - y = t^2e^t$ given that $y = 1, y' = 0, y'' = -2$ at $t = 0$. (7N c) Solve $y''' - 3y'' + 3y' - y = t^2e^t$ given that $y = 1, y' = 0, y'' = -2$ at $t = 0$. (7N b) Solve $y''' - 3y'' + 3y' - y = t^2e^t$ given that $y = 1, y' = 0, y'' = -2$ at $t = 0$. (7N c) Determine whether the functions $U = \frac{x}{y-z}$, $V = \frac{y}{z-x}$, $W = \frac{z}{x-y}$ are dependent. f dependent find the relationship between them. b) Examine the function for extreme values $f(x, y) = x^4 + y^4 - 2x^2 + 4xy - 2y^2$. (7N 6. a) Form a partial differential equation by eliminating a and b from (7N log($az - 1$) = $x + ay + b$. | l. a) | | (2M) |
| d) Expand $e^x \cos y$ near $(1, \frac{\lambda}{4})$ (2N e) Find the general solution of $p+q=1$. (2N f) Find the general solution of $(D^2 - 4DD' + 4D'^2) = 0$. (2N g) If $L\left(\frac{\sin t}{t}\right) = \tan^{-1}\frac{1}{s}$, find $L\left(\frac{\sin at}{t}\right)$. (2N PART -B 2. a) Solve $\cosh x \frac{dy}{dx} + y \sinh x = 2\cosh^2 x \sinh x$. (7N b) Find the orthogonal trajectories of $r^2 = a \sin 2\theta$. (7N b) Solve $(D^2 + 3D + 2)y = e^{-x} + Cosx$. (7N b) Solve $(D^2 + 2D - 3)y = x^2e^{-3x}$. (7N 4. a) Find $L\left[e^{-3t}\int_{0}^{t}\frac{1-\cos t}{t^2}dt\right]$ (7N 5. a) Determine whether the functions $U = \frac{x}{y-z}$, $V = \frac{y}{z-x}$, $W = \frac{z}{x-y}$ are dependent. ff dependent find the relationship between them. b) Examine the function for extreme values $f(x, y) = x^4 + y^4 - 2x^2 + 4xy - 2y^2$. (7N 6. a) Form a partial differential equation by eliminating a and b from (7N $\log(az-1) = x + ay + b$. | b) | Test whether the functions e^{2x} and e^{5x} are linearly independent or not. | (2M) |
| Expand $e^{-1} \cos y$ near $(1, \frac{1}{4})$ e) Find the general solution of $p+q=1$. (2N f) Find the general solution of $(D^2 - 4DD^1 + 4D^{12}) = 0$. (2N g) If $L\left(\frac{\sin t}{t}\right) = \tan^{-1}\frac{1}{s}$, find $L\left(\frac{\sin at}{t}\right)$. (2N PART -B 2. a) Solve $\cosh x \frac{dy}{dx} + y \sinh x = 2\cosh^2 x \sinh x$. (7N b) Find the orthogonal trajectories of $r^2 = a \sin 2\theta$. (7N b) Find the orthogonal trajectories of $r^2 = a \sin 2\theta$. (7N b) Solve $(D^2 + 3D + 2)y = e^{-x} + Cosx$. (7N b) Solve $(D^2 + 2D - 3)y = x^2e^{-3x}$. (7N c) Solve $(D^2 + 2D - 3)y = x^2e^{-3x}$. (7N c) Solve $(D^2 + 3y' - y) = t^2e^t$ given that $y = 1, y' = 0, y'' = -2$ at $t = 0$. (7N find $L\left[e^{-3t}\int_{0}^{t}\frac{1-\cos t}{t^2}dt\right]$ (7N b) Solve $y''' - 3y'' + 3y' - y = t^2e^t$ given that $y = 1, y' = 0, y'' = -2$ at $t = 0$. (7N f) Determine whether the functions $U = \frac{x}{y-z}, V = \frac{y}{z-x}$, $W = \frac{z}{x-y}$ are dependent. If dependent find the relationship between them. b) Examine the function for extreme values $f(x, y) = x^4 + y^4 - 2x^2 + 4xy - 2y^2$. (7N 6. a) Form a partial differential equation by eliminating a and b from (7N $\log(az-1) = x + ay + b$. | c) | Find the Laplace transform of Heaviside's unit function. | (2M) |
