

[54,700 प्रतियाँ]

Roll No.

Code No. : 0821

[Total No. of Pages : 7

Sl. No.

(ODD SEMESTER) DECEMBER - 2017 EXAMINATION

- (720301) [Third Semester] Chemical Technology (Fertilizer) [720]
(721301) [Third Semester] Chemical Technology (Rubber and Plastic) [721]
(728301) [Third Semester] Electrical Engineering [728]
(729301) [Third Semester] Electrical Engineering (Industrial Control) [729]
(730301) [Third Semester] Electronics Engineering [730]
(731301) [Third Semester] Electronics Engineering (Modern Consumer Electronics Appliances) [731]
(732301) [Third Semester] Electronics Engineering (Advance Microprocessor & Interface) [732]
(733301) [Third Semester] Electronics Engineering (Micro Electronics) [733]
(734301) [Third Semester] Electrical & Electronics Engineering [734]
(738301) [Third Semester] Instrumentation and Control [738]
(741301) [Third Semester] Mechanical Engineering (Automobile) [741]
(742301) [Third Semester] Mechanical Engineering (Computer Aided Design) [742]
(743301) [Third Semester] Mechanical Engineering (Production) [743]
(744301) [Third Semester] Mechanical Engineering (Refrigeration & Airconditioning) [744]
(745301) [Third Semester] Mechanical Engineering (Maintenance) [745]
(752301) [Third Semester] Chemical Engineering [752]
(753301) [Third Semester] Chemical Engineering (Petro Chemical) [753]
(755302) [Third Semester] Computer Science and Engineering [755]
(756303) [Third Semester] Information Technology [756]
(757301) [Third Semester] Diploma in Paint Technology [757]
(758301) [Third Semester] Diploma in Plastic Mould Technology [758]
(778301) [Third Semester] Electrical Engineering (Lateral Entry) [778]

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(779301) [Third Semester] Electrical Engineering (Industrial Control) (Lateral Entry) [779]

(780301) [Third Semester] Electronics Engineering (Lateral Entry) (Second Year) [780]

(781301) [Third Semester] Electronics Engineering (Modern Consumer Electronics) (Lateral Entry) [781]

(782301) [Third Semester] Electronics Engineering (Advance Microprocessor & Interface) (Lateral Entry) [782]

(783301) [Third Semester] Electronics Engineering (Micro Electronics) (Lateral Entry) [783]

(784301) [Third Semester] Mechanical Engineering (Automobile) (Lateral Entry) [784]

(785301) [Third Semester] Mechanical Engineering (Computer Aided Design) (Lateral Entry) [785]

(786301) [Third Semester] Mechanical Engineering (Production) (Lateral Entry) [786]

(787301) [Third Semester] Mechanical Engineering (Refrigeration & Airconditioning) (Lateral Entry) [787]

(788301) [Third Semester] Mechanical Engineering (Maintenance) (Lateral Entry) [788]

(790303) [Third Semester] Information Technology (Lateral Entry) [790]

APPLIED MATHEMATICS - II

Time : 2.30 Hours]

[Maximum Marks : 50

[Minimum Marks : 17

NOTES :

- i) Attempt all questions.
- ii) Students are advised to specially check the Numerical Data of question paper in both versions. If there is any difference in Hindi Translation of any question, the students should answer the question according to the English version.
- iii) Use of Pager and Mobile Phone by the students is not allowed.

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Q1) Attempt any four parts of the following :

[4 × 2 = 8]

a) If $A = \begin{bmatrix} 2 & 5 \\ 1 & 3 \end{bmatrix}$, then find A^{-1}

b) Find the order and the degree of the differential equation

$$\left[1 + \left(\frac{dy}{dx}\right)^2\right]^{2/3} = k \frac{d^2y}{dx^2}$$

c) Evaluate $L^{-1} \left[\frac{s}{(s^2 + 4)^2} \right]$

d) Solve $(D^2 + D - 2)y = e^{-2x}$

e) Show that vectors $(2, 3, 4)$ $(0, 1, 2)$ $(-1, 1, -1)$ are linearly independent.

Q2) Attempt any two parts of the following :

[2 × 5 = 10]

a) Find the rank of the matrix $A = \begin{bmatrix} 0 & 2 & 3 \\ 0 & 4 & 6 \\ 0 & 6 & 9 \end{bmatrix}$

b) Evaluate $\int_0^1 x^6 (1-x)^7 dx$

c) If $u = \log_e \left(\frac{x^2 + y^2}{x + y} \right)$, Show that $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = 1$

Q3) Attempt any two parts of the following :

[2 × 5 = 10]

a) If $F = xy^3 - x^3y$ then find $\nabla^2 F$

b) Solve $x^2 \frac{d^2y}{dx^2} - 2y = x^2 + \frac{1}{x^2}$

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- c) If mean and variance of a binomial distribution are 4 and 2 respectively, find the probability of
- Exactly two successes
 - at least 2 successes

[2 × 5 = 10]

Q4) Attempt any two parts of the following :

