19th Year of quality education

CODE:- AG-B-6789

पजियन क्रमांक REG.NO:-TMC -D/79/89/36

General Instructions :

1. All question are compulsory.
2. The question paper consists of 29 questions divided into three sections A,B and C. Section – A comprises of 10 question of 1 mark each. Section – B comprises of 12 questions of 4 marks each and Section – C comprises of 7 questions of 6 marks each .
3. Question numbers 1 to 10 in Section – A are multiple choice questions where you are to select one correct option out of the given four.
4. There is no overall choice. However, internal choice has been provided in 2 question of four marks and 2 questions of six marks each. You have to attempt only one lf the alternatives in all such questions.
5. Use of calculator is not permitted.
6. Please check that this question paper contains 3 printed pages.
7. 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.

सामान्य निर्देश :

1. सभी प्रश्न अनिवार्य हैं।
2. इस प्रश्न पत्र में 29 प्रश्न है, जो 3 खण्डों में अ, ब, व स है। खण्ड – अ में 10 प्रश्न हैं और प्रत्येक प्रश्न 1 अंक का है। खण्ड – ब में 12 प्रश्न हैं और प्रत्येक प्रश्न 4 अंको के हैं। खण्ड – स में 7 प्रश्न हैं और प्रत्येक प्रश्न 6 अंको का है।
3. प्रश्न संख्या 1 से 10 बहुविकल्पीय प्रश्न हैं। दिए गए चार विकल्पों में से एक सही विकल्प चुनें।
4. इसमें कोई भी सर्वोपरि विकल्प नहीं है, लेकिन आंतरिक विकल्प 2 प्रश्न 4 अंको में और 2 प्रश्न 6 अंको में दिए गए हैं। आप दिए गए विकल्पों में से एक विकल्प का चयन करें।
5. कैलकुलेटर का प्रयोग वर्जित हैं ।
6. कृपया जाँच कर लें कि इस प्रश्न–पत्र में मुद्रित पृष्ठ 14 हैं।
7. प्रश्न–पत्र में दाहिने हाथ की ओर दिए गए कोड नम्बर को छात्र उत्तर–पुस्तिका के मुख–पृष्ठ पर लिखें।

Pre-Board Examination 2010 -11

Time : 3 Hours
अधिकतम समय : 3

Maximum Marks : 100
अधिकतम अंक : 100
Total No. Of Pages : 14
कुल पृष्ठों की संख्या : 14

CLASS – XII MATHEMATICS

Section A

Q.1	Find the value of x if the area of Δ is 35 square cms with vertices (x,4),(2, -6)and (5,4). Ans x = -2 or 12
Q.2	Evaluate : $\int [1+2\tan x(\tan x+\sec x)]^{1/2}\,dx$. Ans $\log(\sec x+\tan x)+\log\sec$
Q.3	The slope of the curve $2y^2=ax^2+b$ $at(1,-1)$ is -1. Find a and b .
Q.4	Write the value of $\sin\left(\frac{\pi}{3}-\sin^{-1}\left(\frac{-1}{2}\right)\right)$. Ans. =1
Q.5	If $x\begin{bmatrix}2\\3\end{bmatrix}+y\begin{bmatrix}-1\\1\end{bmatrix}=\begin{bmatrix}10\\5\end{bmatrix}$, Find x and y. Ans. X=3, y= -4
Q.6	If A and B are two events such that $P(A)=0.3, P(B)=0.6$ & $P(B/A)=0.5$, find $P(A\cup B)$.

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	Ans a = 2, b = 0
Q.7	A bag contains 5 red, 6 white and 7 black balls. Two balls are drawn at random. What is the probability that both balls are different colour ? Ans. $\frac{107}{153}$
Q.8	At what points on the curve $x^2+y^2-2x-4y+1=0$,is the tangent parallel to y-axis? Ans. $(3,2),(-1,2)$
Q.9	If $A^2=A$ for $A=\begin{bmatrix}-1 & b\\ -b & 2\end{bmatrix}$, then find the value of b. Ans $b=\pm\sqrt{2}$
Q.10	Let * be a binary operation on Q_0. If a * b= $\frac{ab}{4}$; a, b$\in Q_0$ .Find the inverse element with respect to operation * on Q_0 . Ans : $e=4 \& inverse=\frac{16}{a}$
	Section B
Q.11	Find If $y=e^x.\cos x$, prove that $\frac{dy}{dx}=\sqrt{2}\ e^x.\cos\left(x+\frac{\pi}{4}\right)$.
Q.12	The function $f(x)$ is defined as follows: $f(x)=\begin{cases} x^2+ax+b, & 0\le x<2 \\ 3x+2, & 2\le x\le 4 \\ 2ax+5b, & 4<x\le 8 \end{cases}$. If is continuous on $[0,8]$, find the values of a and b . Ans a=3,b =-2
Q.13	
Q.14	Solve the following differential equation: $(3xy+y^2)dx+(x^2+xy)dy=0$. Ans $\frac{1}{4}\log\left(\frac{4xy+2y}{x^2}\right)=\log c-\log x$ Or Show that the function y= (A +B x) e^{3x} is a solution of the differential equation $\frac{d^2y}{dx^2}-6\frac{dy}{dx}+9y=0$.
Q.15	Find the value of : $2\tan^{-1}\left(\frac{1}{5}\right)+\sec^{-1}\left(\frac{5\sqrt{2}}{7}\right)+2\tan^{-1}\frac{1}{8}$. Ans $=\frac{\pi}{4}$
Q.16	Dot product of a vector with vectors 3i – 5 k , 2 i + 7 j , and i + j + k are respectively -1 , 6 and 5 . Find the vector . Ans. $\vec{r}=3i+2k$
Q.17	Evaluate: $\int_0^{\pi/2}\frac{x+\sin x}{1+\cos x}dx$. Ans $=\frac{\pi}{2}$ OR Evaluate: $\int_0^1 \cot^{-1}(1-x+x^2)\,dx$. Ans $\frac{\pi}{2}-\log 2$
Q.18	Three dice are thrown simultaneously. If X denotes the number of sixes, find the expectation of X. Ans mean $=\frac{1}{2}$ OR

