

Series : ABCD3/1

SET – 1



प्रश्न-पत्र कोड 65/1/1
Q.P. Code

रोल नं.
Roll No.

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परीक्षार्थी प्रश्न-पत्र कोड को उत्तर-पुस्तिका के मुख-पृष्ठ पर अवश्य लिखें।
Candidates must write the Q.P. Code on the title page of the answer-book.

- कृपया जाँच कर लें कि इस प्रश्न-पत्र में मुद्रित पृष्ठ 8 हैं।
- प्रश्न-पत्र में दाहिने हाथ की ओर दिए गए प्रश्न-पत्र कोड को छात्र उत्तर-पुस्तिका के मुख-पृष्ठ पर लिखें।
- कृपया जाँच कर लें कि इस प्रश्न-पत्र में 14 प्रश्न हैं।
- कृपया प्रश्न का उत्तर लिखना शुरू करने से पहले, उत्तर-पुस्तिका में प्रश्न का क्रमांक अवश्य लिखें।
- इस प्रश्न-पत्र को पढ़ने के लिए 15 मिनट का समय दिया गया है। प्रश्न-पत्र का वितरण पूर्वाह्न में 10.15 बजे किया जाएगा। 10.15 बजे से 10.30 बजे तक छात्र केवल प्रश्न-पत्र को पढ़ेंगे और इस अवधि के दौरान वे उत्तर-पुस्तिका पर कोई उत्तर नहीं लिखेंगे।
- Please check that this question paper contains 8 printed pages.
- Q.P. Code number given on the right hand side of the question paper should be written on the title page of the answer-book by the candidate.
- Please check that this question paper contains 14 questions.
- Please write down the Serial Number of the question in the answer-book before attempting it.
- 15 minutes time has been allotted to read this question paper. The question paper will be distributed at 10.15 a.m. From 10.15 a.m. to 10.30 a.m., the students will read the question paper only and will not write any answer on the answer-book during this period.

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गणित

MATHEMATICS



निर्धारित समय : 2 घण्टे

Time allowed : 2 hours

अधिकतम अंक : 40

Maximum Marks : 40

65/1/1

309 A

Page 1 of 8

P.T.O.

**General Instructions :**

Read the following instructions very carefully and strictly follow them :

- (i) The question paper contains **three** Sections – Section **A**, **B** and **C**.
- (ii) **Each** Section is **Compulsory**.
- (iii) **Section – A** has **6** short answer type-**I** questions of **2** marks each.
- (iv) **Section – B** has **4** short answer type-**II** questions of **3** marks each.
- (v) **Section – C** has **4** long answer type questions of **4** marks each.
- (vi) There is an internal choice in some questions.
- (vii) Question No. **14** is a case based problem with 2 subparts of **2** marks each.

SECTION – A

Question numbers **1** to **6** carry **2** marks each.

1. Find the sum of the order and the degree of the differential equation :

$$\left(x + \frac{dy}{dx}\right)^2 = \left(\frac{dy}{dx}\right)^2 + 1$$
 2
2. In a parallelogram PQRS, $\overrightarrow{PQ} = 3\hat{i} - 2\hat{j} + 2\hat{k}$ and $\overrightarrow{PS} = -\hat{i} - 2\hat{k}$. Find $|\overrightarrow{PR}|$ and $|\overrightarrow{QS}|$. **2**
3. (a) If $\frac{d}{dx}[F(x)] = \frac{\sec^4 x}{\operatorname{cosec}^4 x}$ and $F\left(\frac{\pi}{4}\right) = \frac{\pi}{4}$, then find $F(x)$. **2**

OR

- (b) Find : $\int \frac{\log x - 3}{(\log x)^4} dx$.
- 4. Let A and B be two events such that $P(A) = \frac{5}{8}$, $P(B) = \frac{1}{2}$ and $P(A/B) = \frac{3}{4}$. Find the value of $P(B/A)$. **2**
- 5. Two balls are drawn at random from a bag containing 2 red balls and 3 blue balls, without replacement. Let the variable X denotes the number of red balls. Find the probability distribution of X. **2**
- 6. Find the values of λ , for which the distance of point $(2, 1, \lambda)$ from plane $3x + 5y + 4z = 11$ is $2\sqrt{2}$ units. **2**





SECTION – B

Question numbers 7 to 10 carry 3 marks each.

