PU M Sc Mathematics

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140 PU_2015_372
The trace of a n x n invertible matrix A:-

- always non-zero
- n
- May be zero
- Always positive

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116 PU_2015_372
The statement $2^n < n!$:-

- Is true for all positive integers n
- Is not true for all positive integers n
- Is true for finite number of positive integers
- Is not true for finite number of positive integers

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145 PU_2015_372
If $\begin{pmatrix} x+y & z+t \\ x-t & x-y \end{pmatrix} = \begin{pmatrix} 20 & 8 \\ 4 & 12 \end{pmatrix}$, then (x,y,z,t) is:-

- (2,6,4,16)
- (16,4,-4,-12)
- (16,4,-4,12)
- (16,4,4,12)

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123 PU_2015_372
If G is an infinite cyclic group then which one is not a correct answer?

- Every subgroup is cyclic
- Every subgroup is abelian
- Every subgroup is normal subgroup of G
- Every element of G, which is not an identity element is a generator of G

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108 PU_2015_372
The subset $\{z \in C \mid Im(z) > 1\}$ of the complex plane is:-

- Compact
- Disconnected

- Connected
- Multiple connected

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196 PU_2015_372

The initial value problem $x\frac{dy}{dx} = y + x^2, x > 0; y(0) = 0$ has:-

- Infinitely many solutions
- Exactly two solutions
- A unique solution
- No solution

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147 PU_2015_372

The number of ways of distributing 10 prizes to 6 students if each student can receive any number of prizes is:-

- 10^6
- 6^{10}
- 60
- 6

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149 PU_2015_372

Let A be a matrix and A^t denotes the transpose of A. Which one is not correct?

- $(A + B)^t = A^t + B^t$
- $(AB)^t = A^tB^t$
- $(A^t)^t = A$
- $(kA)^t = kA^t$

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154 PU_2015_372

If a set A has n elements, then the total number of non-empty subsets of A is:-

- 2^n
- n
- $2^n - 1$
- n^2

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178 PU_2015_372

$\lim_{x\to 0} \frac{\cot x + \cot 2x}{\cot 3x} =$

- $\frac{9}{2}$
- $\frac{2}{3}$
- 1
- 0

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150 PU_2015_372

If f is a continuous function on [a,b] and f'(c) is positive for all c in (a,b), then f is:-

- Constant
- f is always non-negative
- Decreasing
- Increasing

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197 PU_2015_372

The maximum number of linearly independent solutions of the differential equation $\frac{d^4y}{dx^4} = 0$, with the condition y(0) = 1 is:-

- 4
- 3
- 2
- 1

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105 PU_2015_372

The solution of the initial value problem y' = -2xy, y(0) = 2 is:-

- $2e^{-x^2}$
- $e^{-x}\cos x$
- $e^{x}\sin x$
- $e^{x}\cos x$

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155 PU_2015_372

If $y = (x + 3)^2$, then $(-2x - 6)^2 =$

- 4y

- $-2y^2$
- -4y
- 2y

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121 PU_2015_372

If K is kernel of a group homomorphism f: G → H, then which statement is not true?

- K is an abelian subgroup of G
- K is a normal subgroup of G
- K = {e} for some homomorphisms
- K = G for some homomorphisms

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113 PU_2015_372

The equation of the sphere through the circle $x^2+y^2+z^2+=9, 2x+3y+4z=5$ and the point (1,2,3) is:-

- $4(x^2+y^2+z^2)-2x-3y-5z-2=0$
- $x^2+y^2+z^2-2x-3y-4z-20=0$
- $3(x^2+y^2+z^2)-2x-3y-4z-22=0$
- $x^2+y^2+z^2-3x-4y-5z-25=0$

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174 PU_2015_372

Ten points are given in a plane where no three are collinear. Then the number of different line segments that can be formed by joining these points is:-

- $\binom{10}{3}$
- $\binom{10}{2}$
- 0
- 10!

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190 PU_2015_372

Let H be a finite subset of a group G and has 4 elements. Then H is not a subgroup of G if:-

- G is an infinite group
- o(G) = 26
- o(G) = 4
- G is isomorphic to a permutation group S_n, $n \geq 4$

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141 PU_2015_372

If T:U → V is a linear transformation which of the following is true?

- Rank of T - Nullity of T = dim U
- Rank of T + Nullity of T = dim V
- Rank of T + Nullity of T = dim U
- Rank of T + Nullity of T = dim (U + V)

20 of 100

177 PU_2015_372

What is the period of sinh(x+iy)?

- π
- πi
- 2π
- $2\pi i$

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152 PU_2015_372

The number of tangents that can be drawn from (0, 0) to the circle $x^2 + y^2 + 2x + 6y - 15$ is:-

- One
- Two
- Infinite
- Zero

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107 PU_2015_372

The value of the integral of $\oint_C (z-a)^{-1}$ dz (where C is the circle |Z - a| = 1) is:-

- 0
- $2\pi i$
- 2
- π

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110 PU_2015_372

If (l_1, m_1, n_1) and (l_2, m_2, n_2) represents the direction cosines of two lines which are perpendicular then:-

- $l_1 l_2 + m_1 m_2 + n_1 n_2 = 0$

- $\frac{l_1}{l_2}=\frac{m_1}{m_2}=\frac{n_1}{n_2}$
- $(l_1+m_1+n_1)(l_1+m_1+n_1)=0$
- $l_1l_2+m_1m_2-n_1n_2=0$

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195 PU_2015_372

A binary operator on a set S is:-

- A one to one but need not be onto function from S × S to S
- An onto but need not to be a one to one function from S × S to S
- A bijective function from S × S to S
- A function from S × S to S

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124 PU_2015_372

Which of the following iterative formula denote Euler's method?

- $Y_{n+1} = y_n + h\, f(x_n , y_n)$
- $Y_{n+1} = y_n - h\, f(x_n , y_n)$
- $Y_{n+1} = y_n + \frac{h}{2} f(x_n , y_n)$
- $Y_{n+1} = y_n - \frac{h}{2} f(x_n , y_n)$

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210 PU_2015_372

Let X and Y be two non empty sets and let $f: X \to Y$. If $A_i \subseteq X$ and $B_i \subseteq Y$, then:-

- $f(\bigcap_i A_i) = \bigcap_i f(A_i)$
- $\bigcap_i f(A_i) \subseteq f(\bigcap_i A_i)$
- $\bigcup_i f(A_i)$ and $f(\bigcup_i A_i)$ are not related
- $f(\bigcap_i A_i) \subseteq \bigcap_i f(A_i)$

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199 PU_2015_372

The equation $(\alpha xy^3 + y\cos x)\,dx + (x^2y^2 + \beta \sin x)\,dy = 0$ is exact for:-

- $\alpha = \frac{3}{2}, \beta = 1$

- $\alpha = 1, \beta = \frac{3}{2}$
- $\alpha = \frac{2}{3}, \beta = 1$
- $\alpha = 1, \beta = \frac{2}{3}$

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173 PU_2015_372

If $f(2a-x) = -f(x)$ for all $x \in [0,2a]$, then $\int_0^{2a} f(x)dx =$

- $2a$
- a
- 0
- a^2

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115 PU_2015_372

How many permutations of the letter a,b,c,d,e,f,g does not contain '*bge*' ?

- 7! - 4!
- 7! - 5!
- $\frac{7!}{4!}$
- $\frac{7!}{5!}$

30 of 100

153 PU_2015_372

If | x - 2 | + | x - 3 | = 7 , then x =

- 7
- 8
- 6 or -1
- -2

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198 PU_2015_372

If $D = \frac{d}{dx}$ then the value of $\frac{1}{(xD+1)}(x^{-1})$ is:-

- $\log x$
- $\frac{logx}{x}$
- $\frac{logx}{x^2}$
- $\frac{logx}{x^3}$

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213 PU_2015_372

The value of *k* if the line passing through the points (1,4) and (6, *k*) and is parallel to the line 5*x* - *y* = 3.

- 29
- 28
- -29
- -28

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142 PU_2015_372

Which of the following statement is a tautology?

- p ∨ q
- p ∧ q
- p ∨ (~p)
- q ∨ (~q)

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211 PU_2015_372

The area of the region bounded by the curves $y^2 = x - 1$ and $y = x - 3$ is:-

- $\frac{9}{2}$
- $\frac{2}{9}$
- $\frac{3}{7}$
- $\frac{7}{3}$

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112 PU_2015_372

A sphere is inscribed in the tetrahedron whose faces are $x=0, y=0, z=0, 2x+6y+3z=14$. Then the radius of the sphere is:-

- $\frac{7}{6}$
- $\frac{7}{9}$
- $\frac{7}{2}$
- $\sqrt{\frac{7}{9}}$

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215 PU_2015_372

Which of the following statements is true?

- In an infinite group every element is of infinite order
- If in a group every element is of finite order, then the group must be a finite group
- In a finite group every element is of finite order
- If every proper subgroup of a group is cyclic, then the group must be cyclic

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176 PU_2015_372

$\text{Cosh}^2x + \sinh^2x =$

- 1
- 0
- Cosh2x
- Sinh2x

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111 PU_2015_372

What is the distance between the two planes $2x-3y+6z+12=0$ and the plane $2x-3y+8z=0$?

- $\frac{2}{\sqrt{6}}$
- $\frac{2}{7}$
- 0
- Cannot be determined

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114 PU_2015_372

Which of the following is false?

- The set of all natural numbers and the set of all integers have same cardinality
- The set of all rational numbers and the set of all integers have same cardinality

- The cardinality of the set of real numbers is greater than that of the set of real numbers in the interval (0,1)
- The cardinality of the power set of integers is greater than that of the set of integers

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109 PU_2015_372

Which of the following defines a metric on **R**?

- $d(x,y)=(x-y)^2$
- $d(x,y)=x-y$
- $d(x,y)=\frac{|x-y|}{1+|x-y|}$
- $d(x,y)=|x|+|y|+1$

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179 PU_2015_372

$\sin^{-1}x+\cos^{-1}x=$

- 1
- 0
- π
- $\pi/2$

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120 PU_2015_372

If H is a normal subgroup of G, then:-

- N(H) = {e}, the trivial subgroup
- N(H) = H
- N(H) = G
- A proper subgroup of H

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212 PU_2015_372

If $f: R \to R$ and $a \in R$ is such that $f(a)=0$ and $f'(a)=6$ then $\lim_{h\to 0}\frac{f(a+h)}{2h}=$

- 3
- 2

- 1
- 0

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206 PU_2015_372

Which of the following cannot be the degree sequence of any graph?

- {1,1,2,3,1,1,2,5,6,5}
- {1,1,1,1,1,1,1,7}
- {1,2,2,2,2,2,1}
- {6,6,6,6,6,6,6}

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208 PU_2015_372

$\int_C \frac{1}{2z+3} dz$ where C is |Z|=2 is:-

- $2\pi i$
- πi
- 0
- 1

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214 PU_2015_372

The value of $k \in (0,1)$ such that the area under $y = x^2$ from 0 to k is equal to the area under the same curve from *k* to 1.

- $\frac{1}{2\sqrt{3}}$
- $\frac{1}{\sqrt[3]{2}}$
- $\frac{1}{\sqrt[2]{3}}$
- $\frac{1}{3\sqrt{2}}$

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207 PU_2015_372

$$\lim_{\theta \to 0} \frac{\tan\theta + \sec\theta - 1}{\tan\theta - \sec\theta + 1} =$$

- 1
- 0
- 2
- 1/2

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171 PU_2015_372

A function f(x) is an even function if:-

- $f(x) = f(x^2)$
- $f(x) = f(-x^2)$
- $f(x) = f(-x)$
- $f(x) = -f(-x)$

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151 PU_2015_372

$$\sqrt{-2}\sqrt{-3} =$$

- $\sqrt{6}$
- $-\sqrt{6}$
- $i\sqrt{6}$
- $\sqrt{2}\sqrt{-3}$

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143 PU_2015_372

The binary operation * is defined on a set of ordered pairs of real numbers as (a,b)*(c,d) = (ad + bc, bd) and * is associative. Then, (1,2) * (3,5) * (3,4) is:-

- (32,40)
- (23,11)
- (74,30)
- (7,11)

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175 PU_2015_372

A student must answer exactly eight questions out of ten on a final examination. In how many ways can she choose the questions to answer so that she must answer the first three questions?

- $\binom{7}{5}$
- $\binom{10}{8} - 3!$
- $10^4 - 3!$
- $\binom{10}{8}$

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122 PU_2015_372

If a finite group G has two elements a,b having orders 6 and 15, then:-

- 90 divides o(G)
- 30 divides o(G) but 90 need not divide o(G)
- 3 divides o(G) but 30 need not divide o(G)
- 3 does not divide o(G)

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106 PU_2015_372

If f(z) = u (x, y) + iv (x, y) is analytic, then f '(z) is:-

- $\frac{\partial u}{\partial x} - i\frac{\partial v}{\partial x}$
- $\frac{\partial u}{\partial x} + i\frac{\partial u}{\partial y}$
- $\frac{\partial u}{\partial x} - i\frac{\partial v}{\partial y}$
- $\frac{\partial v}{\partial y} - i\frac{\partial v}{\partial x}$

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209 PU_2015_372

For the function $\frac{e^z}{z^2+4}$.

- z = 0 is a simple pole
- z = 0 is a removable singularity
- z = 0 is a removable singularity and z = 2i is the only simple pole
- z = 0 is a removable singularity and z = ± 2i are simple pole

55 of 100

144 PU_2015_372

If |A| = 20, |B| = 10 and |A ∪ B| = 30, then, |A ∩ B| is:-

- 10
- 20
- 30
- 0

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146 PU_2015_372

If $\sum_{i=0}^{n}\binom{n}{i}$, then n is:-

- 5
- 6
- 7
- 8

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148 PU_2015_372

Let H and K be finite subgroups of a group G. Then, O(HK) is:-

- $O(G)O(K)$
- $\frac{O(H\cap K)}{O(H)O(K)}$
- $\frac{O(H)O(K)}{O(H\cap K)}$
- $\frac{O(H\cap K)}{O(H\cup K)}$

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172 PU_2015_372

Evaluate $\int_{-a}^{a} x^3\sqrt{a^2-x^2}\,dx$.