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	A card from a pack of 52 cards is dropped. From the remaining cards two cards are drawn and are found to be red. Find the probability that the dropped card is red . Ans = $\frac{12}{25}$
Q.19	Show that the matrix , $A=\begin{bmatrix}1 & 0 & -2\\ -2 & -1 & 2\\ 3 & 4 & 1\end{bmatrix}$ satisfies the equation, $A^3-A^2-3A-I_3=O$. Hence, find A^{-1}. Ans $A^{-1}=\begin{bmatrix}-9 & -8 & -2\\ 8 & 7 & 2\\ -5 & -4 & -1\end{bmatrix}$ $A^3=\begin{bmatrix}-1 & -8 & 10\\ 0 & 7 & 10\\ 7 & 12 & 7\end{bmatrix}$
Q.20	If $\cos^{-1}\frac{x}{a}+\cos^{-1}\frac{y}{b}=\alpha$ prove that $\frac{x^2}{a^2}-\frac{2xy}{ab}(\cos\alpha)+\frac{y^2}{b^2}=\sin^2\alpha$.
Q.21	Evaluate : $\int\frac{dx}{\sqrt{\sin^3 x\sin(x+\alpha)}}$. Ans $-2\cos ec\alpha(\cos\alpha+\cot x\sin\alpha)$
Q.22	Find the interval in which $f(x)=(x-2)^4(x+1)^3$ is (i) increasing (ii) decreasing . . Ans f (x) is increasing $(-\infty,-1)\cup\left(-1,\frac{2}{7}\right)\cup(2,\infty)OR\left(-\infty,\frac{2}{7}\right)\cup(2,\infty)$ & decreasing on $(\frac{2}{7},2)$ OR Verify Rolle's Theorem for the function $f(x)=(x-a)^m.(x-b)^n, m,n$ being positive integers, on [a, b]. Ans x = a ; x = b ; $x=\frac{mb+na}{m+n}\in(a,b)$
	Section C
Q.23	A rectangular sheet of tin 45 cm by 24 cm is to be made into a box without top, by cutting off squares from each corners and folding up the flaps. What should be the side of the square to be cut off so that the volume of the boxes is maximum possible? OR A given quantity of metal is to be cast into a half cylinder with a rectangular base and semi- circular ends. Show that in order that the total surface area may be minimum , the ratio of the length of the cylinder to the diameter of its semi-circular ends is $\pi:(\pi+2)$. Ans: V = $V=\frac{1}{2}\pi R^2H$ $S=2RH+\pi R^2+\pi RH\Rightarrow f(R)=\frac{4V}{\pi R}+\pi R^2+\frac{2V}{R}$ $R^3=\frac{V(2+\pi)}{\pi^2}$
Q.24	Find the equation of the line of shortest distance (S.D.) between the lines $\frac{x-8}{3}=\frac{y+9}{-16}=\frac{z-10}{7}$ and $\frac{x-15}{3}=\frac{y-29}{8}=\frac{z-5}{-5}$, Find also the S.D. and the points where the line of S.D. intersects the given lines. Ans $157\lambda+77\mu+311=0, 77\lambda+49\mu+175=0\therefore\lambda=-1\&\mu=-2$ Points are (5 , 7 , 3) ; (9 , 13 , 15) S.D . = 14 & Equation of S.D. $\frac{x-5}{2}=\frac{y-7}{3}=\frac{z-3}{6}$
Q.25	Using integration, find the area of the two parabolas $4y^2=9x\ \&\ 3x^2=16y$ .Also find the angle between two curves . Ans =4 $unit^2, \theta=\tan^{-1}(\frac{18}{25})$

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Q.26	Two number are selected at random (without replacement) from the first six positive integers .. Let X denote the larger of the two numbers. Find E (X) & Var (X) . . Ans $mean = \frac{14}{3}, \text{var}\,iance = \frac{14}{9}$
Q.27	Show that $\begin{vmatrix} (b+c)^2 & ba & ca \\ ab & (c+a)^2 & cb \\ ac & bc & (a+b)^2 \end{vmatrix} = 2abc(a+b+c)^3$.
Q.28	let * be an binary operation defined $a * b = a + b + ab$ on the set R – {-1} , then (i) Prove that * is a binary operation R – {-1} (ii) Is * commutative ? (iii)Is associative (iv) Find the identity element R – {-1} w.r.t. *. and also prove that every element of R – {-1}is invertible . Ans : * is commutative and associative & identity element is 0 .Inverse element is $R^{-1} = \frac{-a}{1+a}$
Q.29	A company sells two different products A and B. The two products are produced in a common production process which has a total capacity of 500 man hours. It takes 5 hours to produce a unit of A and 3 hours to produce a unit of B. The demand in the market shows that the maximum number of units of A that can be sold is 70 and that of B is 125.Profit on each unit of A is Rs.20 and on B is Rs. 15.How many units of A and B should be produced to maximize the profit. From an L.P.P. and solve it graphically. Ans $x, y \geq 0; x \leq 70, y \leq 125; 5x + 3y \leq 500$ & $z = 20 + 15y$ $A(0,125); B(25,125); C(70,50); D(70,0)$ Maximum profit at B = 2375
	_____x_____

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