Printed Pages : 12

MASC-03

B.Sc. Mathematics (Semester-III) Examination, July-Dec., 2025

(Session : 2025-26) (NEP-2020)

(Session : 2025-26)

DIFFERENTIAL EQUATIONS

Time Allowed : Three Hours

Maximum Marks : 70

नोट: यह प्रश्न-पत्र दो खण्डों में विभक्त है। सभी खण्डों के प्रश्नों के उत्तर निर्देशानुसार दीजिए। अंकों का विभाजन प्रत्येक खण्ड में दिया गया है।

Note : This question paper is divided into **two** sections. Attempt questions of **all** sections as directed. Distribution of marks is given in each section.

खण्ड-अ / Section-A

बहुविकल्पीय प्रश्न / Multiple Choice Questions

नोट: निम्नलिखित में से सभी प्रश्नों के उत्तर दीजिए। **[10×1=10]**

Note : Attempt all questions of the following.

cguniversities.com | Join WhatsApp Channel

Join our WhatsApp Channel for FREE Question Papers, Syllabus & Exam Updates
More papers: cguniversities.com | Tap here to join
JOIN NOW >

Q.1. वराहमिहिर किस राजा के दरबार में विद्वान थे?

(अ) चन्द्रगुप्त द्वितीय

(ब) स्कन्दगुप्त

(स) विक्रमादित्य

(द) हर्षवर्धन

Varahmihir was a scholar in the Court of which King?

(a) Chandragupta-II

(b) Skandagupta

(c) Vikramaditya

(d) Harshavardhana

Q.2. श्रीधराचार्य किस योगदान के लिए प्रसिद्ध हैं?

(अ) खगोल विज्ञान

(ब) पंचांग गणना

(स) द्वितीय सूत्र

(द) संचय

cguniversities.com | Join WhatsApp Channel

Join our WhatsApp Channel for FREE Question Papers, Syllabus & Exam Updates
More papers: cguniversities.com | Tap here to join
JOIN NOW >

Shreedharacharya is well known for contribution in :

(a) Astronomy

(b) Calendar calculations

(c) Quadratic formula

(d) Combinatorics

Q.3. $\frac{dy}{dx} + Py = Q$ का समाकलन गुणक क्या है?

(अ) $e^{-\int Pdx}$

(ब) $e^{\int Pdx}$

(स) $e^{\int Q.dx}$

(द) P.Q.

The integrating facter of $\frac{dy}{dx} + Py = Q$ is :

(a) $e^{-\int Pdx}$

(b) $e^{\int Pdx}$

(c) $e^{\int Q.dx}$

(d) P.Q.

cguniversities.com | Join WhatsApp Channel

Join our WhatsApp Channel for FREE Question Papers, Syllabus & Exam Updates
More papers: cguniversities.com | Tap here to join
JOIN NOW >

Q.4. अवकल समीकरण $\left(\frac{dy}{dx}\right)^3 + \frac{d^2y}{dx^2} + y = 0$ की घात है?

(अ) 1

(ब) 2

(स) 3

(द) 0

The degree of the Differential equation $\left(\frac{dy}{dx}\right)^3 + \frac{d^2y}{dx^2} + y = 0$ is :

(a) 1

(b) 2

(c) 3

(d) 0

Q.5. विशिष्ट समाकल $\frac{1}{D^2 + a^2} \text{Sin } ax$ का मान है :

(अ) $\frac{-x}{2a} \text{Sin } ax$

cguniversities.com | Join WhatsApp Channel

Join our WhatsApp Channel for FREE Question Papers, Syllabus & Exam Updates
More papers: cguniversities.com | Tap here to join
JOIN NOW >

(ब) $\frac{x}{2a}\text{Cos } ax$

(स) $\frac{x}{2a}\text{Sin } ax$

(द) $\frac{-x}{2a}\text{Cos } ax$

The value of particular integral $\frac{1}{D^2+a^2}\text{Sin } ax$ is :

(a) $\frac{-x}{2a}\text{Sin } ax$

(b) $\frac{x}{2a}\text{Cos } ax$

(c) $\frac{x}{2a}\text{Sin } ax$

(d) $\frac{-x}{2a}\text{Cos } ax$

Q.6. $y = e^{ax}$ समीकरण $\frac{d^2y}{dx^2} + P\frac{dy}{dx} + Qy = 0$ का एक हल होगा यदि :

cguniversities.com | Join WhatsApp Channel

Join our WhatsApp Channel for FREE Question Papers, Syllabus & Exam Updates
More papers: cguniversities.com | Tap here to join
JOIN NOW >

(अ) $a^2 + aP + Q = 0$

(ब) $a^2 + aQ + P = 0$

(स) $a^2 - aP + Q = 0$

(द) $a^2 + aQ - P = 0$

$y = e^{ax}$ will be the solution of equation $\frac{d^2y}{dx^2} + P\frac{dy}{dx} + Qy = 0$ if :

(a) $a^2 + aP + Q = 0$

(b) $a^2 + aQ + P = 0$

(c) $a^2 - aP + Q = 0$

(d) $a^2 + aQ - P = 0$

Q.7. अवकल समीकरण $f(p, q) = 0$ का पूर्ण हल होगा :