- a^3
- $2a^3$
- 0
- $5a^5$

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125 PU_2015_372

If $f(x) = 0$ is a reciprocal equation of second type and even degree, then one of the standard reciprocal equations that can be obtained from $f(x)$ is:-

- $\frac{f(x)}{x+1}$
- $\frac{f(x)}{x-1}$
- $\frac{f(x)}{x^2-1}$
- $\frac{f(x)}{x^2+1}$

60 of 100

170 PU_2015_372

The function $f(x) = \text{Sin}\frac{1}{x}$ on $(0,1)$ is:-

- Continuous
- Uniformly Continuous
- Discontinuous
- Piecewise Continuous

61 of 100

225 PU_2015_372

Which regular n-sided polygon has three times as many diagonals as sides?

- 6
- 7
- 8
- 9

62 of 100

240 PU_2015_372

If ω be an imaginary cube root of unity then $(1-\omega+\omega^2)^5+(1+\omega-\omega^2)^5$ is:-

- 64
- 32
- 16
- 8

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223 PU_2015_372

If *a, b, c* are the intercepts of a plane which meet the coordinate axes at A,B,C respectively, then the volume of the tetrahedron OABC is given by:-

- $\frac{1}{\sqrt{3}}abc$
- $\frac{1}{3}abc$
- $\frac{1}{6}abc$
- $\frac{1}{\sqrt{6}}abc$

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222 PU_2015_372

If f(z) is an entire function, then its Taylor series is:-

- Convergent for all z
- Divergent for all z
- Divergent if |z| > 1
- Constant

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257 PU_2015_372

If $f(x,y) = y^2\left(e^{-x^2+y^2} + xy\sin(x^2+y^2)\right)$, then the value of $\frac{\partial f}{\partial x}$ at the point $(\pi, 0)$ is:-

- π
- $\frac{\pi}{2}$
- 0
- 1

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244 PU_2015_372

Consider $f: [0,1] \to R$ defined as $f(x) = \begin{cases} x \text{ if } x \text{ is rational} \\ 0 \text{ if } x \text{ is irrational} \end{cases}$. The upper and lower Riemann integrals of *f* over [0,1] are given by:-

- $\underline{\int_0^1} f(x)dx = 0 = \overline{\int_0^1} f(x)dx$
- $\underline{\int_0^1} f(x)dx = 0$ and $\overline{\int_0^1} f(x)dx = \frac{1}{2}$
- $\underline{\int_0^1} f(x)dx = \frac{1}{2}$ and $\overline{\int_0^1} f(x)dx = 1$
- $\underline{\int_0^1} f(x)dx = 1 = \overline{\int_0^1} f(x)dx$

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256 PU_2015_372
Suppose *f*: *R* → *R* is differentiable and $\lim_{x\to\infty} f'(x) = 0$. Then $\lim_{x\to\infty}[f(x+1) - f(x)] =$

- 1
- Does not exist
- 0
- -1

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224 PU_2015_372
In how many ways is it possible to make 7 persons A, B, C, D, E, F, H sit at a round table if B, D and H insist on sitting together?

- 3!4!
- $\frac{7!}{3!}$
- $\frac{7!}{4!}$
- 3!5!

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254 PU_2015_372
If *f*: *R* → *R* is defined as $f(x) = \begin{cases} xe^{\frac{-1}{x^2}} & if\ x \neq 0 \\ 0 & if\ x = 0 \end{cases}$ then $f'(0)$, then *f*' (0) =

- 1
- 3
- -1
- 0

70 of 100
242 PU_2015_372
The real part of $e^{e^{i\theta}}$ is:-

- $e^{\cos\theta}$
- $e^{\cos\theta}\sin(\sin\theta)$
- $e^{\cos\theta}\cos(\sin\theta)$
- $e^{\cos\theta}\sin(\cos\theta)$

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229 PU_2015_372

If $-1+i\sqrt{3}=re^{i\theta}$, then:-

- r = 2, θ = $\pi/3$
- r = 2, θ = 2 $\pi/3$
- r = 3, θ = π
- r = 3, θ = $\pi/3$

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255 PU_2015_372

Consider the functions *f* and *g*, both from *R* to *R* defined as $f(x)=\frac{1+x}{1+x^2}$ and $g(x)=e^{-x}$ for all *x* ∈ *R*. Then:-

- *f* is bounded but *g* is unbounded
- *f* is unbounded but *g* is bounded
- Both *f* and *g* are bounded
- Both *f* and *g* are unbounded

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239 PU_2015_372

The value of the limit, $\lim_{n\to\infty}\left(\sqrt{n^2+n}-\sqrt{n^2+1}\right)$:-

- $\frac{1}{3}$
- $\frac{1}{4}$
- $\frac{1}{2}$
- $\frac{1}{5}$

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243 PU_2015_372

Let x and y be limits of two subsequences of a bounded sequence (a_n) of real numbers. Consider the following statements.

(i) x = y if the sequence (a_n) is increasing sequence
(ii) x = y if the sequence (a_n) is decreasing sequence
(iii) x = y if the sequence (a_n) is convergent sequence

Then:-

- All the statements i), ii) and iii) are true
- Only iii) is true

- i) and ii) are true but not iii)
- All the three statements are false

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246 PU_2015_372

When an edge is removed from a graph, the number of components:-

- Increase by at least one
- Increase by at most one
- Decrease by at least one
- Decrease by at most one

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241 PU_2015_372

If z = a is an isolated singularity of f and $f(z) = \sum_{n=-\infty}^{\infty} a_n (z-a)^n$ is its Laurent series expansion in annulus $0<|a|<r$ then if $a_n = 0$ for $n<-1$, we say z=a, we say z = a is:-

- A pole of order n
- A simple pole
- A removable singularity
- An essential singularity

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245 PU_2015_372

Given that $\sum_{n=1}^{\infty} \frac{1}{n^2} = \frac{\pi^2}{6}$. The sum of the series $\sum_{n=1}^{\infty} \frac{1}{(2n-1)^2}$ is:-

- $\frac{\pi^2}{8}$
- $\frac{\pi^2}{3}$
- $\frac{\pi^2}{2}$
- $\frac{\pi^2}{4}$

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227 PU_2015_372

All the permutation groups S_n are:-

- Finite
- Non-abelian

- Cyclic
- Abelian

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228 PU_2015_372

The Cantor set is:-

- Open in **R**
- Closed in R
- Dense in [0,1]
- A connected subset of **R**

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226 PU_2015_372

The number of integer solutions of $x_1 + x_2 + x_3 = 5\ (where\ \ x_1, x_2, x_3 \geq 1)$, is:-

- $\binom{7}{5}$
- $\binom{7}{2}$
- $\binom{4}{2}$
- $\binom{7}{3}$

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280 PU_2015_372

Which of the following is false?

- There exists a continuous function mapping (0,1) onto [0,1]
- There exists a continuous function mapping (0,1) onto *R*
- There exists a continuous function mapping [0,1] ∪ [2,3] onto [0,1]
- There exists a continuous function mapping [0,1] onto (0,1)

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292 PU_2015_372

The partial differential equation $x^2\frac{\partial^2 z}{\partial x^2} - (y^2-1)x\frac{\partial^2 z}{\partial x \partial y} + y(y-1)^2\frac{\partial^2 z}{\partial y^2} + x\frac{\partial z}{\partial x} + y\frac{\partial z}{\partial y} = 0$ is hyperbolic in a region in the XY-plane, if:-

- $x \neq 0\ and\ y = 1$
- $x = 0\ and\ y \neq 1$

- $x \neq 0 \text{ and } y \neq 1$
- $x = 0 \text{ and } y = 1$

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262 PU_2015_372

For the power series $\sum_{n=0}^{\infty} \frac{n!}{n^n} z^n$ the radius of convergence is:-

- e
- 1
- ∞
- 0

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289 PU_2015_372

The expression $\frac{1}{Dx^2 - Dy^2} \sin(x - y)$ is equal to:-

- $-\frac{x}{2}\cos(x - y)$
- $-\frac{x}{2}\sin(x - y) + \cos(x - y)$
- $-\frac{x}{2}\cos(x - y) + \sin(x - y)$
- $\frac{3x}{2}\sin(x - y)$

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294 PU_2015_372

The value of the integral $\iint_{x^2+y^2 \leq 1} e^{-(x^2+y^2)} dxdy$ is:-

- $\pi\left(1 + \frac{1}{e}\right)$
- $\pi\left(1 - \frac{1}{e}\right)$
- $\pi\left(1 + \frac{1}{e^2}\right)$
- $\pi\left(1 - \frac{1}{e^2}\right)$

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264 PU_2015_372

Define $f: Z \to Z$ by $f(x) = 3x^3 - x$. Then *f* is:-

- Both one-to-one and onto
- One-to-one but not onto
- Onto but not one-to-one
- Neither one-to-one nor onto

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275 PU_2015_372

$$\tan^{-1}\left(\frac{1}{2}\right) + \tan^{-1}\left(\frac{1}{3}\right) =$$

- 1
- $\frac{\pi}{2}$
- $\frac{\pi}{3}$
- $\frac{\pi}{4}$

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293 PU_2015_372

The general solution of the partial differential equation $\frac{\partial^2 z}{\partial x \partial y} = x + y$ is of the form:-

- $\frac{1}{2}xy(x+y) + F(x) + G(y)$
- $\frac{1}{2}xy(x-y) + F(x) + G(y)$
- $\frac{1}{2}xy(x-y) + F(x)G(y)$
- $\frac{1}{2}xy(x+y) + F(x)G(y)$

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269 PU_2015_372

The sum of the squares of the roots of $x^3 + ax^2 - bx + c = 0$ is:-

- $a^2 - 2b$
- $a^2 + 2b$
- $b^2 - 2c$

- $a^2 + 2c$

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268 PU_2015_372

In a group G with identity element e, the equation:-

(i) x*x = e has unique solution in G.
(ii) x*x = x has unique solution in G.

- (i) is true but (ii) is not true
- (ii) is true but (i) is not true
- Neither (i) nor (ii) is true
- Both (i) and (ii) are true

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281 PU_2015_372

If $f(x,y) = x^2\vec{i} - xy\vec{j}$ and *C* is the line segment from (1,1) to the point (0,0) then the value of the line integral $\int_C f.d\vec{r}$ is:-

- 0
- 1
- -1
- $\frac{1}{2}$

92 of 100

277 PU_2015_372

If *f*: *R* → *R* is defined as $f(x) = \begin{cases} x^2 \sin\frac{1}{x} if x \neq 0 \\ 0 \quad\quad if x = 0 \end{cases}$ then:-

- *f* is not continuous at 0
- *f* is continuous at 0 but not differentiable at 0
- *f* is differentiable but its derivative *f'* is not continuous at 0
- *f* is differentiable and its derivative *f'* is continuous at all points

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263 PU_2015_372

A cube has edges of length *a*. The distance between a diagonal and a skew edge is:-

- $\sqrt{\frac{a}{2}}$
- $\frac{a}{2}$

- $2a$
- $\sqrt{2a}$

94 of 100

266 PU_2015_372

In how many ways can the integer 1 through 9 be permuted such that exactly four of the nine integers are in their natural positions? (D_n denotes the number of derangement of n symbols)

- $\binom{9}{5} D_5$
- $\binom{10}{5} D_5$
- $\binom{9}{4} D_5$
- $\binom{10}{4} D_4$

95 of 100

278 PU_2015_372

For what values of *a* it is true that $\lim_{n\to\infty} \frac{a^n}{n!} = 0$?

- For all $a \in R$
- Only if $|a| < 1$
- Only if $|a| = 1$
- Only if $|a| > 1$

96 of 100

276 PU_2015_372

Consider *R* with the discrete metric d. Then which of the following is true?

- The sequence $\left\{\frac{1}{n}\right\}_{n=1}^{\infty}$ is a Cauchy sequence
- The map $f:(R,d)\to(R,d)$ defined as $f(x)=\begin{cases}1 & if\ x\ is\ rational\\ 0 & if\ x\ is\ irrational\end{cases}$ is nowhere continuous on R
- Finite sets are the only compact subsets of X
- $[0,1]$ is connected in (R,d)

97 of 100

267 PU_2015_372

If (x_n) and (y_n) are sequences of real numbers with limit points x and y, x < y only if:-

- $x_n \leq y_n$ for all n
- $x_n \leq y_n$ for infinitely many n
- $x_n \geq y_n$ for finitely many n
- $x_n \geq y_n$ for infinitely many n

98 of 100

291 PU_2015_372

If V is the solid in R^3 bounded by the cylinder $x^2 + y^2 = 1$ and the planes $z = 0$ and $z = 1$, then the value of $\iiint_V dxdydz$ is:-

- 4π
- 2π
- π
- $\pi/2$

99 of 100

279 PU_2015_372

If $a_n = \frac{1}{n^2+1}$ and $b_n = \frac{n}{3^n}$ for all $n \in N$ then:-

- Both $\sum_{n=1}^{\infty} a_n$ and $\sum_{n=1}^{\infty} b_n$ are convergent.
- $\sum_{n=1}^{\infty} a_n$ is convergent but $\sum_{n=1}^{\infty} b_n$ is divergent.
- $\sum_{n=1}^{\infty} a_n$ is divergent but $\sum_{n=1}^{\infty} b_n$ is convergent.
- Both $\sum_{n=1}^{\infty} a_n$ and $\sum_{n=1}^{\infty} b_n$ are divergent.

100 of 100

290 PU_2015_372

If $y = \sum_{m=0}^{\infty} C_m x^{r+m}$ is assumed to be a solution of the differential equation $x^2y'' - xy' - 3(1+x^2)y = 0$ then, the value of r are:-

- 1 and 3
- -1 and 3
- 1 and -3

-1 and -3

372 PU M Sc Mathematics

1 of 100
118 PU_2016_372_E
If A and B are any two sets, then A ∪ (A ∩ B) is equal to:-

- B^C
- A
- B
- A^C

2 of 100
100 PU_2016_372_E
$\int x \tan^{-1} x dx$ = ?