7. (a) If $\vec{a}$, $\vec{b}$, $\vec{c}$ and $\vec{d}$ are four non-zero vectors such that $\vec{a} \times \vec{b} = \vec{c} \times \vec{d}$ and $\vec{a} \times \vec{c} = 4\vec{b} \times \vec{d}$, then show that $(\vec{a} - 2\vec{d})$ is parallel to $(2\vec{b} - \vec{c})$ where $\vec{a} \neq 2\vec{d}$, $\vec{c} \neq 2\vec{b}$.

3

OR

- (b) The two adjacent sides of a parallelogram are represented by $2\hat{i} - 4\hat{j} - 5\hat{k}$ and $2\hat{i} + 2\hat{j} + 3\hat{k}$. Find the unit vectors parallel to its diagonals. Using the diagonal vectors, find the area of the parallelogram also.
8. Find the vector equation of the plane passing through the intersection of the planes $\vec{r} \cdot (2\hat{i} + 2\hat{j} - 3\hat{k}) = 7$ and $\vec{r} \cdot (2\hat{i} + 5\hat{j} + 3\hat{k}) = 9$ and through the point $(2, 1, 3)$.

3

9. (a) Find : $\int \frac{dx}{\sqrt{x} + \sqrt[3]{x}}.$

3

OR

- (b) Evaluate : $\int_0^{\pi/2} \frac{\cos x}{(1 + \sin x)(4 + \sin x)} dx.$

10. Find the particular solution of the differential equation $x \frac{dy}{dx} + x \cos^2\left(\frac{y}{x}\right) = y;$ given that when $x = 1$, $y = \frac{\pi}{4}$.

3

SECTION – C

Question numbers 11 to 14 carry 4 marks each.

11. (a) Using integration, find the area of the region $\{(x, y) : 4x^2 + 9y^2 \leq 36, 2x + 3y \geq 6\}.$

4

OR

- (b) Using integration, find the area of the region bounded by lines $x - y + 1 = 0$, $x = -2$, $x = 3$ and x -axis.





12. A card from a pack of 52 playing cards is lost. From the remaining cards, 2 cards are drawn at random without replacement, and are found to be both aces. Find the probability that lost card being an ace.

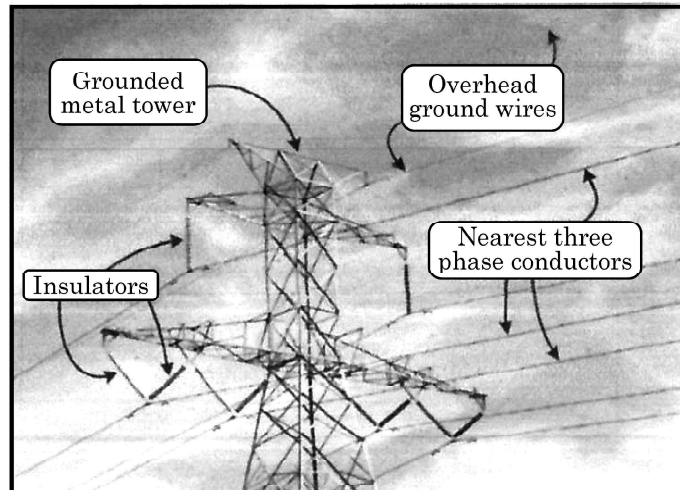
4

13. Evaluate : $\int_0^{\pi} \frac{x}{1 + \sin x} dx.$

4

CASE BASED / DATA BASED QUESTION

14. Electrical transmission wires which are laid down in winters are stretched tightly to accommodate expansion in summers.



Two such wires lie along the following lines :

$$l_1 : \frac{x+1}{3} = \frac{y-3}{-2} = \frac{z+2}{-1}$$

$$l_2 : \frac{x}{-1} = \frac{y-7}{3} = \frac{z+7}{-2}$$

Based on the given information, answer the following questions :

- (i) Are the lines l_1 and l_2 coplanar ? Justify your answer.
- (ii) Find the point of intersection of the lines l_1 and l_2 .

2

2

