Model Question Paper

UG, Sem-VI, Mathematics

Paper : CC MATH-614

Kolhan University, Chaibasa

By

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Model Question Paper of UG, Sem-VI, 2020

Paper: CCMATH - 614 (Mathematics)

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Full Marks: 70

Time: 3 hours

Answer from all the Parts as directed.
The figures in the right-hand margin indicate Marks.

Part-A

(Compulsory)

1. Choose the correct answer of the following: $2\times10=20$

(a) The Solution of the equation $zp+x=0$ is

(i) $\phi(x, x^2+z^2)=0$ (ii) $\phi(y, x^2+z^2)=0$

(iii) $\phi(z, x^2+y^2)=0$ (iv) None of these

(b) Charpit's method use to solve partial diff. equation of

(i) Ist order linear (ii) Ist order non-linear

(iii) 2nd order linear (iv) 2nd order non-linear

(c) The Solution of $r=a^2t$, where r, t has usual meaning is

(i) $z=f_1(y+ax)+f_2(y-ax)$ (ii) $z=f(y+a^2x)$

(iii) $z=f_1(x+ay)+f_2(x-ay)$ (iv) $z=f_1(y+x)-f_2(y-x)$

(d) The C.F. of the equation $\frac{\partial z}{\partial x}+\frac{\partial z}{\partial y}=\sin x$ is

(i) $f(y-x)$ (ii) $f(x+y)$ (iii) $f(x^2+y)$ (iv) $f(xy)$

(e) To get Monge's Subsidiary equations, we put

$r=\frac{dp+s\,dy}{dy}$, $t=\frac{dq-s\,dx}{dx}$. Is it true or false?

P.T.O.

(f) One dimensional wave equation is

(i) $\frac{\partial^2 y}{\partial t^2} = c^2 \frac{\partial^2 y}{\partial x^2}$ (ii) $\frac{\partial y}{\partial t} = c^2 \frac{\partial^2 y}{\partial x^2}$

(iii) $\frac{\partial y}{\partial t} = c^2 \frac{\partial y}{\partial x}$ (iv) $\frac{\partial^2 y}{\partial t^2} = c^2 \frac{\partial^2 x}{\partial t^2}$

(g) The Laplace transform of $F(t) = 2e^{3t} - e^{-3t}$ is

(i) $\frac{p+3}{p-3}$ (ii) $\frac{p+9}{p^2+9}$ (iii) $\frac{p+9}{p^2-9}$ (iv) $\frac{p^2+9}{p^2-9}$

(h) The value of $L^{-1}\left(\frac{1}{\sqrt{p}}\right)$ is

(i) $\frac{1}{\sqrt{\pi t}}$ (ii) $\frac{t}{\sqrt{\pi}}$ (iii) $\sqrt{\frac{t}{\pi}}$ (iv) $\frac{1}{\pi t}$

(i) If $F(t) = \begin{cases} 4 & ; 0<t<1 \\ 3 & ; t>1 \end{cases}$, Then $L\{F(t)\} =$

(i) $\frac{4+e^{p}}{p}$ (ii) $\frac{4-e^{-p}}{p}$ (iii) $\frac{e^{p}}{p+4}$ (iv) None of these

(j) If $F(t)$ is a function of class A and if $L\{F(t)\} = f(p)$ Then $L\{t\,F(t)\}$ is equal to

(i) $f'(p)$ (ii) $-f'(p)$ (iii) $f''(p)$ (iv) $\frac{f''(p)}{p}$

Part-B

Answer any four questions: $5 \times 4 = 20$

2. Solve $z(xp - yq) = y^2 - x^2$

3. Solve by Charpit's method of the equation

$$2xz - px^2 - 2qxy + pq = 0$$

P.T.O.

4. Solve $(D^2 + 3DD' + 2D'^2)z = x + y$, where $D \equiv \frac{\partial}{\partial x}$ and $D' \equiv \frac{\partial}{\partial y}$.

5. Solve $q^2 r - 2pqs + p^2 t = 0$

6. Obtain the general solution of one-dimensional wave equation.

7. Evaluate $L(e^{-t} t^2 \sin 2t)$

8. Solve $\frac{d^2y}{dt^2} + y = 0$ under the conditions

$y = 1,\ \frac{dy}{dt} = 0$ when $t = 0$.

by Laplace transform.

9. Find $L^{-1}\left\{\log\left(\frac{p+3}{p+2}\right)\right\}$

Part-C

Answer any two questions: $15 \times 2 = 30$

10. (a) Solve $(z^2 - 2yz - y^2)p + (xy + zx)q = xy - zx$

(b) Solve $z = px + qy + p^2 + q^2$

11. (a) Find the general solution of

$$(D^3 - 4D^2D' + 4DD'^2)z = \cos(2x+y)$$

where $D \equiv \frac{\partial}{\partial x}$ and $D' \equiv \frac{\partial}{\partial y}$

(b) Solve by Monge's method:

$$y^2 r - 2ys + t = p + 6y$$

12. (a) Solve the boundary value problem $\frac{\partial^2 u}{\partial x^2} = \frac{1}{k}\frac{\partial u}{\partial t}$ satisfying $u(0,t) = 0 = u(l,t)$ and $u(x,0) = lx - x^2$.

(b) Evaluate $L^{-1}\left(\frac{3p+7}{p^2-2p+3}\right)$

13. (a) State and prove Convolution theorem

(b) Solve $(D^2+1)y = t\cos 2t$; $y=0, \frac{dy}{dt}=0$ when $t=0$.

—End—

Remark: Ans. of Q.1

a → (ii)
b → (ii)
c → (i)
d → (i)
e → false
f → (i)
g → (iii)
h → (i)
i → (ii)
j → (ii)