

Series : ABCD4/3

SET – 2



प्रश्न-पत्र कोड
Q.P. Code

65/3/2

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

65/3/2

310 B

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P.T.O.

**General Instructions :**

- (i) This 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) Q. **14** is a case study based problem with **2** sub-parts of **2** marks each.

SECTION – A

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

1. Write the projection of the vector $(\vec{b} + \vec{c})$ on the vector $\vec{a}$, where $\vec{a} = 2\hat{i} - 2\hat{j} + \hat{k}$, $\vec{b} = \hat{i} + 2\hat{j} - 2\hat{k}$ and $\vec{c} = 2\hat{i} - \hat{j} + 4\hat{k}$. **2**
2. Find the general solution of the differential equation : $\log \left(\frac{dy}{dx} \right) = ax + by$. **2**
3. Two cards are drawn successively with replacement from a well shuffled pack of 52 cards. Find the probability distribution of the number of spade cards. **2**
4. A pair of dice is thrown and the sum of the numbers appearing on the dice is observed to be 7. Find the probability that the number 5 has appeared on atleast one die. **2**

OR

The probability that A hits the target is $\frac{1}{3}$ and the probability that B hits it, is $\frac{2}{5}$. If both try to hit the target independently, find the probability that the target is hit.

5. If the distance of the point (1, 1, 1) from the plane $x - y + z + \lambda = 0$ is $\frac{5}{\sqrt{3}}$, find the value(s) of λ . **2**
6. Find : $\int \frac{dx}{x^2 - 6x + 13}$ **2**





SECTION – B

Question Nos. 7 to 10 carry 3 marks each.

7. If $\vec{a}$, $\vec{b}$, $\vec{c}$ are three vectors such that $\vec{a} \cdot \vec{b} = \vec{a} \cdot \vec{c}$ and $\vec{a} \times \vec{b} = \vec{a} \times \vec{c}$, $\vec{a} \neq 0$, then show that $\vec{b} = \vec{c}$. 3

OR

If $|\vec{a}| = 3$, $|\vec{b}| = 5$, $|\vec{c}| = 4$ and $\vec{a} + \vec{b} + \vec{c} = \vec{0}$, then find the value of $(\vec{a} \cdot \vec{b} + \vec{b} \cdot \vec{c} + \vec{c} \cdot \vec{a})$.

8. Evaluate : $\int_{-1}^2 |x^3 - x| dx$ 3

9. Show that the lines : 3
 $\frac{1-x}{2} = \frac{y-3}{4} = \frac{z}{-1}$ and $\frac{x-4}{3} = \frac{2y-2}{-4} = z-1$ are coplanar.

10. Find the particular solution of the differential equation $x \frac{dy}{dx} - y = x^2 \cdot e^x$,
 given $y(1) = 0$. 3

OR

Find the general solution of the differential equation $x \frac{dy}{dx} = y(\log y - \log x + 1)$.

SECTION – C

Question Nos. 11 to 14 carry 4 marks each.

11. Find : $\int \frac{x^2}{(x^2+1)(3x^2+4)} dx$ 4

OR

Evaluate : $\int_{-2}^1 \sqrt{5-4x-x^2} dx$





12. Using integration, find the area of the region bounded by the curves $x^2 + y^2 = 4$, $x = \sqrt{3}y$ and x -axis lying in the first quadrant. 4
13. Find the distance of the point $(1, -2, 9)$ from the point of intersection of the line $\vec{r} = 4\hat{i} + 2\hat{j} + 7\hat{k} + \lambda(3\hat{i} + 4\hat{j} + 2\hat{k})$ and the plane $\vec{r} \cdot (\hat{i} - \hat{j} + \hat{k}) = 10$. 4

Case Study Problem :

14. A shopkeeper sells three types of flower seeds A1, A2, A3. They are sold in the form of a mixture, where the proportions of these seeds are 4 : 4 : 2, respectively. The germination rates of the three types of seeds are 45%, 60% and 35% respectively.



Based on the above information :

- (a) Calculate the probability that a randomly chosen seed will germinate; 2
- (b) Calculate the probability that the seed is of type A2, given that a randomly chosen seed germinates. 2