- $\frac{1}{2}[(x^2+1)\tan^{-1}x]$
- $(x^2 + 1) \tan^{-1} x - x$
- 0
- $\frac{1}{2}[(x^2+1)\tan^{-1}x - x]$

3 of 100
187 PU_2016_372_E
The Integrating factor for the differential equation $y' + \frac{x}{1+x} y = 1 + x$ is:-

- $e^x(1 + x)$
- $\frac{e^x}{1+x}$
- e^{x+x^2}
- $e^{(1+x)}x$

4 of 100
105 PU_2016_372_E
The separation of real and imaginary parts of the expression tan(x + iy) is:-

- $\frac{\sinh 2x}{\cosh 2x + \cos 2y} + i\frac{\sin 2y}{\cosh 2x + \cos 2y}$
- $\frac{\sin 2x}{\cos 2x - \cos 2y} + i\frac{\sin 2y}{\cos 2x + \cos 2y}$
- $\frac{\sinh 2x}{\cos 2x - \cos 2y} + i\frac{\sin 2y}{\cos 2x + \cos 2y}$

- $\frac{\sin 2x}{\cosh 2x - \cos 2y} + i\frac{\sin 2y}{\cosh 2x + \cos 2y}$

5 of 100

139 PU_2016_372_E

If A is an orthogonal matrix then det(A) is equal to:-

- 1 or -1
- 0 or 1
- zero always
- -1 or 0

6 of 100

121 PU_2016_372_E

The function y(x) which is not a solution of the equation $x^2y'' + xy' - y = 0$ is given by y(x) =

- 0
- 1
- x
- x^{-1}

7 of 100

101 PU_2016_372_E

$$\int_0^{\pi} \cos^{2n+1} x dx = ?$$

- $2\pi + 1$
- $\frac{\pi}{2n+1}^{2n+1}$
- 0
- $\frac{\pi}{2}^{2n+1}$

8 of 100

135 PU_2016_372_E

The eigenvalues of the matrix $\begin{bmatrix} a & b \\ -b & a \end{bmatrix}$, where a and b are real numbers, are real when:-

- b = 0
- a = b = 0
- a and b are arbitrary

- a = 0

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128 PU_2016_372_E

A solution of the equation $y'' + 8y' + 16y = 0$ is given by $y(x) =$

- x
- xe^{-2x}
- xe^{-x}
- xe^{-4x}

10 of 100

148 PU_2016_372_E

If m = n, the system AX = 0 with m linear equations and n unknowns has:-

- no solution
- unique solution if det(A)≠0
- unique solution
- non zero solution

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142 PU_2016_372_E

Which one of the following is not a solution of the equation $(y')^2 - xy' + y = 0$?

- y = x
- y = 2x - 4
- y = x-1
- y = 3x - 9

12 of 100

140 PU_2016_372_E

The graph of the function that is the solution of the problem $x\,y' + y = 0,\ y(1) = 1$ is:-

- a Parabola
- a straight line
- a hyperbola
- an ellipse

13 of 100

103 PU_2016_372_E

If $f(x) = f(a+x)$, *then* for any positive integer n, $\int_0^{na} f(x)dx = ?$

- $n\int_0^a f(x)dx$
- $\int_0^{na} f(x)dx$
- 0
- $\int_0^{na} f(a+x)dx$

14 of 100

129 PU_2016_372_E

A solution of the equation $y'' - 2y' + 10y = 0$ is given by $y(x) =$

- sinx + cosx
- sinx
- $e^x \cos 3x$
- cosx

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130 PU_2016_372_E

An eigenvector of the matrix $A = \begin{bmatrix} 5 & 4 \\ 1 & 2 \end{bmatrix}$ with eigenvalue $\lambda_1 = 1$ is given by $\underset{x}{\rightarrow} =$

- $\begin{bmatrix} 1 \\ 1 \end{bmatrix}$
- $\begin{bmatrix} 1 \\ 0 \end{bmatrix}$
- $\begin{bmatrix} 0 \\ 1 \end{bmatrix}$
- $\begin{bmatrix} 1 \\ -1 \end{bmatrix}$

16 of 100

133 PU_2016_372_E

If λ is an eigenvalue of an unitary matrix then:-

- $\lambda = 1$ always
- λ is any real number
- $|\lambda| = 1$
- $\lambda = 0$ always

17 of 100

114 PU_2016_372_E

$L^{-1}\left[\log\left(\frac{s+1}{s+2}\right)\right] = ?$

- $\frac{-e^{-t}+e^{-t}}{t}$
- $\frac{-e^{-t}+e^{-2t}}{t}$
- $\frac{-e^{t}+e^{2t}}{t}$
- $\log\left(\frac{-e^{-t}+e^{-2t}}{t}\right)$

18 of 100

134 PU_2016_372_E

If λ is a real eigenvalue of a skew – Hermitian matrix then:-

- $\lambda = 0$
- λ can be any real number.
- $\lambda = 1$
- $\lambda = -1$

19 of 100

213 PU_2016_372_E

Let f′ and g′ be continuous functions on [a, b]. Then $\int_a^b f(x)\, g'(x)\, dx + \int_a^b f'(x) g(x)\, dx$ = f(b) g (b) $\oplus$ f(a) g(a), where $\oplus$ is:-

- x
- -
- +
- ÷

20 of 100

145 PU_2016_372_E

Identify the function that is not a solution of the Laplace's equation.

- f = xy
- $f = x^2 + y^2$
- $f = x^2 - y^2$
- arctan (y/x)

21 of 100

127 PU_2016_372_E

A solution of the equation $y'' - 4y' + 4y = 0$ is given by $y(x)$ =

- x

- e^{2x}
- xe^{x}
- $x^{2}e^{2x}$

22 of 100

138 PU_2016_372_E

The geometric multiplicity of the eigenvalue λ=-3 of the matrix $\begin{bmatrix} -2 & 2 & -3 \\ 2 & 1 & -6 \\ -1 & -2 & 0 \end{bmatrix}$ is:-

- 1
- 2
- 0
- 3

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132 PU_2016_372_E

The geometric multiplicity of the eigenvalue $\lambda = 1$ of the matrix $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ is:-

- 1
- 3
- 2
- 0

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150 PU_2016_372_E

Which is false?

- $\det(A^{-1}) = 1/\det(A)$
- $\det(AB) = \det(A)\ \det(B)$
- rank(A) = order(A), if det(A) = 0
- $\det(A^{T}) = \det(A)$

25 of 100

197 PU_2016_372_E

Let $f(x) = \begin{cases} (x-1)\sin\left(\frac{1}{x-1}\right) & if \quad x \neq 1 \\ 0 & if \quad x = 1 \end{cases}$. Then which of the following is true?

- f is neither differentiable at $x = 0$ nor at $x = 1$
- f is differentiable at $x = 0$ and at $x = 1$

- f is differentiable at $x = 0$ but not at $x = 1$.
- f is differentiable at $x = 1$ but not at $x = 0$.

26 of 100

125 PU_2016_372_E

A solution of the equation $x^2y'' - 3xy' + 4y = 0$ is given by $y(x) =$

- $x \log x$
- x
- $x\,e^x$
- x^2

27 of 100

115 PU_2016_372_E

$L[e^{-t} \sin 2t] = ?$

- $\frac{2}{s^2+1}$
- $\frac{1}{(s+1)^2+1}$
- $\frac{2}{(s+1)^2+1}$
- $\frac{2}{(s+1)^2}$

28 of 100

116 PU_2016_372_E

The general solution of the equation $\frac{d^3y}{dx^3} - 3\frac{d^2y}{dx^2} + 3\frac{dy}{dx} - y = 0$ is $y = ?$

- $e^x(c_1x^2 + c_2x + c_3)$
- $e^x(c_1x^2 + c_2)$
- $e^{2x}(c_1x^2 + c_2x + c_3)$
- $e^x(c_1x^2 + x(c_2 + c_3))$

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Copy of 107 PU_2016_372_E

The equation of the plane through (1,2,3) parallel to the plane 4x+5y-3z+7=0 is:-

- 4x+5y-3z = -7
- 4x+5y-3z = 2
- 4x+5y-3z = 5

- 4x+5y-3z = 1

30 of 100

141 PU_2016_372_E

The solution of the initial value problem y′=-2xy, y(0)=2 is:-

- $2\,e^{-x^2}$
- $2\,e^{-x}$
- $2\,e^{-2x^2}$
- $\frac{e^{-x^2}}{2}$

31 of 100

210 PU_2016_372_E

Let A, B and C be finite sets. Then |A| + |B| +| C| - |A ∩B| - |B ∩C|-|C ∩A| + |A ∩B ∩C| is:-

- |A∩(BUC)|
- |A U (B ∩C)|
- |AUBUC|
- |(AUB)-C)|

32 of 100

126 PU_2016_372_E

A solution of the equation $y'' + 8y' + 16y = 0$ is given by $y(x) =$

- e^{-4x}
- e^{-2x}
- e^{-x}
- e^{-3x}

33 of 100

112 PU_2016_372_E

$\int \log(1+x^2)dx = ?$

- $\frac{1}{n-1}\log\left(1+x^n\right)$
- $\log\left(1+x^n\right)$
- $\frac{1}{n}\log\left(1+x^n\right)$

- $x\log(1+x^{x})-2x+2\tan^{-1}x$

34 of 100

120 PU_2016_372_E

A particular solution of the equation y'' + y = sin *x* is given by:-

- cos*x*
- sin *x*
- $\frac{-x\sin x}{2}$
- $\frac{-x\cos x}{2}$

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119 PU_2016_372_E

The roots of the auxiliary equation of the differential equation $\frac{d3y}{dx^3}+\frac{d^2y}{dx^2}+\frac{dy}{dx}+y=0$ are:-

- (i, 1, -1),
- (i, -1, 1),
- (i, 0, -1)
- (i, -i, -1)

36 of 100

202 PU_2016_372_E

Consider the following statements:

(i) For each positive integer n, there exists a cyclic group of order n
(ii) For each positive integer n, there exists a nonabelian group of order n
Then:-

- (ii) is true but (i) is false
- Both (i) and (ii) are true
- Both (i) and (ii) are false
- (i) is true but (ii) is false

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193 PU_2016_372_E

Let f and g be functions such that f + g is a continuous function then

- g may be discontinuous but f must be continuous
- Both f and g may be discontinuous
- f may be discontinuous but g must be continuous
- f and g are continuous

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194 PU_2016_372_E

Let $f: R \to R$ be any function. Define $g: R \to R$ by $g(x) = |f(x)|$ for all $x \in R$. Then g is:-

- On to if f is onto
- One-one if f is one-one
- Discontinuous if f is discontinuous
- Continuous if f is continuous

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147 PU_2016_372_E

If the position vector of a particle is given by r(t) = cos(t) I + sin(t) j where I and j are unit vectors along x,y coordinate axes then the acceleration vector is equal to:-

- - r/2
- r/2
- r
- - r

40 of 100

149 PU_2016_372_E

Let AX = b be a system of m-linear equations in n unknowns. Then it is homogeneous if:-

- $b \neq 0$ in R^m
- $b \neq 0$ in R^n
- $b = 0$ in R^n
- $b = 0$ in R^m

41 of 100

113 PU_2016_372_E

$$L^{-1}\left[\frac{1}{(s+3)^4}\right] = ?$$

- $\frac{t^3}{3!}e^{-3t}$
- $t^3 e^{-3t}$
- $\frac{t^3}{3!}e^{3t}$
- e^{-3t}

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131 PU_2016_372_E

An eigenvector of the matrix $A = \begin{bmatrix} 1 & 1 \\ -1 & 1 \end{bmatrix}$ with eigenvalue $\lambda_1 = 1 + i$ is given by $\vec{x}$ =

- $\begin{bmatrix} 1 \\ 1 \end{bmatrix}$
- $\begin{bmatrix} 1 \\ -i \end{bmatrix}$
- $\begin{bmatrix} 1 \\ i \end{bmatrix}$
- $\begin{bmatrix} i \\ i \end{bmatrix}$

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123 PU_2016_372_E

$y = x^m$ is not a solution of the equation $x^3y^{(4)} + 8x^2y''' + 8xy'' - 8y' = 0$ when m =

- 1
- 2
- -1
- 0

44 of 100

122 PU_2016_372_E

The Euler equation $x^2y'' + xy' - y = 0$ can be transformed into an equation with constant coefficients by the transformation z =

- Log x
- *x*
- x^2
- e^x

45 of 100

117 PU_2016_372_E

The general solution of the equation $\frac{d^5y}{dx^5} + \frac{d^3y}{dx^3} = 0$ is $y = ?$

- $c_1e^{-x} + c_2e^{x} + (c_3 + c_4x + c_5x^2)e^{3x}$
- $c_1e^{-x} + c_2e^{x} + (c_3 + c_4x + c_5x^2)e^{0x}$
- $c_1e^{-x} + c_2e^{x}$
- $c_1e^{2x} + c_2e^{x} + (c_3 + c_4x + c_5x^2)e^{0x}$

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137 PU_2016_372_E

The geometric multiplicity of the eigenvalue $\lambda=5$ of the matrix $\begin{bmatrix} -2 & 2 & -3 \\ 2 & 1 & -6 \\ -1 & -2 & 0 \end{bmatrix}$ is:-

- 2
- 0
- 1
- 3

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209 PU_2016_372_E

If $A=\left\{\frac{m+n}{mn} \mid m,n \in N\right\}$ then:-

- lub A =1 and glb A =0
- lub A =0 and glb A = 2
- $lub\, A = 1$ and $glb\, A = \frac{1}{2}$
- lub A =2 and glb A =0

48 of 100

151 PU_2016_372_E

A is orthogonel, then det(A) is:-

- -1
- 1
- 0
- +1 or -1

49 of 100

136 PU_2016_372_E

An eigenvector of the matrix $\begin{bmatrix} 1 & 1 \\ -1 & 1 \end{bmatrix}$ is:-

- $\begin{bmatrix} 2 \\ -i \end{bmatrix}$
- $\begin{bmatrix} 0 \\ 0 \end{bmatrix}$
- $\begin{bmatrix} 1 \\ -2i \end{bmatrix}$

- $\begin{bmatrix} 1 \\ -i \end{bmatrix}$

50 of 100

107 PU_2016_372_E

The equation of the plane through (1,2,3) parallel to the plane 4x+5y-3z+7=0 is:-