- a) If $A^{-1} = (3x^2 + 6y)i - 14yzj + 20xz^2k$, then evaluate the line integral $\int_c A^{-1} \cdot dr^{-1}$ from (0, 0, 0) to (1, 1, 1) along the curve C; $x = t$, $y = t^2$ and $z = t^3$.
- b) Find the fourier series of the functions $f(x) = x^3$ in the interval $[-\pi, \pi]$
- c) If $Z = f(x, y)$, $x = e^u + e^{-v}$, $y = e^{-u} - e^v$,

Prove that
$$\frac{\partial z}{\partial u} - \frac{\partial z}{\partial v} = x \frac{\partial z}{\partial x} - y \frac{\partial z}{\partial y}$$

Q5) Attempt any two parts of the following :

[2 × 6 = 12]

- a) Find the Eigen values and Eigen vectors of the matrix $\begin{bmatrix} 2 & 1 & 1 \\ 1 & 2 & 1 \\ 0 & 0 & 1 \end{bmatrix}$
- b) A resistance of 100 ohms and an inductance of 0.5 henry are connected in series with a battery of 20volts. Find the current in a circuit as a function of t.
- c) Using Laplace Transforms solve the differential equation $y'' - 3y' + 2y = 4t + e^{3t}$, given $y(0) = 1$ $y'(0) = -1$



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(हिन्दी अनुवाद)

नोट :- सभी प्रश्नों के उत्तर दीजिये।

प्र.1) निम्नलिखित में कोई चार भाग हल कीजिये।

[4 × 2 = 8]

अ) यदि $A = \begin{bmatrix} 2 & 5 \\ 1 & 3 \end{bmatrix}$ तो A^{-1} का मान ज्ञात करो।

ब) अवकल समीकरण $\left[1 + \left(\frac{dy}{dx}\right)^2\right]^{2/3} = k \frac{d^2y}{dx^2}$ की कोटि तथा घात ज्ञात करो।

स) $L^{-1} \left[\frac{s}{(s^2 + 4)^2} \right]$ का मान ज्ञात करो।

द) हल करो - $(D^2 + D - 2)y = e^{-2x}$

इ) दिखाइये कि सदिश $(2, 3, 4)$ $(0, 1, 2)$ $(-1, 1, -1)$ एक घात स्वतंत्र है।

प्र.2) निम्नलिखित में कोई दो भाग हल कीजिये।

[2 × 5 = 10]

अ) आव्यूह $A = \begin{bmatrix} 0 & 2 & 3 \\ 0 & 4 & 6 \\ 0 & 6 & 9 \end{bmatrix}$ की कोटि ज्ञात करो।

ब) $\int_0^1 x^6 (1-x)^7 dx$ का मान ज्ञात करो।

स) यदि $u = \log_e \left(\frac{x^2 + y^2}{x + y} \right)$, तो सिद्ध कीजिए $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = 1$

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[2 × 5 = 10]

प्र.3) निम्नलिखित में कोई दो भाग हल कीजिये।

अ) यदि $F = xy^3 - x^3y$ तो $\nabla^2 F$ का मान ज्ञात करो।

ब) हल करो - $x^2 \frac{d^2y}{dx^2} - 2y = x^2 + \frac{1}{x^2}$

स) एक द्विपद बंटन में समान्तर माध्य 4 तथा विचरण 2 है तो प्रायिकता ज्ञात करो

i) ठीक दो सफलता की।

ii) कम से कम दो सफलता की।

प्र.4) निम्नलिखित में कोई दो भाग हल कीजिये।

[2 × 5 = 10]

अ) यदि $A^{-1} = (3x^2 + 6y)i - 14yzj + 20xz^2k$ तब $\int A^{-1} \cdot dr^{-1}$ का मान ज्ञात करो।
यदि समाकलन का पथ मूलबिन्दु (0, 0, 0) से बिन्दु (1, 1, 1) तक $x=t, y=t^2$ तथा $z=t^3$ के अनुदिश है।

ब) फलन $f(x) = x^3$ की $[-\pi, \pi]$ अन्तराल में फोरियर श्रेणी ज्ञात कीजिए।

स) यदि $Z = f(x, y), x = e^u + e^{-v}, y = e^{-u} - e^v$,

सिद्ध कीजिए $\frac{\partial z}{\partial u} - \frac{\partial z}{\partial v} = x \frac{\partial z}{\partial x} - y \frac{\partial z}{\partial y}$

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प्र.5) निम्नलिखित में कोई दो भाग हल कीजिये।

[2 × 6 = 12]

अ) आव्यूह $\begin{bmatrix} 2 & 1 & 1 \\ 1 & 2 & 1 \\ 0 & 0 & 1 \end{bmatrix}$ के अभिलक्षणिक मान तथा अभिलक्षणिक सदिश ज्ञात करो।

ब) 100 ओम के प्रतिरोध तथा 0.5 हेनरी के प्रेरकत्व को 20 वोल्ट की एक बॅटरी के साथ श्रेणी क्रम में जोड़ा गया है। परिपथ में धारा i का मान समय t के फलन के रूप में ज्ञात करो।

स) अवकल समीकरण $y'' - 3y' + 2y = 4t + e^{3t}$ को लाप्लास रूपान्तर के प्रयोग से हल कीजिये। दिया है $y(0) = 1, y'(0) = -1$



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