Unit 9 - Week 8

Course outline

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Week 8

- Nonlinear PDE of first order
- Cauchy method of characteristics-I
- Cauchy method of characteristics-II
- Compatible systems of first order equations
- Charpit's method-I
- Quiz : Assignment 8
- Solution of assignment 8

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WEEKLY FEEDBACK

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Assignment 8

The due date for submitting this assignment has passed. **Due on 2018-09-26, 23:59 IST.**
As per our records you have not submitted this assignment.

1) *The integral surface of the equation (using Cauchy method of characteristics) $z = p^2 - 3q^2$ passing through the curve $z = x^2, y = 0$ is* **1 point**

- $4z = (2x + y)^2$
- $4z = (2x - y)^2$
- $z = (x + 2y)^2$
- $z = (x - 2y)^2$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$4z = (2x + y)^2$

2) *The integral surface of the equation (using Cauchy method of characteristics) $z = p^2x + qy$ passing through the curve $x + z = 0, y = 1$ is* **1 point**

- $z(y - 2) = xy$
- $zy = xy^2$
- $z^2 = (x + y - 1)^2$
- $z^2 = (x - y - 1)^2$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$z(y - 2) = xy$

3) *The integral surface of the equation (using Cauchy method of characteristics) $z = px + qy + pq$ passing through the curve $x = 0,\ z = y^2$ is* **1 point**

- $16z = (4y + x)^2$
- $16z = (4y - x)^2$
- $z = (y - 4x)^2$
- $z = (y + 2x)^2$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$16z = (4y - x)^2$

4) *The integral surface of the equation (using Cauchy method of characteristics) $z = p^2 - q^2$ passing through the curve $4z + x^2 = 0,\ y = 0$ is* **1 point**

- $4z + (x - \sqrt{2}y)^2 = 0$
- $4z + (x + \sqrt{2}y)^2 = 0$
- $z + (\frac{x}{2} - \sqrt{2}y)^2 = 0$
- $z + (\frac{x}{2} + y)^2 = 0$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$4z + (x - \sqrt{2}y)^2 = 0$

5) *The equations $f(x, y, p, q) = 0$ and $g(x, y, p, q) = 0$ are compatible if* **1 point**

$\frac{\partial(f,g)}{\partial(y,p)} - \frac{\partial(f,g)}{\partial(x,q)} = 0$

$\frac{\partial(f,g)}{\partial(x,p)} + \frac{\partial(f,g)}{\partial(y,q)} = 0$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$\frac{\partial(f,g)}{\partial(x,p)} + \frac{\partial(f,g)}{\partial(y,q)} = 0$

6) *Consider the partial differential equations* 1 point

$z = px + qy \quad (1)$
$z^2 = xyp + yzq \quad (2)$
$zx + xyp + yzq = 0 \quad (3)$
Then

PDE (1) *is compatible with PDE* (2) *but not with PDE* (3)

PDE (1) *is compatible with PDE* (3) *but not with PDE* (2)

PDE (1) *is compatible with both PDE* (2) *and PDE* (3)

PDE (1) *is compatible with neither PDE* (2) *nor with PDE* (3).

No, the answer is incorrect.
Score: 0

Accepted Answers:
PDE (1) *is compatible with both PDE* (2) *and PDE* (3)

7) *Consider the partial differential equations* 1 point

$p^2 + q^2 = 1 \quad (1)$
$(p^2 + q^2)y = pz \quad (2)$
Then

PDE (1) *and* (2) *are not compatible*

PDE (1) *and* (2) *are compatible and a common solution is* $\sqrt{2}z = x + y$

PDE (1) *and* (2) *are compatible and a common solution is* $z^2 = x^2 - (y + c)^2$

PDE (1) *and* (2) *are compatible and a common solution is* $z^2 = (x + y)^2 + c_1$

No, the answer is incorrect.
Score: 0

Accepted Answers:
PDE (1) *and* (2) *are not compatible*

8) *Complete integral of the equation* $p^2x + q^2y = z$ *is* 1 point

$z = (\sqrt{x} + a)^2 + (\sqrt{y} + b)^2$

$(z + \sqrt{a}x)^2 = (\sqrt{y} - b)^2$

$(z - \sqrt{xy})^2 = (\sqrt{y} - \sqrt{x})^2$

none of these.

No, the answer is incorrect.
Score: 0

Accepted Answers:
$z = (\sqrt{x} + a)^2 + (\sqrt{y} + b)^2$

9) 1 point

The envelope of the one parameter subsystem obtained by taking $b = -\frac{a}{\lambda} - \frac{\mu}{1+\lambda}$ *in the complete integral* $z = \sqrt{2x + a} + \sqrt{2y + b}$ *of the*

$z + \mu = 2\left(1 + \frac{1}{\lambda}\right)(x + \lambda\, y)$

$z^2 + \mu = (1 + \lambda)(x + \lambda^{-1}\, y)$

$z^2 + \mu = 2(1 + \lambda)(x + \lambda^{-1} y)$

$z^2 + \mu = 2\left(1 + \frac{1}{\lambda}\right)(x + \lambda\, y)$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$z^2 + \mu = 2\left(1 + \frac{1}{\lambda}\right)(x + \lambda\, y)$

10) *The envelope of the one parameter subsystem obtained by taking* $b = k + ah$ *in the complete integral* 1 point

$z + a^2x = axy + bx^2$
of the PDE is
$2xz + q^2 = x(xp + Yq)$
is

$x(y+hx)^2 = 4(z-kx)^2$

$x(y+hx)^2 = 4(z-kx^2)$

$x^2(y+hx) = 4(z-kx^2)$

$x(y+hx^2) = 4(z-kx)^2$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$x(y+hx)^2 = 4(z-kx^2)$

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