- 4x+5y-3z = 5
- 4x+5y-3z = 2
- 4x+5y-3z = -7
- 4x+5y-3z = 1

51 of 100

211 PU_2016_372_E

The value of $\lim_{n\to\infty} \frac{n^3}{2^n}$ is:-

- ∞
- 1
- $\frac{1}{2}$
- 0

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108 PU_2016_372_E

The equation of the sphere whose centre is (2, -3, 4) and radius 5 units is:-

- $x^2+y^2+z^2-x-6y-8z+4=0$
- $x^2+y^2+z^2-4x-6y-8z+1=0$
- $x^2+y^2+z^2-4x+6y-8z+4=0$
- $x^2+y^2+z^2-4x-6y-8z=0$

53 of 100

110 PU_2016_372_E

The rank of the matrix $\begin{bmatrix} 1 & 2 & 1 & 2 \\ 1 & 3 & 2 & 2 \\ 2 & 4 & 3 & 4 \\ 3 & 7 & 4 & 6 \end{bmatrix}$ is:-

- 4
- 2
- 1

- 3

54 of 100

109 PU_2016_372_E

The eigen values of $\begin{bmatrix} 2 & 2 & 1 \\ 1 & 3 & 1 \\ 1 & 2 & 2 \end{bmatrix}$ are:-

- (1, 5, 5)
- (1, 1, 5)
- (1, 1, 1)
- (1, 1, 0)

55 of 100

102 PU_2016_372_E

$\int_0^{2a} f(x)dx = ?$ if $f(2a-x) = -f(x)$:-

- 0
- a^2
- a
- 2a

56 of 100

124 PU_2016_372_E

A solution of the equation $x^2y'' - \frac{3}{2}xy' - \frac{3}{2}y = 0$ is given by $y(x) =$

- $e^{\frac{x}{2}}$
- $\sin x$
- $e^{\frac{-x}{2}}$
- $x^{\frac{-1}{2}}$

57 of 100

111 PU_2016_372_E

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

- $\frac{\pi}{4}$
- $\frac{\pi}{2}$
- π^2

- 0

58 of 100

143 PU_2016_372_E

Integration of the equation yy' = - x gives the

- hyperbola xy =1
- line x+ y =1
- parabola x = y^2
- circle x^2 +y^2 =1

59 of 100

106 PU_2016_372_E

The distance between the parallel planes 2x-3y+6z+12=0 and 2x-3y+6z-2=0 is:-

- 0
- 2
- 1
- 12

60 of 100

104 PU_2016_372_E

$Lim_{x\to\infty} \sinh^{-1} x - \log x = ?$

- 0
- log 1
- log 2
- log($\sin^{-1}x$)

61 of 100

223 PU_2016_372_M

$\int_0^\infty \int_0^\infty \frac{e^{-y}}{y}$ dx dy is:-

- 1/2
- 1
- 0
- 2

62 of 100

220 PU_2016_372_M

Let p be a prime number. Then (p – 1)! + 1 is divisible by

- p^2

- p
- p + 1
- p - 1

63 of 100

231 PU_2016_372_M

Three concurrent lines with direction cosines (l_1, m_1, n_1), (l_2, m_2, n_2) and (l_3, m_3, n_3) are coplanar if:-

- $l_1 l_2 + m_1 m_2 + n_1 n_2 = 1$
- $l_1 m_2 = l_2 m_1$
- $l_1 l_2 + m_1 m_2 + n_1 n_2 = 0$
- $\begin{vmatrix} l_1 & m_1 & n_1 \\ l_2 & m_2 & n_2 \\ l_3 & m_3 & n_3 \end{vmatrix} = 0$

64 of 100

230 PU_2016_372_M

What is the angle made by the two lines joining (3,1,-2), (4,0,-4) and (4,-3,3), (6,-2,2):-

- $\frac{\pi}{2}$
- $\frac{\pi}{3}$
- π
- 0

65 of 100

255 PU_2016_372_M

There exist zero-divisors in:-

- the ring of real matrices of order n
- the ring of integers
- the ring of real numbers
- the ring of integers modulo a prime p

66 of 100

249 PU_2016_372_M

A sphere is inscribed in the tetrahedron whose faces are x=y=z=0, 2x+6y+3z=14. Then the radius of the sphere is:-

- 7/6

- $\sqrt{\frac{7}{9}}$
- 7/9
- 7

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243 PU_2016_372_M

sinh 3x

- $3\sinh x + 4\sinh^3 x$
- $2\sinh x - 4\sinh^3 x$
- $4\sinh x - 3\sinh^3 x$
- $4\sinh x + 3\sinh^3 x$

68 of 100

235 PU_2016_372_M

The radius of the sphere $ax^2 + ay^2 + az^2 + 2ux + 2vy + 2wz + d = 0$ is:-

- u
- d
- $\sqrt{u^2 + v^2 + w^2 - d}$
- $\sqrt{\frac{u^2}{a^2} + \frac{v^2}{a^2} + \frac{w^2}{a^2} - \frac{d}{a}}$

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232 PU_2016_372_M

What is ratio made by the point (-6,5,4) on the line joining the points (-4,3,2) and (-10,9,8)?

- 1:2
- 3:1
- 2:1
- 1:3

70 of 100

221 PU_2016_372_M

$\int_0^{\frac{\pi}{2}} \log(\sin x)\, dx$ *is* :-

- $\frac{\pi}{2} \log x$
- $\frac{\pi}{2} - \log(\frac{1}{2})$
- $\frac{\pi}{2} + \log(\frac{1}{2})$

- $\frac{\pi}{2}\log(\frac{1}{2})$

71 of 100

240 PU_2016_372_M

$\lim_{\theta \to 0} \frac{\tan\theta + \sec\theta - 1}{\tan\theta - \sec\theta + 1}$ =

- 1
- 2
- 1/2
- 0

72 of 100

227 PU_2016_372_M

Consider the following statements.

(i) Every convergent sequence in R is bounded.
(ii) Every bounded sequence in R has a convergent subsequence.
Then:-

- Both (i) and (ii) are true
- (ii) is true but (i) is false
- Neither (i) nor (ii) is true
- (i) is true but (ii) is False

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236 PU_2016_372_M

The direction cosines of a line parallel to the z-axis are:-

- 0,0,1
- 0,1,0
- 0,0,0
- 1,0,0

74 of 100

246 PU_2016_372_M

If G is a group of order 10 then it must have a subgroup of order:-

- 3
- 6
- 4
- 2

75 of 100

244 PU_2016_372_M

$$\lim_{\theta \to 0} \frac{\tan\theta - \sin\theta}{\theta^3} =$$

- 1
- 1/2
- 2
- 0

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259 PU_2016_372_M

If $f(z)$ is continuous in a simply connected domain D and if $\oint f(z)dz = 0$ for every closed contour in D, then –

- f (z) is non - analytic in D
- f(z) is bounded
- f(z) is analytic in D
- f(z) is constant

77 of 100

234 PU_2016_372_M

$\tan^{-1} x + \tan^{-1} y =$

- $\tan^{-1}(x-y)$
- $\tan^{-1}(x+y)$
- $\tan^{-1}\left(\frac{x+y}{1+xy}\right)$
- $\tan^{-1}\left(\frac{x+y}{1-xy}\right)$

78 of 100

252 PU_2016_372_M

Which regular n-sided polygon has three times as many diagonals as sides?

- 7
- 8
- 6
- 9

79 of 100

257 PU_2016_372_M

The function sin z is analytic in (C is set of complex numbers):-

- C
- C∪ {∞}
- C except on the negative real axis
- C-{0}

80 of 100

250 PU_2016_372_M

Define $f : Z \to Z$ by $f(x) = 3x^3 - x$. Then f is:-

- one-to-one but not onto
- neither one to one nor onto
- both one- to-one and onto
- onto but not one-to-one

81 of 100

268 PU_2016_372_D

Which of the following is a uniformly continuous function on (0,1)?

- e^x
- 1/x
- Sin(1/x)
- $1/(x-1)^2$

82 of 100

279 PU_2016_372_D

Which is not an associative binary operator on the set of integers:-

- a*b = a+b+2
- a*b = a-b (substraction)
- a*b = a.b (multiplication)
- a*b = 2ab

83 of 100

297 PU_2016_372_D

A connected graph G with at least two vertices contains:-

- at most two vertices that are not cut vertices
- at least two vertices that are not cut vertices
- at least three vertices that are not cut vertices
- at most three vertices that are not cut vertices

84 of 100

261 PU_2016_372_D

If the only ideals of a ring R are {0} and R then:-

- R is a field
- R is a field provided R is commutative with unit element
- R is the set of all rational numbers
- R is an integral domain

85 of 100

273 PU_2016_372_D

In the following statements which one is not correct?

- A countable infinite set and an uncountable set have different cardinalities.
- A set and its power set have different cardinalities
- A set and its proper subset always have different cardinalities
- A finite and an infinite set have different cardinalities

86 of 100

262 PU_2016_372_D

The number of elements of order 5 in the symmetric group S_5 is:-

- 20
- 12
- 5
- 24

87 of 100

267 PU_2016_372_D

Which of the following is a countable set:-

- The set of all sequences of 0's and 1's.
- (0,1)
- QXQ
- Cantor set

88 of 100

298 PU_2016_372_D

Which of the following statement is wrong?

If G is a connected and unicyclic graph with n vertices and m edges then:-

- for some edge e of G, G-e is a tree
- G is connected and the set of edges of G that are not cut edges forms a cycle
- for every edge e of G, G-e is a tree
- G is connected and n = m

89 of 100

278 PU_2016_372_D

If the integers a, b divides an integer c then ab divides c

- if lcm of a, b is c
- if gcd of a,b is one
- if a divides b
- if a = b

90 of 100

271 PU_2016_372_D

Suppose a, a′, b and b′ are real numbers, then (a+ib)/(a′+ib′) will also be a real number if:-

- ab'-a'b=0
- aa'-bb'=0
- ab - a'b' =0
- ab' -a'b=0

91 of 100

269 PU_2016_372_D

If $z_1 \neq z_2 \neq z_3 \neq z_4$ in C_∞ the cross ratio (z_1, z_2, z_3, z_4) is a real number if z_1, z_2, z_3, z_4 lies on :-

- Parabola
- hyperbola
- Circle
- Triangle

92 of 100

299 PU_2016_372_D

Which of the following statement is true?

- If G is Eulerian then so is G-e for some edge e in G
- If G is Hamiltonian then ω(G-S) ≤ |S| for every nonempty proper subset S of V
- If G is Eulerian then it is hamiltonian
- G is Hamiltonian iff ω(G-S) ≤ |S| for every nonempty proper subset S of V

93 of 100

260 PU_2016_372_D

If f(z) is entire function the Taylor series is:-

- Divergent for all z
- Convergent and bounded for all z

- Convergent for all z
- Constant

94 of 100

292 PU_2016_372_D

In a convergent series of real numbers if first finite number of elements are replaced by different real numbers then:-

- the altered series convergent only if its term are positive real numbers.
- the altered series is also convergent and the sum is not changed.
- the altered series need not be convergent.
- the altered series is also convergent and the sum may be changed.

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284 PU_2016_372_D

Let H and K be subgroups of a group G. Then HK is subgroup of G:-

- only if both H and K are normal sub groups of G.
- only if G is a finite group.
- if one of H and K is a normal subgroup of G.
- only if G is abelian group.

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295 PU_2016_372_D

The sum of the degrees of the vertices of a graph is:-

- the number of vertices minus two
- two times the number of vertices
- two times the number of edges
- the number of edges plus 2

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281 PU_2016_372_D

If A and B are any two right cosets of a nontrivial proper subgroup H of a finite group G. Then:-

- A and B are either having exactly one element common or equal.
- A and B are either disjoint or equal
- A union B is contained in H.
- either A is contained in B or B is contained in A.

98 of 100

265 PU_2016_372_D

The value of $\arg(z)+\arg(\bar{z})$, where z is not equal to zero is:-

- 0

- $\frac{\pi}{4}$
- $\frac{\pi}{2}$
- π

f

99 of 100

275 PU_2016_372_D

In the following statements

(i) There exists no bijective map from a set to its proper subset.
There exists no bijective map between disjoint sets.

- Both (i) and (ii) are true
- Neither (i) nor (ii) is true
- (ii) is true but (i) is not true
- (i) is true but (ii) is not true

100 of 100

287 PU_2016_372_D

Which one is not a countable set:-

- set of positive rational numbers
- set of all rational numbers.
- set of real numbers greater than one and less than 2.
- Set of all integers

Sr No.	MSC Maths
1	Find the missing term in the following series: 3,15,?,63,99,143…?
Alt1	27
Alt2	35
Alt3	45
Alt4	56

2	Choose word from the given options which bears the same relationship to the third word, as the first two bears: Horse : Jockey :: Car : ?
Alt1	Mechanic
Alt2	Chauffeur
Alt3	Steering
Alt4	Brake

3	Food is to Fad as Religion is to……?.....
Alt1	Crucification
Alt2	Notion
Alt3	Superstition
Alt4	Mythology

4	Select the lettered pair that has the same relationship as the original pair of words: Fond: Doting
Alt1	Solicitous: Concern
Alt2	Verbose: Wordiness
Alt3	Flurry: Blizzard
Alt4	Magnificent: Grandiose

5	Which of the following is the same as Emancipate, Free, Release?
Alt1	Liberate
Alt2	Quit
Alt3	Pardon
Alt4	Ignore

6	Spot the defective segment from the following:
Alt1	I met one of the mountaineers
Alt2	that have returned
Alt3	to their base camp
Alt4	the last week

7	Choose the meaning of the idiom/phrase from among the options given: To call names
Alt1	to abuse
Alt2	to recall something
Alt3	to count the prisoners
Alt4	to take attendance

8	Our tour programme fell ------ because of inclement weather.
Alt1	through
Alt2	off
Alt3	out
Alt4	down

9	Choose the option closest in meaning to the given word: POIGNANT
Alt1	unbearable
Alt2	maximal
Alt3	pathetic
Alt4	sharp

10	Choose the antonymous option you consider the best: WANTON
Alt1	rational
Alt2	abstemious
Alt3	dearth
Alt4	deliberate

11	Six people K, L, M, N, O and P are sitting around a table as per the following conditions. i. N and O are opposite each other ii. K is to the right of M iii. L and K are opposite each other iv. N is to the left of P Who is to the left of L ?
Alt1	P
Alt2	M
Alt3	N
Alt4	O

12	Study the following table carefully to answer the questions that follow (15 to 17) :Total number of employees in different departments in an organisation and (of these) percentage of females and males Department Total number of employees Percentage of female employees Percentage of male employees IT 840 45 55 Accounts 220 35 65 Production 900 23 77 HR 360 65 35 Marketing 450 44 56 Customer Service 540 40 60 What is the total number of male employees in the IT and Customer Service departments put together?
Alt1	115
Alt2	786

Alt3	768
Alt4	85

13	Study the following table carefully to answer the questions that follow (15 to 17) :Total number of employees in different departments in an organisation and (of these) percentage of females and males Department Total number of employees Percentage of female employees Percentage of male employees IT 840 45 55 Accounts 220 35 65 Production 900 23 77 HR 360 65 35 Marketing 450 44 56 Customer Service 540 40 60 What is the total number of employees in all departments put together ?
Alt1	3260
Alt2	3310
Alt3	3140
Alt4	3020

14	Select the alternative that logically follows from the two given statements, but not from one statement alone: All Cats are dogs No dogs are rats
Alt1	All cats are rats
Alt2	Some cats are rats
Alt3	No cat is rat
Alt4	None of the above

15	In a certain code language, " When did you come" is written as 'ti na ki ja'. "Will you come again" is written as 'na pa sa ja' and "She will go" is written as 'pa da ra'. How is "again" written in that code language ?
Alt1	Na
Alt2	sa
Alt3	ja
Alt4	da

16	In each of the following questions some statements are followed by two conclusions (i) and (ii). Read the statements carefully and then decide which of the conclsions follow beyond a reasonable doubt. Mark your answer as Statement: The aspirants should apply through a proper channel for permission Conclusions: (i) Those who apply through proper channel will get permission (ii) Those who do not apply through proper channel will not get permission
Alt1	If only conclusion (i) follows

Alt2	If only conclusion (ii) follows
Alt3	If neither conclusion (i) nor (ii) follows
Alt4	If both the conclusions follow

17	The average height of 3 children is 115 cms. If the heights of 2 children are 117 cms. And 112 cms. Respectively, the height of the third child is
Alt1	112 cms.
Alt2	113 cms.
Alt3	115 cms.
Alt4	116 cms.