| f) Find the general solution of $(D^2 - 4DD' + 4D'^2) = 0.$ (2N g) If $L\left(\frac{\sin t}{t}\right) = \tan^{-1}\frac{1}{s}$, find $L\left(\frac{\sin at}{t}\right).$ (2N PART -B 2. a) Solve $\cosh x \frac{dy}{dx} + y \sinh x = 2\cosh^2 x \sinh x.$ (7N b) Find the orthogonal trajectories of $r^2 = a \sin 2\theta.$ (7N c) Find the orthogonal trajectories of $r^2 = a \sin 2\theta.$ (7N b) Solve $(D^2 + 3D + 2)y = e^{-x} + Cosx.$ (7N c) Solve $(D^2 + 2D - 3)y = x^2e^{-3x}.$ (7N c) Solve $(D^2 + 2D - 3)y = x^2e^{-3x}.$ (7N c) Solve $y'' - 3y'' + 3y' - y = t^2e'$ given that $y = 1, y' = 0, y'' = -2$ at $t = 0.$ (7N c) Solve $y''' - 3y'' + 3y' - y = t^2e'$ given that $y = 1, y' = 0, y'' = -2$ at $t = 0.$ (7N c) Solve $y''' - 3y'' + 3y' - y = t^2e'$ given that $y = 1, y' = 0, y'' = -2$ at $t = 0.$ (7N c) Solve $y''' - 3y'' + 3y' - y = t^2e'$ given that $y = 1, y' = 0, y'' = -2$ at $t = 0.$ (7N c) Solve $y''' - 3y'' + 3y' - y = t^2e'$ given that $y = 1, y' = 0, y'' = -2$ at $t = 0.$ (7N c) Solve $y''' - 3y'' + 3y' - y = t^2e'$ given that $y = 1, y' = 0, y'' = -2$ at $t = 0.$ (7N c) Solve $y''' - 3y'' + 3y' - y = t^2e'$ given that $y = 1, y' = 0, y'' = -2$ at $t = 0.$ (7N c) Solve $y''' - 3y'' + 3y' - y = t^2e'$ given that $y = 1, y' = 0, y'' = -2$ at $t = 0.$ (7N c) Solve $y''' - 3y'' + 3y' - y = t^2e'$ given that $y = 1, y' = 0, y'' = -2$ at $t = 0.$ (7N c) Solve $y'' - 3y'' + 3y' - y = t^2e'$ given that $y = 1, y' = 0, y'' = -2$ at $t = 0.$ (7N c) Solve $y'' - 3y'' + 3y' - y = t^2e'$ given that $y = 1, y' = 0, y'' = -2$ at $t = 0.$ (7N c) Solve $y'' - 3y'' + 3y' - y = t^2e'$ given that $y = 1, y' = 0, y'' = -2$ at $t = 0.$ (7N c) Solve $y'' - 3y'' + 3y' - y = t^2e'$ given that $y = 1, y' = 0, y'' = -2$ at $t = 0.$ (7N c) Solve $y'' - 3y'' + 3y' - y = t^2e'$ given that $y = 1, y' = 0, y'' = -2$ at $t = 0.$ (7N c) Solve $y'' - 3y'' + 3y' - y = t^2e'$ given $t = 1, y' = 0, y'' = -2$ at $t = 0.$ (7N c) Solve $y'' - 3y'' + 3y' - y = t^2e'$ given $t = 1, y' = 0, y'' = -2$ at $t = 0.$ (7N c) Solve $y'' - 3y'' + 3y' - y = t^2e'$ given $t = 1, y' = 0, y'' = -2$ at $t = 0.$ | d) | Expand $e^x \cos y$ near $(1, \frac{\lambda}{4})$ | (2M) |
| g) If $L\left(\frac{\sin t}{t}\right) = \tan^{-1}\frac{1}{s}$, find $L\left(\frac{\sin at}{t}\right)$. PART -B 2. a) Solve $\cosh x \frac{dy}{dx} + y \sinh x = 2\cosh^2 x \sinh x$. b) Find the orthogonal trajectories of $r^2 = a \sin 2\theta$. 3. a) Solve $(D^2 + 3D + 2)y = e^{-x} + Cosx$. b) Solve $(D^2 + 2D - 3)y = x^2e^{-3x}$. 4. a) Find $L\left[e^{-3t}\int_{0}^{t}\frac{1-\cos t}{t^2}dt\right]$ c) Solve $y''' - 3y'' + 3y' - y = t^2e^t$ given that $y = 1, y' = 0, y'' = -2$ at $t = 0$. 5. a) Determine whether the functions $U = \frac{x}{y-z}$, $V = \frac{y}{z-x}$, $W = \frac{z}{x-y}$ are dependent. If dependent find the relationship between them. b) Examine the function for extreme values $f(x, y) = x^4 + y^4 - 2x^2 + 4xy - 2y^2$. 6. a) Form a partial differential equation by eliminating a and b from (7N $\log(az-1) = x + ay + b$. | e) | Find the general solution of $p+q=1$. | (2M) |
