BACK – UP
TEST – 2 B

Mathematics – XII

Max Marks – 100
Time – 3 hr

6 – Marks

(1) A manufacturer makes cycles and scooters. Processing of these products is done on two machines **A** and **B.** The cycle parts need **1** hours on machine **A** and **3** hours on machine **B.** Parts of a scooter needs **3** hours on machine **A** and **1** hours on machine **B.** Both machines are available for **12** hours per day. Profit gained by the manufacturers from a cycle and a scooter is ***Rs.*1000** and ***Rs.*3000** respectively. Find with the help of a graph what should be the daily production of each of the two products to maximize the profit**?**
Which of the above modes of transport is a better option and why?

(2) A toy company manufactures two type of dolls**,** **A** and **B.** Market tests and available resources have indicated that the combine production level should not exceed **1200** dolls / week and the demand for the dolls of type **B** is at most half of that for the dolls of type **A.** Further , the production level of dolls of type **A** can exceed three times the production of dolls of other type by at most **600** units. If the company makes the profit of **Rs12** and **Rs16** per doll respectively on dolls **A** and **B,** how many of each should be produced weekly in order to maximize the profit **.**

(3) Find the area lying above x-axis, included between the circle $x^2 + y^2 = 8x$ and interior to parabola $y^2 = 4x$.

(4) Using the method of integration find the area of the region bounded by the curves $y^2 = x$ and $x + y = 2$.

(5) Solve the initial value problem **:** $x\,dy + y\,dx - x\,dx + xy\cot x\,dx = 0$ **;** $x = 0$ **,** $y = 1$

(6) In a test**,** an examinee either guesses or copies or knows the answer to a multiple choice question with four choices**.** The probability that he makes a guess is $\frac{1}{3}$ and the probability that he copies the answer is $\frac{1}{6}$**.** The probability that his answer is correct**,** given that he copied it**,** is $\frac{1}{8}$**.** Find the probability that he knew the answer to the question, given that he correctly answered it**.**
Copying is akin to using a painkiller. Explain the analogy.

(7) Suppose a girl throws a die**.** If she gets **5** or **6** she tosses a coin three times and notes the number of heads**.** If she gets **1, 2, 3** or **4,** she tosses the coin once and notes whether a head or tail is obtained**.** If she obtained exactly one head, what is the probability that she threw **1, 2, 3** or **4** with the die **?**

(8) Evaluate : $\int_{-1}^{3/2} |x \sin \pi x|\, dx$

(9) Find the distance of the point **(2, 3, 4)** from the plane $3x + 2y + 2z + 5 = 0$**,** measured parallel to the line $\frac{x+3}{3} = \frac{y-2}{6} = \frac{z}{2}$ **.**

(10) Find the cartesian as well as the vector equation of the plane through the intersection of the planes $\vec{r}\,.\,(2i + 6j) + 12 = 0$ and $\vec{r}\,.\,(3i - j + 4k) = 0$**,** and at a unit distance from origin **.**

P.T.O

4 – Marks

(11) A coin is biased so that the head is three times as likely to occur as tail. If the coin is tossed twice, find the probability distribution of number of tails.

(12) A die is thrown again and again until three sixes are obtained. Find the probability of obtaining the third six in the sixth throw of the die.

(13) Find the distance of the point **(–1, –5, –10)** from the point of intersection of the line $\vec{r} = 2\hat{i} - \hat{j} + 2\hat{k} + \lambda(3\hat{i} + 4\hat{j} + 2\hat{k})$ and the plane $\vec{r} \cdot (\hat{i} - \hat{j} + \hat{k}) = 5$.

(14) If $\vec{a} = \hat{i} + \hat{j} + \hat{k}$ and $\vec{b} = \hat{j} - \hat{k}$, find a vector $\vec{c}$ such that $\vec{a} \times \vec{c} = \vec{b}$ and $\vec{a} \cdot \vec{c} = 3$

(15) If a unit vector $\vec{a}$ makes angles $\frac{\pi}{3}$ with $\hat{i}$, $\frac{\pi}{4}$ with $\hat{j}$ and an acute angle θ with $\hat{k}$, then find θ and hence the vector $\vec{a}$.

(16) If the vectors $\vec{a} = x\hat{i} + \hat{j} + \hat{k}$, $\vec{b} = \hat{i} + y\hat{j} + \hat{k}$ and $\vec{c} = \hat{i} + \hat{j} + z\hat{k}$ are coplanar, then prove that $\frac{1}{1-x} + \frac{1}{1-y} + \frac{1}{1-z} = 1$, where $x, y, z \neq 1$

(17) Solve the initial value problem : $(x - y)(dx + dy) = dx - dy$; $y = -1$, $x = 0$

(18) Evaluate : $\int \sqrt{\tan x}\ dx$

(19) Evaluate : $\int_0^1 \log(1 + x)dx \Big/ (1 + x^2)$

(20) Evaluate : $\int dx \Big/ \sqrt{\sin^3 x \sin(x + \alpha)}$

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