18	What is the 30% of 40% of 2/5th of 5000?
Alt1	500
Alt2	800
Alt3	240
Alt4	720

19	There are n persons in a room. Each one is shaking hand with the other . Ultimately there are 66 hand-shakes. Then n=
Alt1	11
Alt2	12
Alt3	16
Alt4	33

20	A problem is given to students 10 students choose option A ; 6 students choose option B ; 2 students choose option C; Gopal choose option D; 5 students did not answer. which option is correct if the teacher tells that One-Twelth of the class gave the correct answer.
Alt1	B
Alt2	A
Alt3	C
Alt4	D

21	The solution of $\lim_{x \to 0} \frac{x - tanx}{x^3}$ is A: 1/3 B: 3 C: 2/3 D:−1/3

Alt1	A
Alt2	B
Alt3	C
Alt4	D

22	The Taylor series expansion of $f(x)=log(cosx)$ about the point $x=\pi/3$ is A: $\log(1/2)+\sqrt{3}(x-\pi/3)-2(x-\pi/3)^2-4/\sqrt{3}(x-\pi/3)^3$ B: $\log(1/2)-\sqrt{3}(x-\pi/3)-2(x-\pi/3)^2-4/\sqrt{3}(x-\pi/3)^3$ C: $\log(1/2)+\sqrt{3}(x-\pi/3)+2(x-\pi/3)^2+4/\sqrt{3}(x-\pi/3)^3$ D: $\log(1/2)+\sqrt{3}(x-\pi/3)-2(x-\pi/3)^2+4/\sqrt{3}(x-\pi/3)^3$
Alt1	A
Alt2	B
Alt3	C
Alt4	D

23	The solution of $u(x)=x-\int_0^x (x-t)u(t)dt$ is A: $x+\sin x$ B: $\sin x$ C: $\cos x$ D: e^x
Alt1	A
Alt2	B
Alt3	C
Alt4	D

24	If F{f(x)}=F(s) is the complex Fourier transform of f(x), then F{f(x-k)} is A: $e^{-iks}F(s)$ B: $e^{iks}F(s)$ C: $e^{is}F(s-k)$ D: $F(s-k)$

Alt1	A
Alt2	B
Alt3	C
Alt4	D

25	If the centre is (1,−2, 3) and radius is 3, then the equation of the sphere is A: $x^2+y^2+z^2-2x+4y-6z+5=0$ B: $x^2+y^2+z^2+2x-4y+6z-5=0$ C: $x^2+y^2+z^2+2x+4y-6z-5=0$ D: $x^2+y^2+z^2-2x-4y+6z+5=0$
Alt1	A
Alt2	B
Alt3	C
Alt4	D

26	Let C be a simple closed curve in three dimensional space and S be an open regular surface bounded by C, Then for a vector field **u** defined on V and on C is a A: Divergence Theorem B: Greens Theorem C: Stokes Theorem D: Cauchy Theorem
Alt1	A
Alt2	B
Alt3	C
Alt4	D

27	A vector u is solenoidal in a simply connects region if and only if A: $div\ u \neq 0$ B: $curl\ u = 0$ C: $div\ u = 0$ D: $div\ u + curl\ u \neq 0$
Alt1	A
Alt2	B
Alt3	C
Alt4	D

28	A sequence $\langle a_n \rangle$ is said to be _____, if there exist a number M>0 such that $\lvert a_n \rvert < M$ for all $n \in N$. A: Bounded sequence B: Unbounded sequence C: Divergent sequence D: Cauchy sequence
Alt1	A
Alt2	B
Alt3	C
Alt4	D

29	The series $\sum \frac{1}{4}\{1 + (-1)^{n+1}(2n+1)\}$ is A: convergent B: divergent C: oscillating infinitely D: oscillating finitely
Alt1	A
Alt2	B
Alt3	C

Alt4	D

30	The general solution of the equation $dy/dx = 1+x^2+y^2+x^2y^2$ is A: $\tan^{-1}(x)=y-y^3/3+c$ B: $\tan^{-1}(x)=y+y^3/3+c$ C: $\tan^{-1}(y)=x-x^3/3+c$ D: $\tan^{-1}(y)=x+x^3/3+c$
Alt1	A
Alt2	B
Alt3	C
Alt4	D

31	The differential equation $y'' + y = 0$ has A: only one solution B: two solutions C: infinitely many solutions D: no solution
Alt1	A
Alt2	B
Alt3	C
Alt4	D

32	The initial value problem $\frac{dy}{dx} + \lvert y \rvert = 0, y(0) = 1$ has A: Unique solution B: Infinite number of solution C: No solution D: finite number of solution
Alt1	A

Alt2	B
Alt3	C
Alt4	D

33	The partial differential equation corresponding $(x-h)^2+(y-k)^2+z^2=c^2$ is A: $z^2(p^2-q^2-1)=0$ B: $z^2(p^2+q^2+1)=c^2$ C: $z^2(p^2-q^2+1)=c^2$ D: $z^2(p^2-q^2-1)=c^2$ Here $p=\frac{\partial z}{\partial x}, q=\frac{\partial z}{\partial y}$
Alt1	A
Alt2	B
Alt3	C
Alt4	D

34	Solution of the differential equation $\frac{\partial^2 z}{\partial x^2}+\frac{\partial^2 z}{\partial y^2}-\left(\frac{\partial^2 z}{\partial x^2}\frac{\partial^2 z}{\partial y^2}-\left(\frac{\partial^2 z}{\partial x\partial y}\right)^2\right)=1$ is A: $z=\frac{1}{2}(x^2+y^2)+ax+by+c$ B: $z=\frac{1}{2}(x^2-y^2)+ax+by+c$ C: $z=\frac{1}{2}(x^2-y^2)+ax$ D: $z=\frac{1}{2}(x^2-y^2)$
Alt1	A
Alt2	B
Alt3	C
Alt4	D

35	If H is a subgroup of finite group G and order of H and G are respectively m and n, then A: m | n B: n | m C: mn D: m+n
Alt1	A
Alt2	B
Alt3	C
Alt4	D

36	If G is the group of non-zero complex number under multiplication and G^1 is the group of non-zero real numbers under multiplication, then the f: $G \to G^1$ defined by $f(z)=\|z\|$ is a A: Isomorphism B: Non-isomorphism C: Automorphism D: Endomorphism
Alt1	A
Alt2	B
Alt3	C
Alt4	D

37	The number of sylow p-subgroups is of the 1+kp (where k is non- negative integer) is. A: o(N(P)) | o(G) B: o(G) | o(N(P)) C: o(N(P)) D: o(G)
Alt1	A
Alt2	B
Alt3	C
Alt4	D

38	Let R= C[0, 1] be the ring of real valued continuous functions on [0,1]. Then A: I={x∈R: x(1)=0} is an ideal of R. B: I={x∈R: x(0)=1} is an ideal of R. C: I={x∈R: x(1/2)=0} is an ideal of R. D: I={x∈R: x(1/2)=1/2} is an ideal of R.
Alt1	A
Alt2	B
Alt3	C
Alt4	D

39	A polynomial $f(x)=x^2-2$ is irreducible over Q and $f(\sqrt{2})=0$ and thus x^2-2 is the minimal polynomial of $\sqrt{2}$ over Q and $\deg_Q(\sqrt{2})=2$. Thus $[Q(\sqrt{2}):Q]=$ A: $\sqrt{2}$ B: 2 C: 1 D: 0
Alt1	A
Alt2	B
Alt3	C
Alt4	D

40	Let P be a matrix of order $m \times n$ and Q be a matrix of order $n \times p$, $n \neq p$. If rank (P)=n and rank (Q) =p, then rank (PQ) is A: n B: p C: np D: $n+p$

Alt1	A
Alt2	B
Alt3	C
Alt4	D

41	Which one of the following is not a subspace of the vector space of n ×n matrices over a field F. A: The set of all upper (lower) triangular matrices of order n. B: The set of all non-singular (singular) matrices of order n. C: The set of all symmetric (skew-symmetric) matrices of order n. D: The set of all diagonal matrices of order n
Alt1	A
Alt2	B
Alt3	C
Alt4	D

42	Let T be a linear transformation of U into V. If U has finite dimension, then in dimension theorem, the $rank\,(T)$ is A: nullity(T). B: dim(U) C: dim(U) – nullity(T). D: dim(U) + nullity(T).
Alt1	A
Alt2	B
Alt3	C
Alt4	D

43	If V is finite dimensional vector space over a field F and if $T \in A(V)$ is non-invertible (singular), then there exists an $S \neq 0$ in $A(V)$ such that A: ST = 0 and TS = 1 B: ST = 1 and TS = 0 C: ST = TS = 1 D: ST = TS = 0
Alt1	A
Alt2	B
Alt3	C
Alt4	D

44	Let V be an inner product space over a field F. Then for all $x, y \in V$ and $\|\langle x, y\rangle\| = \|x\| \cdot \|y\|$ is A: Triangle inequality B: Cauchy-Schwarz inequality C: Holder's inequality D: Minkowski's inequality
Alt1	A
Alt2	B
Alt3	C
Alt4	D

45	If $\{v_1, v_2, \ldots\ldots v_n\}$ is an orthonormal set in an inner product space V and $v \in V$, then the Bessel's inequality is A: $\sum_{i=1}^{n} \|\langle v, v_i\rangle\|^2 \leq \|v + v_n\|^2$ B: $\sum_{i=1}^{n} \|\langle v, v_i\rangle\|^2 \leq \|v - v_n\|^2$ C: $\sum_{i=1}^{n} \|\langle v, v_i\rangle\|^2 \leq \|v\|^2$ D: $\sum_{i=1}^{n} \|\langle v, v_i\rangle\|^2 \geq \|v\|^2$
Alt1	A
Alt2	B

Alt3	C
Alt4	D

46	Mobius transformation takes A: circle into circle B: circle into line C: circle into square D: line into square
Alt1	A
Alt2	B
Alt3	C
Alt4	D

47	If z=a is an isolated singularity of f and $f(z) = \sum_{-\infty}^{\infty} a_n (z-a)^n$ is its Laurent expansion in ann(a; 0, R), then if a_n =0 for n<−1, z=a is _____ A: a pole of order m B: an essential singularity C: isolated singularity D: non-isolated singularity
Alt1	A
Alt2	B
Alt3	C
Alt4	D

48	What is the radius of convergence for power series $f(z) = \sum \frac{1}{n^p} z^n$? A: 1 B: 2 C: 3 D: ∞
Alt1	A
Alt2	B
Alt3	C
Alt4	D

49	$f(z) = \frac{\sin z}{(z-\pi)^2}$ have the pole of order_____ A: 1 B: 2 C: 3 D: 0
Alt1	A
Alt2	B
Alt3	C
Alt4	D

50	A coin is tossed 5 times and its outcomes are noted in a sequence . The total number of event points in this case is A: 10 B: 5 C: 32 D: 16
Alt1	A

Alt2	B
Alt3	C
Alt4	D

51	Two cards are drawn at random from a well shuffled pack of 52 playing cards. The probability that the both cards are of the same suit is A: 4/17 B: 3/17 C: 2/17 D: 1/17
Alt1	A
Alt2	B
Alt3	C
Alt4	D

52	Which of the following distribution does not have mean? A: Binomial distribution B: Poisson distribution C: Cauchy distribution D: Normal distribution
Alt1	A
Alt2	B
Alt3	C
Alt4	D

53	For a free particle (moving) A: kinetic energy is always constant B: potential energy is always constant C: Lagrangian is always constant D: Hamiltonian is always constant
Alt1	A
Alt2	B
Alt3	C
Alt4	D

54	The number of integral values of k for which the equation $7\cos x + 5\sin x = 2k+1$ has a solution is A: 4 B: 8 C: 10 D: 12
Alt1	A
Alt2	B
Alt3	C
Alt4	D

55	For linear congruence equation $ax \equiv b \pmod{m}$, where d=gcd (a, m), if d does note divide b, then the equation has A: unique solution B: no solution C: three solution D: exactly two solution
Alt1	A
Alt2	B