| PART -B PART -B 2. a) Solve $\cosh x \frac{dy}{dx} + y \sinh x = 2\cosh^2 x \sinh x.$ (7N b) Find the orthogonal trajectories of $r^2 = a \sin 2\theta.$ (7N c) Solve $(D^2 + 3D + 2)y = e^{-x} + Cosx.$ (7N c) Solve $(D^2 + 2D - 3)y = x^2e^{-3x}.$ (7N c) Solve $(D^2 + 2D - 3)y = x^2e^{-3x}.$ (7N c) Solve $y''' - 3y'' + 3y' - y = t^2e^t$ given that $y = 1, y' = 0, y'' = -2$ at $t = 0.$ (7N c) Solve $y''' - 3y'' + 3y' - y = t^2e^t$ given that $y = 1, y' = 0, y'' = -2$ at $t = 0.$ (7N c) Solve $y''' - 3y'' + 3y' - y = t^2e^t$ given that $y = 1, y' = 0, y'' = -2$ at $t = 0.$ (7N c) Solve $y''' - 3y'' + 3y' - y = t^2e^t$ given that $y = 1, y' = 0, y'' = -2$ at $t = 0.$ (7N c) Solve $y''' - 3y'' + 3y' - y = t^2e^t$ given that $y = 1, y' = 0, y'' = -2$ at $t = 0.$ (7N c) Solve $y'' - 3y'' + 3y' - y = t^2e^t$ given that $y = 1, y' = 0, y'' = -2$ at $t = 0.$ (7N c) Solve $y'' - 3y'' + 3y' - y = t^2e^t$ given that $y = 1, y' = 0, y'' = -2$ at $t = 0.$ (7N c) Solve $y'' - 3y'' + 3y' - y = t^2e^t$ given that $y = 1, y' = 0, y'' = -2$ at $t = 0.$ (7N c) Solve $y'' - 3y'' + 3y' - y = t^2e^t$ given that $y = 1, y' = 0, y'' = -2$ at $t = 0.$ (7N c) Solve $y'' - 3y'' + 3y' - y = t^2e^t$ given that $y = 1, y' = 0, y'' = -2$ at $t = 0.$ (7N c) Solve $y'' - 3y'' + 3y' - y = t^2e^t$ given that $y = 1, y' = 0, y'' = -2$ at $t = 0.$ (7N c) Solve $y'' - 3y'' + 3y' - y = t^2e^t$ given that $y = 1, y' = 0, y'' = -2$ at $t = 0.$ (7N c) Solve $y'' - 3y'' + 3y' - y = t^2e^t$ given that $y = 1, y' = 0, y'' = -2$ at $t = 0.$ (7N c) Solve $y'' - 3y'' + 3y' - y = t^2e^t$ given that $y = 1, y' = 0, y'' = -2$ at $t = 0.$ (7N c) Solve $y'' - 3y'' + 3y' - y = t^2e^t$ given that $y = 1, y' = 0, y'' = -2$ at $t = 0.$ (7N c) Solve $y'' - 3y'' + 3y' - y = t^2e^t$ given $t = 1, y' = 0, y'' = -2$ at $t = 0.$ (7N c) Solve $y'' - 3y'' + 3y' - y = t^2e^t$ given $t = 1, y' = 0, y'' = -2$ at $t = 0.$ (7N c) Solve $y'' - 3y'' + 3y' - y = t^2e^t$ given $t = 1, y' = 0, y'' = -2$ at $t = 0.$ (7N c) Solve $y'' - 3y'' + 3y' - y = t^2e^t$ given $t = 1, y' = 0, y'' = -2$ | f) | Find the general solution of $(D^2 - 4DD' + 4D'^2) = 0$. | (2M) |
| 2. a) Solve $\cosh x \frac{dy}{dx} + y \sinh x = 2\cosh^2 x \sinh x$. b) Find the orthogonal trajectories of $r^2 = a \sin 2\theta$. 3. a) Solve $(D^2 + 3D + 2)y = e^{-x} + \cos x$. b) Solve $(D^2 + 2D - 3)y = x^2e^{-3x}$. 4. a) Find $L\left[e^{-3t}\int_{0}^{t} \frac{1 - \cos t}{t^2} dt\right]$ b) Solve $y''' - 3y'' + 3y' - y = t^2e^t$ given that $y = 1, y' = 0, y'' = -2$ at $t = 0$. 5. a) Determine whether the functions $U = \frac{x}{y-z}$, $V = \frac{y}{z-x}$, $W = \frac{z}{x-y}$ are dependent. If dependent find the relationship between them. b) Examine the function for extreme values $f(x, y) = x^4 + y^4 - 2x^2 + 4xy - 2y^2$. (7M) Solve $(az - 1) = x + ay + b$. | g) | If $L\left(\frac{\sin t}{t}\right) = \tan^{-1}\frac{1}{s}$, find $L\left(\frac{\sin at}{t}\right)$. | (2M) |
