

[15,150 प्रतियाँ]

Code No. : 2041 - (D)

प्र.3) निम्न में से किन्हीं दो भागों को हल कीजिये।

[2×5=10]

अ) द्विपद $\left(x^2 - \frac{2}{x^3}\right)^{15}$ के प्रसार में x से स्वतन्त्र पद ज्ञात कीजिये।

ब) डिमाइवर प्रमेय का प्रयोग करते हुए समीकरण $x^4+1=0$ को हल कीजिये।

स) यदि $\vec{a}=3\hat{i}+4\hat{j}-5\hat{k}$ तथा $\vec{b}=7\hat{i}-3\hat{j}+6\hat{k}$ है तो $(\vec{a}+\vec{b})\times(\vec{a}-\vec{b})$ का मापांक ज्ञात करो।

प्र.4) निम्न में से किन्हीं दो भागों को हल कीजिये।

[2×5=10]

अ) क्रमर नियम से निम्न समीकरण हल करो।

$$6x + y - 3z = 5, x + 3y - 2z = 5, 2x + y + 4z = 8$$

ब) प्रथम सिद्धान्त से x^n का अवकल गुणांक ज्ञात करो।

स) यदि $y = \frac{x \cdot \sin^{-1} x}{\sqrt{1-x^2}}$, तो सिद्ध करो कि $(1-x^2) \cdot \frac{dy}{dx} = x + \frac{y}{x}$

प्र.5) निम्न में से किन्हीं दो भागों को हल कीजिये।

[2×5=10]

अ) $\frac{x}{3 + \tan x}$ का अवकल गुणांक ज्ञात करो।

ब) हल करो -

$$\tan^{-1}(x+1) + \tan^{-1}(x-1) = \tan^{-1} \frac{8}{31}$$

स) वक्र $2x^2 + 3y^2 = 14$ के बिन्दु (1, 2) पर स्पर्शी तथा अभिलम्ब का समीकरण ज्ञात करो।



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Roll No.

Code No. : 2041 - (D)

Sl. No. 10948

[Total No. of Pages : 8

ODD SEMESTER EXAMINATION, DECEMBER - 2019

[First Semester] Three Years Diploma Course in Civil Engineering [322]

[First Semester] Three Years Diploma Course in Civil Engineering (Environmental Pollution & Control) [323]

[First Semester] Three Years Diploma Course in Electrical Engineering [328]

[First Semester] Three Years Diploma Course in Electrical Engineering (Industrial Control) [329]

[First Semester] Three Years Diploma Course in Electronics Engineering [330]

[First Semester] Three Years Diploma Course in Electronics Engg. (Modern Consumer Electronics Appliances) [331]

[First Semester] Three Years Diploma Course in Electronics Engg. (Advance Microprocessor & Interface) [332]

[First Semester] Three Years Diploma Course in Electronics Engineering (Micro Electronics) [333]

[First Semester] Three Years Diploma Course in Instrumentation & Control Engg. [338]

[First Semester] Three Years Diploma Course in Mechanical Engineering (Automobile) [341]

[First Semester] Three Years Diploma Course in Mechanical Engineering (Computer Aided Design) [342]

[First Semester] Three Years Diploma Course in Mechanical Engineering (Production) [343]

[First Semester] Three Years Diploma Course in Mechanical Engineering (R A C) [344]

[First Semester] Three Years Diploma Course in Mechanical Engineering (Maintenance) [345]

[First Semester] Three Years Diploma Course in Chemical Engineering [352]

[First Semester] Three Years Diploma Course in Computer Science and Engineering [355]

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- [First Semester] Three Years Diploma Course in Information Technology [356]
[First Semester] Three Years Diploma Course in Mechanical Engineering [367]
[Third Semester] Three Years Diploma Course in Civil Engineering {Lateral Entry} [375]
[Third Semester] Three Years Diploma Course in Civil Engineering (Environmental Pollution & Control) {Lateral Entry} [376]
[Third Semester] Three Years Diploma Course in Electrical Engineering {Lateral Entry} [378]
[Third Semester] Three Years Diploma Course in Electrical Engineering (Industrial Control) {Lateral Entry} [379]
[Third Semester] Three Years Diploma Course in Electronics Engineering {Lateral Entry} [380]
[Third Semester] Three Years Diploma Course in Electronics Engg. (Modern Consumer Electronics Appliances) {Lateral Entry} [381]
[Third Semester] Three Years Diploma Course in Electronics Engg. (Advance Microprocessor & Interface) {Lateral Entry} [382]
[Third Semester] Three Years Diploma Course in Electronics Engineering (Micro Electronics) {Lateral Entry} [383]
[Third Semester] Three Years Diploma Course in Mechanical Engineering (Automobile) {Lateral Entry} [384]
[Third Semester] Three Years Diploma Course in Mechanical Engineering (Computer Aided Design) {Lateral Entry} [385]
[Third Semester] Three Years Diploma Course in Mechanical Engineering (Production) {Lateral Entry} [386]
[Third Semester] Three Years Diploma Course in Mechanical Engineering (RAC) {Lateral Entry} [387]
[Third Semester] Three Years Diploma Course in Mechanical Engineering (Maintenance) {Lateral Entry} [388]
[Third Semester] Three Years Diploma Course in Computer Science and Engineering {Lateral Entry} [389]
[Third Semester] Three Years Diploma Course in Information Technology {Lateral Entry} [390]