Alt3	C
Alt4	D

56	The common solution of $x \equiv 3 (\text{mod } 5)$ and $x \equiv 4 (\text{mod } 7)$ is A: $x \equiv 3 (\text{mod } 35)$ B: $x \equiv 4 (\text{mod } 35)$ C: $x \equiv 12 (\text{mod } 35)$ D: $x \equiv 18 (\text{mod } 35)$
Alt1	A
Alt2	B
Alt3	C
Alt4	D

57	Forces are called coplanar when all of them acting on body lie in A: parallel planes B: one position C: different planes D: one plane
Alt1	A
Alt2	B
Alt3	C
Alt4	D

58	Which model follows the changes over time that results from the system activates A: stationary model B: analytical model C: dynamic model D: numerical model
Alt1	A
Alt2	B

Alt3	C
Alt4	D

59	The angle between the two lines whose direction cosines are given by the equation l+m+n=0 and $l^2+m^2+n^2=0$ is A: $\pi/3$ or $2\pi/3$ B: $\pi/2$ or $3\pi/2$ C: $\pi/2$or $\pi/4$ D: π or 2π
Alt1	A
Alt2	B
Alt3	C
Alt4	D

60	If the function $x^4 - 62x^2 + ax + 9$ at $x = 1$ attains its maximum value in the interval $[0, 2]$, then the value of a. A: 9 B: 62 C: 120 D: 124
Alt1	A
Alt2	B
Alt3	C
Alt4	D

61	Degree of the differential equation $[1+(dy/dx)^3]^{2/3}= 2x(d^2y/dx^2)$ is A: 2 B: 3 C: 4 D: 6
Alt1	A
Alt2	B
Alt3	C
Alt4	D

62	The relation _____ is an implicit solution of the differential equation $\frac{dy}{dx} = -\frac{x}{y}$ on the interval defined by $-5 < x < 5$. A: $x^2 + y^2 + xy = 5$ B: $x^2 + y^2 - xy = 5$ C: $x^2 - y^2 = 10$ D: $x^2 + y^2 = 25$
Alt1	A
Alt2	B
Alt3	C
Alt4	D

63	What is the Cardinality of the Power set of the set {0, 1, 2}. A: 8 B: 7 C: 6 D: 5
Alt1	A
Alt2	B
Alt3	C

Alt4	D

64	Which one of the following is not a bipartite graph A: Even cycle B: odd cycle C: path D: tree
Alt1	A
Alt2	B
Alt3	C
Alt4	D

65	The equation of the plane passing through the three non-collinear points with position vectors $\vec{a}, \vec{b}, \vec{c}$ in vector form and $\vec{r}$ is the position vector of an arbitrary point on the plane is A: $[\vec{r}-\vec{a}, \vec{b}-\vec{a}, \vec{c}-\vec{a}] = 0$ B: $(\vec{r}-\vec{a}).(\vec{b}\times\vec{a}) = 0$ C: $[\vec{r}-\vec{a}, \vec{b}-\vec{a}, \vec{c}] = 0$ D: $[\vec{a}, \vec{b}, \vec{c}] = 0$
Alt1	A
Alt2	B
Alt3	C
Alt4	D

66	The Cayley-Hamilton theorem states that A: The eigen values of any matrix are linearly independent. B: Every square matrix satisfies its own characteristic equation. C: The characteristic equation of a matrix admits a non-zero solution D: Every characteristic roots of a non-singular matrix are distinct.
Alt1	A
Alt2	B
Alt3	C
Alt4	D

67	The value of $\lim_{x\to 0}\left(\frac{tanx}{x}\right)^{\frac{1}{x^2}}$ is A. 1 B: $e^{\frac{1}{3}}$ C: 0 D: ∞
Alt1	A
Alt2	B
Alt3	C
Alt4	D

68	The maximum value of $f(x) = sinx\ (1+\cos x)$ is A: $\frac{\pi}{2}$ B: $-\frac{\pi}{2}$ C: $-\frac{\pi}{3}$ D: $\frac{\pi}{3}$
Alt1	A
Alt2	B
Alt3	C

Alt4	D

69	The value of $\int \frac{dx}{x\cos^2(1+\log x)}$ is A: $\tan\ (1-\log x)\ + c.$ B: $\sec\ (1+\log x)\ +$ c. C: $\text{cosec}\ (1+\log x) +$ c. D: $\tan\ (1+\log x)\ +\ c.$
Alt1	A
Alt2	B
Alt3	C
Alt4	D

70	The value of $\int cos^{-1}(x)\ dx$ is A: $xcos^{-1}(x) - \sqrt{1-x^2}\ +\ c.$ B: $x\ cos^{-1}(x)\ +\ \sqrt{1-x^2}\ +\ c.$ C: $x\ sin^{-1}(x) - \sqrt{1-x^2}\ +\ c.$ D: $xtan^{-1}(x) - \sqrt{1-x^2}\ +\ c$
Alt1	A
Alt2	B
Alt3	C
Alt4	D

71	The value of $\int sech(x)\ dx$ is A: $cos^{-1}(e^x)\ +\ c.$ B: $sin^{-1}\ (e^x)\ + c.$ C: $2\ tan^{-1}(e^x)\ + c.$ D: $tan^{-1}(x)\ +\ \ c.$
Alt1	A
Alt2	B
Alt3	C

Alt4	D

72	If the points $(0,-1,\lambda)$, $(4,5,1,)$, $(3,9,4)$ and $(-4,4,4)$, are coplanar, then the value of λ is A: 2 B: 3 C: -2 D: -1
Alt1	A
Alt2	B
Alt3	C
Alt4	D

73	The equation of the plane passing through the point $(3,-3,1)$ and normal to the join of the points $(3,4,-1)$ and $(2,-1,5)$, is A: $2x+4y-4z+11=0$. B: $2x+y-6z+15=0$. C: $x+5y-6z+18=0$. D: $x+y-4z+7=0$
Alt1	A
Alt2	B
Alt3	C
Alt4	D

74	The equation of the sphere with centre at $(1, -1, 2)$ and touching the plane $2x - 2y + z = 3$, is A: $x^2 + y^2 + z^2 - 2x + 2y - 4z + 5 = 0$. B: $x^2 + y^2 + z^2 + 2x + y - 6z + 6 = 0$. C: $x^2 + y^2 + z^2 - x + 5y - 6z + 12 = 0$. D: $x^2 + y^2 + z^2 + x + y - 4z + 16 = 0$
Alt1	A
Alt2	B
Alt3	C
Alt4	D

75	The value of a such that $\vec{F} = (axy - z^2)\hat{i} + (x^2 + 2yz)\hat{j} + (y^2 - axz)\hat{k}$, being irrotational is, A: -2. B: 1. C: 2. D: -1
Alt1	A
Alt2	B
Alt3	C
Alt4	D

76	If $\vec{A}$ and $\vec{B}$ are irrotational vectors ,then $\vec{A} \times \vec{B}$ is, A: rotational. B: irrotational. C: solenoidal. D: constant.
Alt1	A
Alt2	B
Alt3	C

Alt4	D

77	The solution of the differential equation $\frac{dy}{dx} + \frac{1+y^2}{1+x^2} = 0$, is A: $tan^{-1}(y) + sec^{-1}(x) = c.$ B: $sin^{-1}(y) + tan^{-1}(x) = c.$ C: $cos^{-1}(y) + tan^{-1}(x) = c.$ D: $tan^{-1}(y) + tan^{-1}(x) = c.$
Alt1	A
Alt2	B
Alt3	C
Alt4	D

78	The solution of the differential equation $e^y\,dx + (xe^y + 2y)dy = 0$, is A: $x\,e^y + y^2 = c.$ B: $x\,e^y - y^2 = c.$ C: $ye^x - x^2 = c.$ D: $ye^x + x^2 = c.$
Alt1	A
Alt2	B
Alt3	C
Alt4	D

79	The singular solution of $y = px + {}^{a}/_{p}$, is A: $x^2 + y^2 = a^2.$ B: $y^2 = 4ax.$ C: $x^2 = 4ay.$ D: $x^2 - y^2 = a^2.$
Alt1	A
Alt2	B
Alt3	C
Alt4	D

80	The value of $\lim_{x\to\infty}[sinh^{-1}(x) - \log(x)]$ is A: log 2 B: 1 C: 0. D: ∞.
Alt1	A
Alt2	B
Alt3	C
Alt4	D

81	If each element of a group G except the identity element is of order 2, then A: G is a non-abelian group. B: G is a Hamiltonian group. C: G is an abelian group. D: G is an additive group.
Alt1	A
Alt2	B
Alt3	C
Alt4	D

82	If G is a finite group with two conjugate classes only, then O(G) is, A: 1. B: 0. C: 2. D: ∞.
Alt1	A
Alt2	B
Alt3	C

Alt4	D

83	If v_1 and v_2 are elements of an inner product space V, then $\|(v_1 + v_2)\|^2 + \|(v_1 - v_2)\|^2$ is equal to A: $2(\|v_1\|^2 - \|v_2\|^2)$ B: $2(\|v_1\|^2 + \|v_2\|^2)$ C: $\mathbf{2}(\|v_1\|^2$ D: $\mathbf{2}(\|v_2\|^2$
Alt1	A
Alt2	B
Alt3	C
Alt4	D

84	If T : V → V is a linear transformation and n(T) = $\mathbf{dim}(\boldsymbol{ker\,T})$ and r(T) = dim [V(T)], then r (T)+n(T), is equal to A: dim(ker T). B: dim [V(T)]. C: ϕ D: dim (V).
Alt1	A
Alt2	B
Alt3	C
Alt4	D

85	If C is the field of complex numbers, then the vectors (a_1, a_2) and (b_1, b_2) in V_2C:, are linearly dependent if A: $a_1 b_2 + a_2 b_1 = 0$. B: $a_1 b_2 + a_2 b_1 \neq 0$. C: $a_1 b_2 - a_2 b_1 = 0$. D: $a_1 a_2 + b_1 b_2 \neq 0$.
Alt1	A
Alt2	B
Alt3	C
Alt4	D

86	The value of $c \int \frac{e^z}{z} dz$, where C is the unit circle $\|z\| = 1$, is A: $2\pi i$. B: πi C: 1. D: $1 + \pi i$.
Alt1	A
Alt2	B
Alt3	C
Alt4	D

87	The residue of $\frac{z+1}{z^2-2z}$ at its poles are A: $(\frac{1}{2}, \frac{3}{2})$. B: $(-\frac{1}{2}, \frac{3}{2})$. C: $(-\frac{1}{2}, \frac{3}{4})$. D: $(\frac{1}{2}, \frac{3}{4})$.Ans : [b]
Alt1	A
Alt2	B

Alt3	C
Alt4	D

88	If the function $u(x,y) = ax^2 - y^2 + xy$, is harmonic, then the value of a , is A: 0. B: -1. C: -2. D: 1.
Alt1	A
Alt2	B
Alt3	C
Alt4	D

89	The invariant (or) fixed points of the bilinear transformation $\omega = \frac{1+z}{1-z}$ are A: i, i. B: 1, i. C: i, $-i$. D: $-i$, $-i$.
Alt1	A
Alt2	B
Alt3	C
Alt4	D

90	P and Q are two unlike parallel forces .When P is doubled, it is found that the line of action of Q is midway between the lines of action of P and the new resultant. Then P:Q is A: 1 : 4. B: 2 : 1. C: 2 : 3. D: 3 : 2.
Alt1	A
Alt2	B
Alt3	C
Alt4	D

91	For a particle executing a Simple Harmonic Motion, the period required to move from the position of maximum displacement to one in which the displacement is one-half the amplitude , is A: $\frac{1}{4}$ (period). B: $\frac{1}{2}$ (period). C: $\frac{1}{3}$(period). D: $\frac{1}{6}$ (period).
Alt1	A
Alt2	B
Alt3	C
Alt4	D

92	If one of the roots of the equation $3x^5 - 4x^4 - 42x^3 + 56x^2 + 27x - 36 = 0$, is $\sqrt{2} + \sqrt{5}$, then the roots of the equation are A: $\pm\sqrt{2} \pm \sqrt{5}, \frac{3}{4}$. B: $\pm\sqrt{2} \pm \sqrt{5}, \frac{1}{4}$. C: $\pm\sqrt{2} \pm \sqrt{5}, \frac{4}{3}$. D: $\pm\sqrt{2} \pm \sqrt{5}, \frac{3}{2}$.
Alt1	A
Alt2	B
Alt3	C
Alt4	D

93	If α, β, γ are the roots of the equation $x^3 + px^2 + qx + r = 0$, then the value of $\sum \alpha(\beta + \gamma)$ is A: $2p$. B: $2q$. C: $p + q$. D: $p - q$.
Alt1	A
Alt2	B
Alt3	C
Alt4	D

94	The probability that a company director will travel by train is $\frac{1}{5}$and byplane is $\frac{2}{3}$. The probability of his travel by train or plane is, A: $\frac{1}{6}$. B: $\frac{3}{5}$. C: $\frac{13}{15}$. D: $\frac{3}{7}$.
Alt1	A
Alt2	B
Alt3	C
Alt4	D

95	The two regression equations of the variables x and y are $x = 19.13 - 0.87\,y$and $y = 11.64 - 0.50\,x$. Then mean of x and mean of y are A: 10.20 , 11.04. B: 15.79, 3.74. C: 2.70, 3.40. D: 6.00 , 4.00.
Alt1	A
Alt2	B
Alt3	C
Alt4	D

96	The sequence $\{a_n\}$ defined by $a_1 = \frac{3}{2}, a_{n+1} = 2 - \frac{1}{a_n}$, for all n ≥ 1, is convergent, then the limit of the sequence is, A: 0 B: -1 C: 1 D: 2
Alt1	A
Alt2	B
Alt3	C
Alt4	D

97	The series $\frac{1}{1+x} + \frac{x}{1+x^2} + \frac{x^2}{1+x^3} + \cdots$ to ∞ A: converges if $x > 1$ and diverges if $x \leq 1$. B: converges if $x > 1$. C: converges if $x < 1$ and diverges if $x \geq 1$. D: diverges if $x < 1$.
Alt1	A
Alt2	B
Alt3	C
Alt4	D

98	The function $f: (0,2) \to R$ defined by $f(x) = \lvert x - 1 \rvert$, is A: continuous at $x = 1$ and differentiable at $x = 1$. B: not continuous at $x = 1$ and differentiable at $x = 1$. C: not continuous at $x = 1$ and not differentiable at $x = 1$. D: continuous at $x = 1$ and not differentiable at $x = 1$.
Alt1	A
Alt2	B

Alt3	C
Alt4	D

99	A body originally at 80°C cools down to 60°C in 20 minutes, the temperature of the air being 40°C. The temperature of the body after 40 minutes from the original is A: 45°C. B: 50°C. C: 53°C. D: 48°C
Alt1	A
Alt2	B
Alt3	C
Alt4	D

100	Bacteria in a certain culture increase at a rate proportional to the number present. If the number N increases from 1000 to 2000 in 1 hour. At the end of 1.5 hours, the number of bacteria present is A: 2256.76 B: 2356.76 C: 2828.42 D: 2528.42
Alt1	A
Alt2	B
Alt3	C
Alt4	D

Examination: **M.Sc. Mathematics**

Section 1 - Section 1

Question No.1 4.00

Bookmark

The integrating factor of the differential equation $(y \log y)\, dx = (\log y - x)\, dy$ is

- $1 + \log y$
- $\frac{1}{\log y}$
- $\log y$
- $\log(\log y)$

Question No.2 4.00

Bookmark

If the roots of the equation $x^n - 1 = 0$ are $1, a_1, a_2, \ldots, a_{n-1}$, then the value of $(1 - a_1)(1 - a_2) \cdots (1 - a_{n-1})$ is

- n^n
- n
- n^2
- 0

Question No.3 4.00

Bookmark

The set of all 2×2 matrices with real elements along with matrix addition

- form a semi group
- form a group
- form an abelian group
- form a monoid

Question No.4 4.00

Bookmark

A two digit number is three times the sum of its digits. If 45 is added to it, the digits are reversed. The number is

- 35
- 31
- 32
- 27

Question No.5 4.00

Bookmark

If in a certain language, GRASP is coded as BMVNK, which word would be coded as CRANE?