| Solve $\cosh x \frac{-y}{dx} + y \sinh x = 2\cosh^2 x \sinh x$. b) Find the orthogonal trajectories of $r^2 = a \sin 2\theta$. c) $(7N)$ c) $\cosh (D^2 + 3D + 2)y = e^{-x} + Cosx$. c) $(7N)$ c) $Solve (D^2 + 2D - 3)y = x^2 e^{-3x}$. c) $(7N)$ c) $Solve (D^2 + 2D - 3)y = x^2 e^{-3x}$. c) $(7N)$ c) $Solve (D^2 + 2D - 3)y = x^2 e^{-3x}$. c) $(7N)$ c) $Solve y''' - 3y'' + 3y' - y = t^2 e^t$ given that $y = 1, y' = 0, y'' = -2$ at $t = 0$. c) $(7N)$ c) $Solve y''' - 3y'' + 3y' - y = t^2 e^t$ given that $y = 1, y' = 0, y'' = -2$ at $t = 0$. c) $(7N)$ c) $Solve y''' - 3y'' + 3y' - y = t^2 e^t$ given that $y = 1, y' = 0, y'' = -2$ at $t = 0$. c) $(7N)$ c) $Solve y''' - 3y'' + 3y' - y = t^2 e^t$ given that $y = 1, y' = 0, y'' = -2$ at $t = 0$. c) $(7N)$ c) $Solve y''' - 3y'' + 3y' - y = t^2 e^t$ given that $y = 1, y' = 0, y'' = -2$ at $t = 0$. c) $(7N)$ c) $Solve y''' - 3y'' + 3y' - y = t^2 e^t$ given that $y = 1, y' = 0, y'' = -2$ at $t = 0$. c) $(7N)$ c) $Solve y''' - 3y'' + 3y' - y = t^2 e^t$ given that $y = 1, y' = 0, y'' = -2$ at $t = 0$. c) $(7N)$ c) $Solve y''' - 3y'' + 3y' - y = t^2 e^t$ given that $y = 1, y' = 0, y'' = -2$ at $t = 0$. c) $(7N)$ c) $Solve y''' - 3y'' + 3y' - y = t^2 e^t$ given that $y = 1, y' = 0, y'' = -2$ at $t = 0$. c) $(7N)$ c) $Solve y''' - 3y'' + 3y' - y = t^2 e^t$ given that $y = 1, y' = 0, y'' = -2$ at $t = 0$. c) $(7N)$ c) $Solve y'' - 3y'' + 3y' - y = t^2 e^t$ given that $y = 1, y' = 0, y'' = -2$ at $t = 0$. c) $(7N)$ c) $Solve y'' - 3y'' + 3y' - y = t^2 e^t$ given that $y = 1, y' = 0, y'' = -2$ at $t = 0$. c) $(7N)$ c) $Solve y'' - 3y'' + 3y' - y = t^2 e^t$ given that $y = 1, y' = 0, y'' = -2$ at $t = 0$. c) $Solve y'' - 3y'' + 3y' - y = t^2 e^t$ given that $y = 1, y' = 0, y'' = -2$ at $t = 0$. c) $Solve y'' - 3y'' + 3y' - y = t^2 e^t$ given that $y = 1, y' = 0, y'' = -2$ at $t = 0$. c) $Solve y'' - 3y'' + 3y' - y = t^2 e^t$ given that $y = 1, y' = 0, y'' = -2$ at $t = 0$. c) $Solve y'' = -3y'' + 3y' - y = t^2 e^t$ given that $y = 1, y' = 0, y'' = -2$ at $t = 0$. c) $Solve y'$ | | PART -B | |
| 3. a) Solve $(D^2 + 3D + 2)y = e^{-x} + Cosx.$ (7M b) Solve $(D^2 + 2D - 3)y = x^2e^{-3x}.$ (7M 4. a) Find $L\left[e^{-3t}\int_{0}^{t}\frac{1-\cos t}{t^2}dt\right]$ (7M b) Solve $y''' - 3y'' + 3y' - y = t^2e^t$ given that $y = 1, y' = 0, y'' = -2$ at $t = 0.$ (7M 5. a) Determine whether the functions $U = \frac{x}{y-z}, V = \frac{y}{z-x}, W = \frac{z}{x-y}$ are dependent. If dependent find the relationship between them. b) Examine the function for extreme values $f(x, y) = x^4 + y^4 - 2x^2 + 4xy - 2y^2$. (7M 6. a) Form a partial differential equation by eliminating <i>a</i> and <i>b</i> from (7M $\log(az-1) = x + ay + b$. | 2. a) | Solve $\cosh x \frac{dy}{dx} + y \sinh x = 2 \cosh^2 x \sinh x$. | (7M) |
| b) Solve $(D^2 + 2D - 3)y = x^2 e^{-3x}$. (7M 4. a) Find $L\left[e^{-3t}\int_{0}^{t}\frac{1-\cos t}{t^2}dt\right]$ (7M b) Solve $y''' - 3y'' + 3y' - y = t^2 e^t$ given that $y = 1, y' = 0, y'' = -2$ at $t = 0$. (7M 5. a) Determine whether the functions $U = \frac{x}{y-z}, V = \frac{y}{z-x}, W = \frac{z}{x-y}$ are dependent. (7M 1f dependent find the relationship between them. b) Examine the function for extreme values $f(x, y) = x^4 + y^4 - 2x^2 + 4xy - 2y^2$. (7M 6. a) Form a partial differential equation by eliminating <i>a</i> and <i>b</i> from (7M $\log(az-1) = x + ay + b$. | b) | Find the orthogonal trajectories of $r^2 = a \sin 2\theta$. | (7M) |