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APPLIED MATHEMATICS - I

Time : 2:30 Hours]

[Maximum Marks : 50

[Minimum Marks : 17

NOTES :

- Attempt All questions.
- 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.
- Use of Pager and Mobile Phone by the students is not allowed.

Q1) Answer any ten parts of the following from part a to e select correct choice in the following. **[10×1=10]**

- a) The sum of n terms of the series $a + (a + d) + (a + 2d) + (a + 3d) + \dots$
- $a + (n - 1) \cdot d$
 - $a + nd$
 - $a - (n - 1) \cdot d$
 - None
- b) If $f(x) = \tan x$ then the value of $f(135^\circ)$ is -
- 1
 - 1
 - $\frac{1}{2}$
 - None
- c) The value of $\operatorname{cosec}^2\theta - \cot^2\theta$ is -
- 1
 - $\frac{1}{2}$
 - $\frac{1}{\sqrt{3}}$
 - None
- d) The value of $\frac{d^2y}{dx^2}$ if $y = e^x$
- e^x
 - e^{2x}
 - $2 \cdot e^x$
 - None

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- e) If $\vec{a} = 2\hat{i} - 3\hat{j} + \hat{k}$ then $|\vec{a}|$ is -
 i) 1 ii) 14
 iii) $\sqrt{14}$ iv) None
- f) Evaluate $\begin{vmatrix} 1 & 4 & 5 \\ 3 & 6 & 9 \\ 5 & 3 & 8 \end{vmatrix}$
- g) Evaluate $\lim_{x \rightarrow 2} \frac{x^2 - 4}{x - 2}$.
- h) Find the differential coefficient of $e^{\sin x}$
- i) Change into polar form $(-1 - i\sqrt{3})$
- j) Evaluate ${}^{15}C_8 + {}^{15}C_9 - {}^{15}C_6 - {}^{15}C_7$.
- k) Find $\frac{d^2y}{dx^2}$ of $2x^4 + 3x^3 + 4x^2 + 5x + 7$.
- l) If $\vec{a} = \hat{i} + 3\hat{j} - 5\hat{k}$ and $\vec{b} = 5\hat{i} - \hat{j} - 3\hat{k}$ then find $\vec{a} + \vec{b}$.
- Q2) Answer any Five parts of the following: [5×2=10]
- a) Which term of series 16, 8, 4, 2 is $\frac{1}{32}$
- b) If $k+3, 2k+1, k+7$ are in A.P. then find the value of k .
- c) Prove that $\frac{1+i}{\sqrt{2}} = \sqrt{i}$.
- d) If $y = \sin^{-1}x$ then prove that $(1-x^2) \cdot \frac{d^2y}{dx^2} = x \cdot \frac{dy}{dx}$.
- e) Differentiate $\sqrt{\tan\sqrt{x}}$ with respect to x .