- HWFSJ
- XMVIZ
- FUDQH
- BQZMD

Question No.6 4.00

Bookmark

The solution of the differential equation is $\frac{dy}{dx} + \frac{y}{x} = \log x$ is

- $yx = \frac{x^2}{2}(\log x) - \frac{x^2}{4} + c$
- $x = \frac{x^2}{2}(\log x) + \frac{x^2}{4} + c$
- $yx = \frac{x^2}{2}(\log x) + c$
- $yx = \frac{x}{2}(\log x) - \frac{x^2}{4} + c$

Question No.7 4.00

Bookmark

Choose the correct meaning of the italicized idiom.
You cannot throw *dust into my eyes.*

- Hurt me
- Abuse me
- Terrify me
- Cheat me

Question No.8 4.00

Bookmark

The number of distinct real values of λ, for which the vectors $-\lambda^2\hat{i} + \hat{j} + \hat{k}$, $\hat{i} - \lambda^2\hat{j} + \hat{k}$ and $\hat{i} + \hat{j} - \lambda^2\hat{k}$ are coplanar, is

- $\sqrt{2}$
- 0
- $\sqrt{3}$
- 1

Question No.9 4.00

Bookmark

In the interval $(-3, 3)$, the function $f(x) = \frac{x}{3} + \frac{3}{x}$, $x \neq 0$ is

- increasing
- neither increasing nor decreasing
- partly increasing and partly decreasing
- decreasing

Question No.10 4.00

Bookmark

The value of x in $log_{\cos x} \sin x + log_{\sin x} \cos x = 2$ is

- $2n\pi + \frac{\pi}{4}$
- $2n\pi + \frac{\pi}{3}$
- $2n\pi + \frac{\pi}{6}$
- $2n\pi + \frac{\pi}{2}$

Question No.11 4.00

Bookmark

The value of $\int_{-20\pi}^{20\pi} |\cos x|\, dx$ is

- 80
- 0
- 20
- 40

Question No.12 4.00

Bookmark

If every element of a group G is its own inverse, then G is

- finite
- cyclic
- infinite
- abelian

Question No.13 4.00

Bookmark

$\int_0^{\frac{\pi}{2}} \frac{\cos x - \sin x}{1 + \cos x \sin x}\, dx$ is equal to

- $\frac{\pi}{2}$
- 0
- $\frac{\pi}{6}$
- $\frac{\pi}{4}$

Question No.14 4.00

Bookmark

If α, β are the roots of the equation $x^2 - 2x + 4 = 0$, then the value of $\alpha^6 + \beta^6$

If α, β are the roots of the equation $x^2 - 2x + 4 = 0$, then the value of $\alpha^3 + \beta^3$ is

- 256
- 64
- 32
- 128

Question No.15 4.00

Bookmark

Every bounded infinite set of $\mathbb{R}$ has

- at most one limit point in $\mathbb{R}$
- finite closure
- at least one limit point in $\mathbb{R}$
- no limit point in $\mathbb{R}$

Question No.16 4.00

Bookmark

If $\boldsymbol{v} = (x^2 + y^2 + z^2)^{-1/2}$, then $\frac{\partial^2 v}{\partial x^2} + \frac{\partial^2 v}{\partial y^2} + \frac{\partial^2 v}{\partial z^2}$ is equal to

- 1
- 0
- -1
- 2

Question No.17 4.00

Bookmark

If $u = x + y + z;\ v = x^2 + y^2 + z^2;\ w = yz + zx + xy$, then $(grad\ u)(grad\ v \times grad\ w)$ is equal to

- 2
- 0
- 1
- -1

Question No.18 4.00

Bookmark

Which number replaces the question mark?

- 10
- 9
- 11
- 12

Question No.19 4.00

Bookmark

Study the following information carefully and answer the question below it

(i) There is a group of five persons- A, B, C, D and E
(ii) One of them is manual scavenger, one is sweeper, one is watchman, one is human scarecrow and one is grave-digger
(iii) Three of them – A, C and grave-digger prefer tea to coffee and two of them – B and the watchman prefer coffee to tea
(iv) The human scarecrow and D and A are friends to one another but two of these prefer coffee to tea.
(v) The manual scavenger is C's brother

Who is a manual scavenger?

Who is a manual scavenger?

- A
- B
- C
- D

Question No.20 4.00

Bookmark

Choose the best antonym of the italicized word.
There are four chapters that are *extraneous* to the structure of the book.

- important
- relevant
- needful
- integral

Question No.21 4.00

Bookmark

With respect to addition, the set $\{0, 1, -1\}$ does NOT from a group, since it fails to satisfy

- associativity
- closure
- existence of identity
- existence of inverse

Question No.22 4.00

Bookmark

The differential equation of all non-vertical lines in a plane is

- $\frac{dx}{dy} = 0$
- $\frac{d^2y}{dx^2} = 0$
- $\frac{d^2x}{dy^2} = 0$
- $\frac{dy}{dx} = 0$

Question No.23 4.00

Bookmark

If $x^2 - 1$ is a factor of $x^4 + ax^3 + 3x - b$, then

- a = 3, b = 1
- a = −3, b = 1
- a = −3, b = −1
- a = 3, b = −1

Question No.24 4.00

Bookmark

$\int (\log\ x)^2 dx$ is equal to

- $x(\log\ x)^2 + c$

- $x(\log\ x)^2 + cx$
- $x(\log\ x)^2 - 2[x\log\ x - x] + c$
- $x(\log\ x)^2 + x\log\ x + c$

Question No.25 4.00

Bookmark

The value of determinant $\begin{bmatrix} 1 & 1 & 1 \\ e & \pi & \sqrt{2} \\ 2 & 2 & 2 \end{bmatrix}$ is equal to

- π
- e
- $2(e - \pi + \sqrt{2})$
- 0

Question No.26 4.00

Bookmark

If $A = \begin{bmatrix} \cos^2\alpha & \cos\alpha\sin\alpha \\ \cos\alpha\sin\alpha & \sin^2\alpha \end{bmatrix}$ and $B = \begin{bmatrix} \cos^2\beta & \cos\beta\sin\beta \\ \cos\beta\sin\alpha & \sin^2\beta \end{bmatrix}$ are two matrices such that AB is null matrix, then $\alpha - \beta$ is

- an even multiple of $\frac{\pi}{2}$
- an odd multiple of π
- $\alpha = \beta$
- 0

Question No.27 4.00

Bookmark

The angle between the planes $2x - y + z = 6$ and $x + y + 2z = 3$ is

- $\frac{\pi}{6}$
- $\frac{\pi}{2}$
- $\frac{\pi}{3}$
- $\frac{\pi}{4}$

Question No.28 4.00

Bookmark

The complex numbers $z_1 = 1 + 2i, z_2 = 4 - 2i$ and $z_3 = 1 - 6i$ form the vertices of a

- scalene triangle
- right angled triangle
- equilateral triangle
- isosceles triangle

Question No.29 4.00

Bookmark

The total number of terms in the expansion of $(x + y)^{100} + (x - y)^{100}$ after simplification is

- 51
- 100
- 50
- 202

Question No.30 4.00

Bookmark

Two finite sets X and Y have p and q elements respectively. If the total number of subsets of X is 56 more than the total number of subsets of Y. Then the value of q is

- 2
- 6
- 28
- 3

Question No.31 4.00

Bookmark

Choose the best synonym of the italicized word. The prisoners of war signed the document under *coercion*.

- supervision
- compulsion
- confusion
- security

Question No.32 4.00

Bookmark

The value of $\lim_{x \to 2} \frac{e^{3x-6}-1}{\sin(2-x)}$ is equal to

- 3/2
- -1
- -3
- 3

Question No.33 4.00

Bookmark

The order of the differential equation whose solution is $y = a\ \cos x + b\ \sin x + ce^{-x}$ is

- 3
- 2
- 1
- 4

Question No.34 4.00

Bookmark

If $\vec{a}, \vec{b}, \vec{c}$ are three non-coplanar mutually perpendicular unit vectors, then $[\vec{a}\ \ \vec{b}\ \ \vec{c}]$ is

- 1
- 2
- 0
- 3

Question No.35 4.00

Bookmark

If $y = \int^{x^3} \frac{dt}{\quad}$ then $\frac{dy}{\quad}$ is

If $y = \int_1^{1+t^4} \ldots$ then $\frac{dy}{dx}$ is

- $\frac{3x^3}{1+2x^{12}}$
- $\frac{x^2}{1+x^{12}}$
- $\frac{x^4}{1+x^8}$
- $\frac{3x^2}{1+x^{12}}$

Question No.36 4.00

Bookmark

Based on the information given answer the following question.
1. In a family of six persons, there are people from three generations. Each has separate professions and they like different colours. There are two couples.
2. Shyam is an Engineer and his wife is not a doctor and she does not like Red colour.
3. Chartered Accountant likes green colour and his wife is a teacher.
4. Manisha is the mother-in-law of Sunita and she likes orange colour.
5. Vimal is the grand father of Tarun and tarun is the Principal and likes black colour.
6. Nyna is the grand daughter of Manisha and she likes blue colour. Nyna's Mother likes white colour.

Which of the following is the correct pair of two couples?

- Shyam-Sunita, Vimal-Manisha
- Tarun-Nyna, Shyam-Sunita
- Shyam-Manisha, Vimal-Sunita
- Cannot be determined

Question No.37 4.00

Bookmark

Study the following information carefully and answer the question below it:

Aasha, Bhuvnesh,Charan, Danesh, Ekta, Farhan, Ganesh and Himesh are sitting around a circle, facing the centre. Aasha sits fourth to the right of Himesh while second to the left of Farhan. Charan is not the neighbour of Farhan and Bhuvnesh. Danesh sits third to the right of Charan. Himesh never sits next to Ganesh.

Who among the following sits between Ganesh and Danesh?

- Aasha
- Charan
- Ekta
- Bhuvnesh

Question No.38 4.00

Bookmark

Sum of the series $\frac{1}{1.2} + \frac{1}{3.4} + \frac{1}{5.6} + \ldots +$ is

- log 2
- 0
- e^{-1}
- $\sqrt{e}$

Question No.39 4.00

Bookmark

The set $\{z \in \mathbb{C} : 1 < |z| < 2\}$ is

- connected
- closed
- compact
- convex

Question No.40 4.00

Bookmark

The set $A = \{x \in \mathbb{R} : |x-1| + |x-2| < 3\}$ is

- neither open nor closed
- open
- closed
- open and closed

Question No.41 4.00

Bookmark

The value of $\Delta \tan^{-1} x$ is

- $\tan^{-1}(\frac{x^2}{1-hx})$
- $\tan^{-1}(\frac{x^2}{1+hx})$
- $\tan^{-1}(\frac{h}{1+hx+x^2})$
- $\tan^{-1}(\frac{h}{1-hx-x^2})$

Question No.42 4.00

Bookmark

Choose the missing term : AZ, GT, MN, ?, YB

- SH
- TS
- KE
- SX

Question No.43 4.00

Bookmark

If A+B means A is daughter of B,
A-B means A is husband of B
A × B means A is brother of B

From the statement P – Q + R × S, how is Q related to S?

- Niece
- Sister
- Mother
- None of these

Question No.44 4.00

Bookmark

Under addition, which one of the following statements is true ?

- 2Z is a cyclic subgroup of Z
- 2Z is a subgroup of Z but not cyclic
- Z is a cyclic subgroup of 2Z
- Z is a subgroup of 2Z

Question No.45 4.00

Bookmark

If $\vec{a} = 2\hat{i} + 3\hat{j} + \hat{k}, \vec{b} = 2\hat{i} - p\hat{j} + 3\hat{k}$ and $\vec{c} = 2\hat{i} + 17\hat{j} - 3\hat{k}$ are coplanar, then the value of p is

- -4
- 4
- -1
- -2

Question No.46 4.00

Bookmark

If $\vec{a}+\vec{b}+\vec{c}=0$ and $|\vec{a}|=3, |\vec{b}|=4$ and $|\vec{c}|=\sqrt{37}$, then the angle between $\vec{a}$ and $\vec{b}$ is

- $\frac{\pi}{3}$
- $\frac{\pi}{4}$
- $\frac{\pi}{6}$
- $\frac{\pi}{2}$

Question No.47 4.00

Bookmark

The value of $\int_0^{\frac{\pi}{2}} \frac{dx}{(\sqrt{\cos x}+\sqrt{\sin x})^4}$ is

- 3/4
- 1/3
- 1/2
- 2

Question No.48 4.00

Bookmark

If f is analytic and $f'(z)\neq 0$, then

- f is a constant function
- f is a non-conformal mapping
- f is the identity function
- f is a conformal mapping

Question No.49 4.00

Bookmark

If $\sec^{-1}\left(\frac{1+x}{1-y}\right) = a$, then $\frac{dy}{dx}$ is

- $\frac{x-1}{y+1}$
- $\frac{y+1}{x-1}$
- $\frac{y-1}{x+1}$
- $\frac{x-1}{y-1}$

Question No.50 4.00

Bookmark

The value of $\left(\frac{\Delta^2}{E}\right) e^x \frac{E\, e^x}{\Delta^2\, e^x}$ is

- e^x
- $1 + e^x$
- $\frac{1}{e^x}$
- e^{-x}

Question No.51 4.00

Bookmark

These boys need some new books, _____?