| 4. a) Find $L\left[e^{-3t}\int_{0}^{t}\frac{1-\cos t}{t^{2}}dt\right]$ (7M b) Solve $y'''-3y''+3y'-y=t^{2}e^{t}$ given that $y=1, y'=0, y''=-2$ at $t=0$. (7M 5. a) Determine whether the functions $U=\frac{x}{y-z}, V=\frac{y}{z-x}, W=\frac{z}{x-y}$ are dependent. (7M If dependent find the relationship between them. b) Examine the function for extreme values $f(x,y)=x^{4}+y^{4}-2x^{2}+4xy-2y^{2}$. (7M 6. a) Form a partial differential equation by eliminating <i>a</i> and <i>b</i> from (7M $\log(az-1)=x+ay+b$. | 3. a) | Solve $(D^2 + 3D + 2)y = e^{-x} + Cosx.$ | (7M) |
| Find $L\left[e^{-3t}\int_{0}^{1-\cos t} dt\right]$ b) Solve $y''' - 3y'' + 3y' - y = t^2e^t$ given that $y = 1, y' = 0, y'' = -2$ at $t = 0$. (7N 5. a) Determine whether the functions $U = \frac{x}{y-z}, V = \frac{y}{z-x}, W = \frac{z}{x-y}$ are dependent. If dependent find the relationship between them. b) Examine the function for extreme values $f(x, y) = x^4 + y^4 - 2x^2 + 4xy - 2y^2$. (7N 6. a) Form a partial differential equation by eliminating <i>a</i> and <i>b</i> from (7N $\log(az-1) = x + ay + b$. | b) | Solve $(D^2 + 2D - 3)y = x^2 e^{-3x}$. | (7M) |
| 5. a) Determine whether the functions $U = \frac{x}{y-z}$, $V = \frac{y}{z-x}$, $W = \frac{z}{x-y}$ are dependent. (7M) If dependent find the relationship between them. (b) Examine the function for extreme values $f(x, y) = x^4 + y^4 - 2x^2 + 4xy - 2y^2$. (c) (a) Form a partial differential equation by eliminating <i>a</i> and <i>b</i> from (c) $V = \frac{y}{z-x}$. | 1. a) | Find $L\left[e^{-3t}\int_{0}^{t}\frac{1-\cos t}{t^{2}}dt\right]$ | (7M) |
| b) Examine the functions U = y/(y-z), V = y/(z-x), W = y/(x-y) are dependent. b) Examine the function for extreme values f(x, y) = x⁴ + y⁴ - 2x² + 4xy - 2y². (7N) 6. a) Form a partial differential equation by eliminating a and b from (7N) log(az-1) = x + ay + b. | b) | Solve $y''' - 3y'' + 3y' - y = t^2 e^t$ given that $y = 1, y' = 0, y'' = -2$ at $t = 0$. | (7M) |
| b) Examine the function for extreme values f(x, y) = x⁴ + y⁴ - 2x² + 4xy - 2y². (7M) 6. a) Form a partial differential equation by eliminating a and b from (7M) log(az-1) = x + ay + b. | 5. a) | Determine whether the functions $U = \frac{x}{y-z}$, $V = \frac{y}{z-x}$, $W = \frac{z}{x-y}$ are dependent. | (7M) |
| 6. a) Form a partial differential equation by eliminating <i>a</i> and <i>b</i> from (7M $log(az-1) = x + ay + b$. | b) | | (7M) |
| $\log(az-1) = x + ay + b.$ | | | |
| b) $a_1 = (a_2) (a_3) ($ | J. a) | | (7141) |
| b) Solve $px(z-2y^2) = (z-qy)(z-y^2-2x^3)$. (71) | b) | Solve $px(z-2y^2) = (z-qy)(z-y^2-2x^3)$. | (7M) |
| 7. a) Solve $(D^2 - 4DD' + 4D'^2)z = e^{2x+y}$. (7N) | 7. a) | Solve $(D^2 - 4DD' + 4D'^2)z = e^{2x+y}$. | (7M) |
| b) Classify the nature of the partial differential equation (7M) $\frac{\partial^2 u}{\partial x^2} + 4 \frac{\partial^2 u}{\partial x \partial y} + 4 \frac{\partial^2 u}{\partial y^2} - \frac{\partial u}{\partial x} + 2 \frac{\partial u}{\partial y} = 0.$ | b) | | (7M) |