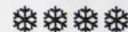
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- f) In a triangle ABC, $a = 2, b = \sqrt{6}, c = \sqrt{3} - 1$ then find $\angle A$.
- g) If $\left(\frac{1+i}{1-i}\right)^3 - \left(\frac{1-i}{1+i}\right)^3 = x + iy$ then find x, y .
- Q3) Answer any two parts of the following: [2×5=10]
- a) Find the independent term from x in the expansion of $\left(x^2 - \frac{2}{x^3}\right)^{15}$
- b) Solve the equation $x^4 + 1 = 0$ by using De Moivre's theorem.
- c) If $\vec{a} = 3\hat{i} + 4\hat{j} - 5\hat{k}$ and $\vec{b} = 7\hat{i} - 3\hat{j} + 6\hat{k}$ then find modulus of $(\vec{a} + \vec{b}) \times (\vec{a} - \vec{b})$
- Q4) Answer any two parts of the following: [2×5=10]
- a) Solve the following equations using Cramer rule - $6x + y - 3z = 5, x + 3y - 2z = 5, 2x + y + 4z = 8$
- b) By using first principle find differential coefficient of x^n .
- c) If $y = \frac{x \cdot \sin^{-1} x}{\sqrt{1-x^2}}$, prove that $(1-x^2) \frac{dy}{dx} = x + \frac{y}{x}$.
- Q5) Answer any two parts of the following. [2×5=10]
- a) Find the differential coefficient of $\frac{x}{3 + \tan x}$
- b) Solve the equation - $\tan^{-1}(x+1) + \tan^{-1}(x-1) = \tan^{-1} \frac{8}{31}$
- c) Find the equation of tangent and normal of curve $2x^2 + 3y^2 = 14$ at point (1, 2).



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(P.T.O.)

(हिन्दी अनुवाद)

नोट : सभी प्रश्नों के उत्तर दीजिए।

प्र.1) किन्हीं दस भागों को हल करो। निम्नलिखित में भाग अ से य तक सही विकल्प चुनिये। [10×1=10]

अ) श्रेणी $a + (a + d) + (a + 2d) + (a + 3d) + \dots$ के n पदों का योग होगा।

- i) $a + (n-1) \cdot d$ ii) $a + nd$
 iii) $a - (n-1) \cdot d$ iv) कोई नहीं

ब) यदि $f(x) = \tan x$ तो $f(135^\circ)$ का मान होगा।

- i) 1 ii) -1
 iii) $\frac{1}{2}$ iv) कोई नहीं

स) $\operatorname{cosec}^2\theta - \cot^2\theta$ का मान होगा।

- i) 1 ii) $\frac{1}{2}$
 iii) $\frac{1}{\sqrt{3}}$ iv) कोई नहीं

द) $\frac{d^2y}{dx^2}$ का मान होगा। यदि $y = e^x$

- i) e^x ii) e^{2x}
 iii) $2 \cdot e^x$ iv) कोई नहीं

घ) यदि $\vec{a} = 2\hat{i} - 3\hat{j} + \hat{k}$ तब $|\vec{a}|$ होगा।

- i) 1 ii) 14
 iii) $\sqrt{14}$ iv) कोई नहीं

र) हल करो $\begin{vmatrix} 1 & 4 & 5 \\ 3 & 6 & 9 \\ 5 & 3 & 8 \end{vmatrix}$ ल) $\lim_{x \rightarrow 2} \frac{x^2 - 4}{x - 2}$ का मान ज्ञात करो।व) $e^{\sin x^2}$ का अवकल गुणांक ज्ञात करो।त) $(-1-i\sqrt{3})$ को ध्रुवीय रूप में बदलो।थ) ${}^{15}C_8 + {}^{15}C_9 - {}^{15}C_6 - {}^{15}C_7$ को हल करो।घ) फलन $2x^4 + 3x^3 + 4x^2 + 5x + 7$ का $\frac{d^2y}{dx^2}$ ज्ञात करो।न) यदि $\vec{a} = \hat{i} + 3\hat{j} - 5\hat{k}$ और $\vec{b} = 5\hat{i} - \hat{j} - 3\hat{k}$ तो $\vec{a} + \vec{b}$ ज्ञात करो।

प्र.2) निम्न में से किन्हीं पाँच भागों को हल कीजिये।

[5×2=10]

अ) श्रेणी 16, 8, 4, 2 का कौनसा पद $\frac{1}{32}$ होगा।ब) यदि $k+3, 2k+1, k+7$ समान्तर श्रेणी में हो तो k का मान ज्ञात करो।स) सिद्ध करो $\frac{1+i}{\sqrt{2}} = \sqrt{i}$ ।द) यदि $y = \sin^{-1}x$ हो तो सिद्ध करो कि $(1-x^2) \cdot \frac{d^2y}{dx^2} = x \cdot \frac{dy}{dx}$ ।य) x के सापेक्ष $\sqrt{\tan \sqrt{x}}$ का अवकल गुणांक ज्ञात करो।र) यदि त्रिभुज ABC में, $a = 2, b = \sqrt{6}$, तथा $c = \sqrt{3} - 1$ हो तो $\angle A$ का मान ज्ञात करो।ल) यदि $\left(\frac{1+i}{1-i}\right)^3 - \left(\frac{1-i}{1+i}\right)^3 = x + iy$ हो तो x, y का मान ज्ञात करो।