- don't they?
- is it?
- isn't it?
- do they?

Question No.52 4.00

Bookmark

The angle between the planes $2x - y + z = 6,\ x + y + 2z = 3$ is

- $\frac{\pi}{2}$
- $\frac{\pi}{4}$
- $\frac{\pi}{6}$
- $\frac{\pi}{3}$

Question No.53 4.00

Bookmark

If the coefficient of x^2 and x^3 in the expansion of $(3 + kx)^9$ are equal, then the value of k is

- -9/7
- 9/7
- -7/9
- 7/9

Question No.54 4.00

Bookmark

The value of $\nabla \times \nabla\varphi$ is

- -1
- 2
- 1
- 0

Question No.55 4.00

Bookmark

If probability of a defective bolt is 0.1, then mean and standard deviation of distribution of bolts in a total of 400 are

- 30, 3
- 40, 6
- 30, 4
- 40, 5

Question No.56 4.00

Bookmark

If $e^{\frac{dy}{dx}} = x + 1$, then y is equal to

- $x\log(x+1) + x + \log(x+1) + c$
- $x\log(x+1) + c$
- $x\log(x+1) - x + \log(x+1) + c$
- $-x + \log(x+1) + c$

Question No.57 4.00

Bookmark

The solution of the differential equation $(2x\log y)\,dx + \left(\frac{x^2}{y} + 3y^2\right)dy = 0$ is

- $x^2(\log y) + y^2 + c$
- $x(\log y) - y^2 + c$
- $x^2(\log y) + y^3 + c$
- $x^2(\log y) - y^2 + c$

Question No.58 4.00

Bookmark

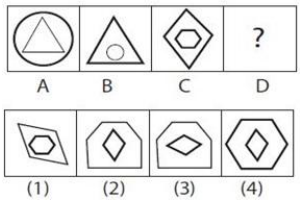
The solution of the differential equation $ydx - xdy + xy^2dx = 0$ is

- $\frac{x}{y} + \frac{x^2}{2} = \lambda$
- $2x \quad x^2$

- $\frac{}{y^2} + \frac{}{4} = \lambda$
- $\frac{x}{y} + x^2 = \lambda$
- $\frac{x}{2y^2} + \frac{x^2}{4} = \lambda$

Question No.59 4.00

Bookmark



- 2
- 4
- 3
- 1

Question No.60 4.00

Bookmark

Find the value of $\sum_{r=2}^{43} \frac{1}{log_r n}$ is

- $log_{n^{(43)!}}$
- 1
- $(43)!$
- $log_{r^{43!}}$

Question No.61 4.00

Bookmark

The locus of the centers of the circles which touch both the axes is given by

- $x^2 - y^2 = 1$
- $x^2 + y^2 = 1$
- $x^2 + y^2 = 0$
- $x^2 - y^2 = 0$

Question No.62 4.00

Bookmark

If the length of the pendulum is increased in the ratio 900 : 901, then the seconds, a clock would lose per day, is

- 5 seconds
- 2 seconds
- 1 second
- 4 seconds

Question No.63 4.00

Bookmark

Choose the best antonym of the italicized word.
Many snakes are actually *innocuous*.

- harmful
- deadly
- poisonous
- ferocious

Question No.64 4.00

Bookmark

The set of congruent 8 classes $\{[1], [3], [5], [7]\}$ under multiplication modulo 8 forms

- a cyclic group
- a monoid
- a semi group
- an abelian group

Question No.65 4.00

Bookmark

The value of $\int_0^{\frac{\pi}{6}} cos^4\ 3\theta sin^3 6\theta\ d\theta$ is

- 1/6
- 2/5
- 1/15
- 1/3

Question No.66 4.00

Bookmark

The value of $\lim_{n\to\infty}\ n^{\ 1/n}$ is equal to

- 0
- 1
- 2
- -1

Question No.67 4.00

Bookmark

The coefficient of x^6 in $\{(1+x)^6 + (1+x)^7 + \ldots + (1+x)^{15}\}$ is

- $^{16}C_6\ - 1$
- $^{16}C_9$
- $^{16}C_5\ -\ ^6C_5$
- $^{16}C_6\ -\ ^6C_5$

Question No.68 4.00

Bookmark

If the point P(4,3) is shifted by a distance $\sqrt{2}$ unit parallel to the line $y = x$, then the coordinates of P in new position is

- (5,4)
- $(5-\sqrt{2}, 4-\sqrt{2})$
- (-5, -4)
- $(5+\sqrt{2}, 4+\sqrt{2})$

Question No.69 4.00

Bookmark

The middle term in the expansion of $(x-\frac{1}{x})^{18}$ is

- $-{}^{18}C_9$
- ${}^{9}C_1$
- ${}^{18}C_9$
- $-{}^{18}C_{10}$

Question No.70 4.00

Bookmark

If a function $f(z)$ is continuous at z_0, then

- $f(z)$ is differentiable at z_0
- $f(z)$ is analytic at z_0
- $f(z)$ need not be differentiable at z_0
- $f'(z)$ is continuous

Question No.71 4.00

Bookmark

$\int \frac{(x^3+3x^2+3x+1)}{(x+1)^5}dx$ is equal to

- $-\frac{2}{\quad}+c$

$x+1$

- $\frac{1}{x^2+1}+c$
- $\frac{2}{x^2+1}+c$
- $-\frac{1}{x+1}+c$

Question No.72 4.00

Bookmark

A square ABCD of diagonal $2a$ is folded along the diagonal AC so that the planes DAC, BAC are at right angles. The shortest distance between DC and AB is

- $\frac{a}{\sqrt[2]{3}}$
- $\frac{a}{\sqrt{3}}$
- $\frac{2a}{\sqrt{3}}$
- $\frac{a^2}{\sqrt{3}}$

Question No.73 4.00

Bookmark

Choose the correct meaning of the italicized idiom.
Those who work by *fits and start* seldom show good results.

- Regularly
- Rarely
- Irregularly
- Disinterestedly

Question No.74 4.00

Bookmark

If $f(x) = 2x^3 + 9x^2 + \lambda x + 20$ is a decreasing function of x in the largest possible interval (-2,-1), then λ is equal to

- 6
- 12
- -6
- -12

Question No.75 4.00

Bookmark

The angle between the lines $\frac{x-6}{2} = \frac{y-2}{1} = \frac{z+4}{-1}$ and $x + 5y - 2z - 6 = 0$; $6x - 4y + 5z - 2 = 0$ is

- $\frac{\pi}{2}$
- $\frac{\pi}{6}$
- π

- $\frac{\pi}{3}$
- $\frac{\pi}{4}$

Question No.76 4.00

Bookmark

If a tangent plane to the sphere $x^2 + y^2 + z^2 = r^2$ makes intercepts a, b, c on the coordinates axes, then

- $\frac{a^2}{b^2} + \frac{b^2}{c^2} + \frac{c^2}{a^2} = \frac{1}{r^2}$
- $\frac{a}{b} + \frac{b}{c} + \frac{c}{a} = \frac{1}{r}$
- $a^2 + b^2 + c^2 = r^2$
- $\frac{1}{a^2} + \frac{1}{b^2} + \frac{1}{c^2} = \frac{1}{r^2}$

Question No.77 4.00

Bookmark

Since the _____ of the motor car, road accidents have increased dramatically.

- inauguration
- inception
- advent
- initiation

Question No.78 4.00

Bookmark

An urn contains 3 red and 5 blue balls. The probability that two balls are drawn in which 2nd ball drawn is blue without replacement is

- 5/8
- 5/16
- 5/56
- 20/56

Question No.79 4.00

Bookmark

In recent times, the number of cases of death by poisoning _____ sharply.

- increased
- has increased
- had increased
- have increased

Question No.80 4.00

Bookmark

The set $A = \{m + n\sqrt{2} : m, n \in \mathbb{Z}\}$

- has irrational limit points
- has no limit point
- is dense in $\mathbb{R}$
- has rational limit points

Question No.81 4.00

Bookmark

$\int_{-2}^{2} |[x]|\, dx$ is equal to

- 0
- 2
- 4
- 1

Question No.82 4.00

Bookmark

The equation of the normal to the curve $y = \sin x$ at $(0, 0)$ is

- x - y = 0
- x + y = 0
- x = 0
- y = 0

Question No.83 4.00

Bookmark

Let $f(z) = |z|^2$ for $z \in \mathbb{C}$. Then

- f is continuous at 0 but is not differentiable at 0
- f is analytic at 0
- f is differentiable at 0 but is not analytic at 0
- f is not continuous at 0

Question No.84 4.00

Bookmark

The direction cosines of the line joining the points $(3, -5, 4)$ and $(1, -8, -2)$ are

- $-\frac{2}{7}, -\frac{3}{7}, -\frac{6}{7}$
- $\frac{2}{5}, \frac{3}{5}, \frac{6}{5}$
- $-\frac{2}{5}, -\frac{3}{5}, -\frac{6}{5}$
- $\frac{2}{7}, \frac{3}{7}, \frac{6}{7}$

Question No.85 4.00

Bookmark

The solution set of the equation $\begin{bmatrix} 2 & 3 & x \\ 2 & 1 & x^2 \\ 6 & 7 & 3 \end{bmatrix} = 0$ is

- {1,−1}
- ϕ
- {0, 1}
- {1,−3}

Question No.86 4.00

Bookmark

Statement: "A Car is required on rent"-An Advertisement
Assumptions:
I. All types of Vehicles are available on Rent
II. People will respond to the advertisements

- If neither I nor II is implicit
- If both I and II are implicit
- If only assumption I is implicit
- If only assumption II is implicit

Question No.87 4.00

Bookmark

The probability that a man will live 10 more years, is $\frac{3}{5}$ and the probability that his wife will live 10 more years, is $\frac{2}{7}$. Then the probability that none of them will be alive after 10 years is

- 2/5

- 3/5
- 2/7
- 5/7

Question No.88 4.00

Bookmark

The product of all values of $(cos\ \alpha + i\ sin\ \alpha)^{\frac{3}{5}}$ is

- 1
- $cos\ 5\alpha + i\ sin\ 5\alpha$
- $cos\ \alpha + i\ sin\ \alpha$
- $cos\ 3\alpha + i\ sin\ 3\alpha$

Question No.89 4.00

Bookmark

The system of linear equations

$x_1 + 2x_2 + x_3 = 3$

$2x_1 + 3x_2 + x_3 = 3$

$3x_1 + 5x_2 + 2x_3 = 1$ has

- exactly 3 solutions
- infinite number of solutions
- a unique solution
- no solution

Question No.90 4.00

Bookmark

The sequence $\{\sqrt{n+1} - \sqrt{n}\}$ converges to

- 1
- 1/2
- -1
- 0

Question No.91 4.00

Bookmark

A fair die is rolled until a number greater than 4 appears. The probability that an even number of rolls shall be required , is

- 3/5
- 1/2
- 2/3

1/5

Question No.92 4.00

Bookmark

If $x^y y^x = 100$, then $\frac{dy}{dx}$ is equal to

- $-\frac{y}{x}$
- $-\frac{y(y+x\log y)}{x(y\log x+x)}$
- $-\frac{y(x+y)\log x}{x(x\log y+y)}$
- $-\frac{x}{y}$

Question No.93 4.00

Bookmark

Statements: All tools are books, Some books are pens.
Conclusion:
I. Some tools are pen
II. Some pens are books

- If only conclusion I follows
- If either I or II follows
- If neither I nor II follows
- If only conclusion II follows

Question No.94 4.00

Bookmark

If α, β, γ are roots of the equation $X^3 + 64 = 0$, then equation whose roots are $(\frac{\alpha}{\beta})^2$ and $(\frac{\alpha}{\gamma})^2$ is

- $x^2 + 4x + 16 = 0$
- $x^2 - 4x + 16 = 0$

- $x^2 + x + 1 = 0$
- $x^2 - x + 1 = 0$

Question No.95 4.00

Bookmark

If the matrix $\begin{bmatrix} a & b \\ c & d \end{bmatrix}$ is commutative with the matrix $\begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix}$, then

- d = 0, a = b
- c = 0, d = a
- a = 0, b = c
- b = 0, c = d

Question No.96 4.00

Bookmark

If $|\vec{a}| = |\vec{b}| = |\vec{a} + \vec{b}| = 1$, then $|\vec{a} - \vec{b}|$ is equal to

- $\sqrt{3}$
- $\sqrt{2}$
- 1
- 2

Question No.97 4.00

Bookmark

If $x^x y^y z^z = c$, then $\frac{\partial z}{\partial x}$ is equal to

- $\frac{1+\log x}{1+\log z}$
- $-\frac{1+\log x}{1+\log z}$
- $\frac{1+\log z}{1+\log x}$
- $\frac{1-\log z}{1-\log x}$

Question No.98 4.00

Bookmark

If 5 men or 8 boys can do a work in 84 days. In how many days can 10 men and 5 boys can do the same work?

- 32
- 28
- 35
- 25

Question No.99 4.00

Bookmark

The series $\frac{1}{1.2} + \frac{1}{2.3} + \frac{1}{3.4} + \ldots\ldots\ldots\infty$ is a

- Oscillatory series
- Divergent but not Oscillatory
- Convergent series
- Divergent series

Question No.100 4.00

Bookmark

The line $\frac{x-1}{2} = \frac{y-3}{3} = \frac{z-4}{-1}$ is parallel to the plane

- x + 2y + 4z + 7 = 0
- x - 2y - 4z + 7 = 0
- x - 2y + 4z - 7 = 0
- x + 2y + 4z - 7 = 0