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I B. Tech I Semester Supplementary Examinations, May - 2018 MATHEMATICS-I

| Time: | 3 hours | Max. Marks: 70 | | |
|-------|--------------------------------------------------------------------------------------------------------------|----------------|--|--|
| | Note: 1. Question Paper consists of two parts (Part-A and Part | t-B) | | |
| | 2. Answer ALL the question in Part-A | | | |
| | 3. Answer any FOUR Questions from Part-B | | | |
| | <u>PART –A</u> | | | |
| 1. a) | Solve the DE y($xy + e^x$) $dx - e^x dy = 0$. | (2M) | | |
| b) | Solve the DE $y^{11} - 2y^1 + 10y = 0$, given y (0) = 4, y ¹ (0) = 1. | (2M) | | |
| c) | If $u = \frac{x^2 y^2}{x + y}$ then find $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y}$ | (2M) | | |
| d) | If f(x, y, z) = e^{xyz} then find $\frac{\partial^3 f}{\partial x \partial y \partial z}$ | (2M) | | |

e) Find $L{\delta(t-3)}$ (2M)

f) Solve
$$z=p(x+1)+q(y+2)$$
. (2M)

g) Classify the nature of the PDE
$$\frac{\partial^2 u}{\partial x^2} + 2\frac{\partial^2 u}{\partial x \partial y} + 4\frac{\partial^2 u}{\partial y^2} = 0$$
 (2M)

