



Series **ABCD1/2**

Set No. **2**



प्रश्न-पत्र कोड
Q.P. Code

65/2/2

अनुक्रमांक

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 7 हैं।
- प्रश्न-पत्र में दाहिने हाथ की ओर दिए गए प्रश्न-पत्र कोड को परीक्षार्थी 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 7 printed pages.
- Q.P. Code 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 minute 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.



गणित

MATHEMATICS



निर्धारित समय : 2 घण्टे

Time allowed : 2 hours

अधिकतम अंक : 40

Maximum Marks : 40



General Instructions :

Read the following instructions very carefully and strictly follow them :

- (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) Question no. **14** is a case-study based question with 2 sub-parts of **2** marks each.

SECTION A

Questions number **1** to **6** carry **2** marks each.

1. A pair of dice is thrown. It is given that the sum of numbers appearing on both dice is an even number. Find the probability that the number appearing on at least one die is 3. 2

2. $\vec{a}$ and $\vec{b}$ are two unit vectors such that $|2\vec{a} + 3\vec{b}| = |3\vec{a} - 2\vec{b}|$. Find the angle between $\vec{a}$ and $\vec{b}$. 2

3. (a) Find : 2

$$\int \frac{\sin 3x}{\sin x} dx$$

OR

- (b) Evaluate : 2

$$\int_0^{\frac{1}{2} \log 3} \frac{e^x}{e^{2x} + 1} dx$$

4. Probabilities of A and B solving a specific problem are $\frac{2}{3}$ and $\frac{3}{5}$, respectively. If both of them try independently to solve the problem, then find the probability that the problem is solved. 2



5. Write the cartesian equation of the line PQ passing through points P(2, 2, 1) and Q(5, 1, -2). Hence, find the y-coordinate of the point on the line PQ whose z-coordinate is -2. 2
6. Find the particular solution of the differential equation $\frac{dy}{dx} = 2y^2$, given $y = 1$ when $x = 1$. 2

SECTION B

Questions number 7 to 10 carry 3 marks each.

7. (a) Find the equation of the plane passing through points (2, 1, 0), (3, -2, -2) and (1, 1, -7). Also, obtain its distance from the origin. 3

OR

- (b) Find the distance between the lines $x = \frac{y-1}{2} = \frac{z-2}{3}$ and $x+1 = \frac{y+2}{2} = \frac{z-1}{3}$. 3

8. Find the general solution of the differential equation

$$x \frac{dy}{dx} - y + x \sin \frac{y}{x} = 0. \quad 3$$

9. (a) Evaluate : 3

$$\int_0^1 \tan^{-1} x \, dx$$

OR

- (b) Find : 3

$$\int \frac{2x}{x^2 + 3x + 2} \, dx$$

10. Using vectors, find the value of 'b' if the points A(-1, -1, 2), B(2, b, 5) and C(3, 11, 6) are collinear. Also, determine the ratio in which the point B divides the line-segment AC internally. 3



SECTION C

Questions number 11 to 14 carry 4 marks each.

11. (a) Using integration, find the area of the smaller region enclosed by the curve $4x^2 + 4y^2 = 9$ and the line $2x + 2y = 3$. 4

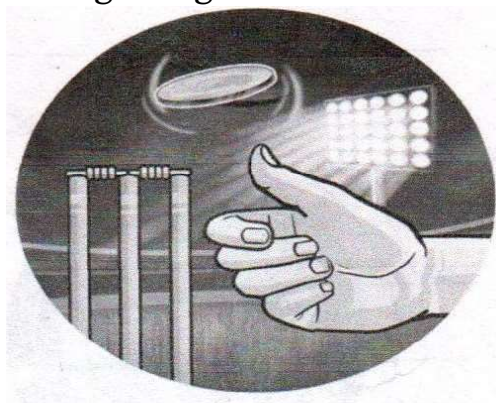
OR

- (b) If the area of the region bounded by the curve $y^2 = 4ax$ and the line $x = 4a$ is $\frac{256}{3}$ sq. units, then using integration, find the value of a , where $a > 0$. 4
12. Find the distance of the point $(-1, -5, -10)$ from the point of intersection of the line $\frac{x-2}{3} = \frac{y+1}{4} = \frac{z-2}{12}$ and the plane $x - y + z = 5$. 4
13. Evaluate : 4

$$\int_0^{\pi/2} \frac{x}{\sin x + \cos x} dx$$

Case-Study Based Question

14. At the start of a cricket match, a coin is tossed and the team winning the toss has the opportunity to choose to bat or bowl. Such a coin is unbiased with equal probabilities of getting head and tail.



Based on the above information, answer the following questions :

- (a) If such a coin is tossed 2 times, then find the probability distribution of number of tails. 2
- (b) Find the probability of getting at least one head in three tosses of such a coin. 2