(अ) $z = ax + by + c$

(ब) $z = ax - by - c$

(स) $ax + by + c = 0$

(द) $z = ax + b$

cguniversities.com | Join WhatsApp Channel

Join our WhatsApp Channel for FREE Question Papers, Syllabus & Exam Updates
More papers: cguniversities.com | Tap here to join
JOIN NOW >

The complete solution of the differential equation $f(p, q) = 0$ will be :

(a) $z = ax + by + c$

(b) $z = ax - by - c$

(c) $ax + by + c = 0$

(d) $z = ax + b$

Q.8. रैखिक आंशिक अवकल समीकरण $Pp + Qq = R$ का सहायक समीकरण कहलाता है :

(अ) चारपिट सहायक समीकरण

(ब) लाग्रांज सहायक समीकरण

(स) जैकोबी सहायक समीकरण

(द) इनमें से कोई नहीं

The auxiliary equation of the linear Partial differential equation $Pp + Qq = R$ is called :

(a) Charpit Auxiliary equation

(b) Lagrange Auxiliary equation

(c) Jacobi Auxiliary equation

(d) None of these

[P.T.O.]

cguniversities.com | Join WhatsApp Channel

Join our WhatsApp Channel for FREE Question Papers, Syllabus & Exam Updates
More papers: cguniversities.com | Tap here to join
JOIN NOW >

Q.9. आंशिक अवकल समीकरण $\frac{\partial^2 z}{\partial y^2} = 0$ का हल है :

(अ) $z = y\phi_1(x) + \phi_2(x)$

(ब) $z = x\phi_1(y) + \phi_2(y)$

(स) $z = y\phi_1(x) + \phi_2(y)$

(द) $z = y\phi_1(y) + \phi_2(x)$

The solution of the partial differential equation $\frac{\partial^2 z}{\partial y^2} = 0$ is :

(a) $z = y\phi_1(x) + \phi_2(x)$

(b) $z = x\phi_1(y) + \phi_2(y)$

(c) $z = y\phi_1(x) + \phi_2(y)$

(d) $z = y\phi_1(y) + \phi_2(x)$

Q.10. तरंग समीकरण $\frac{\partial^2 u}{\partial x^2} = \frac{\partial^2 u}{\partial t^2}$, xy-समतल में सर्वत्र :

(अ) परवलयिक

cguniversities.com | Join WhatsApp Channel

Join our WhatsApp Channel for FREE Question Papers, Syllabus & Exam Updates
More papers: cguniversities.com | Tap here to join
JOIN NOW >

(ब) दीर्घवृत्तीय

(स) अतिपरवलयिक

(द) इनमें से कोई नहीं

The wave equation $\frac{\partial^2 u}{\partial x^2} = \frac{\partial^2 u}{\partial t^2}$ in xy-plane is everywhere:

(a) Parabolic

(b) Elliptic

(c) Hyperbolic

(d) None of these

(Short Answer Type Questions)

Note: सभी प्रश्नों के उत्तर दीजिए। [4×5=20]

Attempt all questions.

Q.1. हल कीजिए :

Solve :

$$(x + y + 1)\ \frac{dy}{dx} = 1$$

[P.T.O.]

cguniversities.com | Join WhatsApp Channel

Join our WhatsApp Channel for FREE Question Papers, Syllabus & Exam Updates
More papers: cguniversities.com | Tap here to join
JOIN NOW >

Q.2. हल कीजिए :

Solve :

$$(D^2 - 3D + 2)y = 6e^{2x} + \sin^{2x}$$

Q.3. $\phi(x + y + z, x^2 + y^2 + z^2) = 0$ से आंशिक अवकल समीकरण का निर्माण कीजिए।

From $\phi(x + y + z, x^2 + y^2 + z^2) = 0$, obtain the partial differential equation.

Q.4. हल कीजिए :

Solve :

$25r - 40s + 16t = 0$

खण्ड-ब / Section-B

Note: सभी प्रश्न अनिवार्य हैं। प्रश्न के अतिरिक्त विकल्प दिये गए हैं। [4×10=40]

All questions are compulsory. Internal choices are given.

Q.1. किसी एक गणितज्ञ के जीवन परिचय एवं उनके गणितीय योगदान को लिखिए।

Write the Biography of any one and their mathematical contributions.

cguniversities.com | Join WhatsApp Channel

Join our WhatsApp Channel for FREE Question Papers, Syllabus & Exam Updates
More papers: cguniversities.com | Tap here to join
JOIN NOW >

(i) वराहमिहिर

Varahamihira

(ii) श्रीधराचार्य

Shreedharacharya

अथवा / OR

हल कीजिए :

Solve :

$$x^2p^2 - 2xyp + 2y^2 - x^2 = 0$$

Q.2. प्राचल विकिरण विधि द्वारा हल कीजिए :

Solve using Variation of parameter method :

$$\frac{d^2y}{dx^2} + y = \text{Cosec } x$$

अथवा / OR

युगपत अवकल समीकरण को हल कीजिए :

Solve the simultaneous differential equation :

$$\frac{dx}{dt} - 7x + y = 0$$

$$\frac{dy}{dt} - 2x - 5y = 0$$

cguniversities.com | Join WhatsApp Channel

Join our WhatsApp Channel for FREE Question Papers, Syllabus & Exam Updates
More papers: cguniversities.com | Tap here to join
JOIN NOW >