PART -B

- 2. a) A body kept in air with temperature $25^{\circ}C$ cools from $140^{\circ}C$ to $80^{\circ}C$ in 20 (7M) minutes. Find when the body cools down to $35^{\circ}C$.
 - b) An R L circuit has an Emf given (in volts) by 10 sin t, a resistance of 90 (7M) ohms, an inductance of 4 henries. Find the current at any time t by assuming zero initial current.

3. a) Solve the DE $(D^2 + 1)y = \cot x$ by the method of variation of parameters (7M)

b) Determine the charge on the capacitor at any time t > 0 in circuit in series having (7M) an emf E(t) = 100 sin 60 t, a resistor of 2 ohms, an inductor of 0.1 henries and capacitor of $\frac{1}{260}$ farads, if the initial current and charge on the capacitor are both zero.

4. a) Evaluate
$$\int_0^\infty \frac{e^{-t} - e^{-2t}}{t} dt$$
 (7M)

b) Using Laplace transform solve $y(t) = sint + \int_0^t u y(t-u) du$ (7M)

5. a) Find the minimum value of
$$x^2 + y^2 + z^2$$
 subject to $ax + by + cz = p$. (7M)

SET - 1

- b) Check whether the following are functionally dependent or not, then find the (7M) relation between $u = \frac{x y}{x + y}, v = \frac{xy}{(x + y)^2}$
- 6. a) Find partial differential equation by eliminating arbitrary function (7M) $f(x^2 + y^2, z xy) = 0$

b) Solve the PDE
$$\frac{p^2}{z^2} = 1 - pq$$
. (7M)

7. a) Solve the PDE
$$(D^2 - 3D - D^{1^2} + 3D^1)z = e^{x-2y}$$
 (7M)

b) Solve the PDE
$$(D-D^{1}-1)(D-D^{1}-2)z = x + e^{3x-y}$$
 (7M)