GATE 2015 MA

AI25BTECH11012 - UNNATHI GARIGE

Q.1-Q.5 carry one mark each.

1) Choose the appropriate word/phrase, out of the four options given below, to complete the following sentence:
   Apparent lifelessness ___________ dormant life. GATE MA 2015

   a) harbours b) leads to c) supports d) affects

2) Fill in the blank with the correct idiom/phrase. GATE MA 2015 That boy from the town was a ___________ in the sleepy village. GATE MA 2015

   a) dog out of herd
   b) sheep from the heap
   c) fish out of water
   d) bird from the flock

3) Choose the statement where underlined word is used correctly. GATE MA 2015
   a) When the teacher eludes to different authors, he is being elusive.
   b) When the thief keeps eluding the police, he is being elusive.
   c) Matters that are difficult to understand, identify or remember are allusive.
   d) Mirages can be allusive, but a better way to express them is illusory.
4) Tanya is older than Eric. Cliff is older than Tanya. Eric is older than Cliff.
   If the first two statements are true, then the third statement is: GATE MA 2015
   a) True
   b) False
   c) Uncertain
   d) Data insufficient
5) Five teams have to compete in a league, with every team playing every other team exactly once, before going to the next round. How many matches will have to be held to complete the league round of matches? GATE MA 2015

   a) 20 b) 10 c) 8 d) 5

Q.6-Q.10 carry two mark each.

6) Select the appropriate option in place of underlined part of the sentence.
   Increased productivity necessary reflects greater efforts made by the employees.
   a) Increase in productivity necessary GATE MA 2015
   b) Increase productivity is necessary
   c) Increase in productivity necessarily
   d) No improvement required
7) Given below are two statements followed by two conclusions. Assuming these statements to be true, decide which one logically follows. GATE MA 2015
   Statements:

I. No manager is a leader.
II. All leaders are executives.

Conclusions:

I. No manager is an executive.
II. No executive is a manager.

a) Only conclusion I follows.
b) Only conclusion II follows.
c) Neither conclusion I nor II follows.
d) Both conclusions I and II follow.

8) In the given figure angle Q is a right angle. $PS : QS = 3 : 1$, $RT : QT = 5 : 2$ and $PU : UR = 1 : 1$. If area of triangle QTS is $20\,\text{cm}^2$, then the area of triangle PQR in cm^2 is ____________. GATE MA 2015

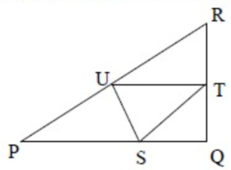

Fig. 8.1

9) constructed in the xy-plane so that the right angle is at P and line PR is parallel to the x-axis. The x and y coordinates of P, Q, and R are to be integers that satisfy the inequalities: $-4 \leq x \leq 5$ and $6 \leq y \leq 16$. How many different triangles could be constructed with these properties? GATE MA 2015

a) 110 b) 1100 c) 9900 d) 10000

10) A coin is tossed thrice. Let X be the event that head occurs in each of the first two tosses. Let Y be the event that a tail occurs on the third toss. Let Z be the event that two tails occur in three tosses. Based on the above information, which one of the following statements is TRUE? GATE MA 2015

a) X and Y are not independent
b) Y and Z are dependent
c) Y and Z are independent
d) X and Z are independent

Q.11 to Q.35 carry one mark each.

11) Let $T : \mathbb{R}^4 \to \mathbb{R}^4$ be a linear map defined by GATE MA 2015

$$T(x, y, z, w) = (x + z,\ 2x + y + 3z,\ 2y + 2z, w).$$

Then the rank of T is equal to ____________.

12) Let M be a 3×3 matrix and suppose that $1, 2$ and 3 are the eigenvalues of M. If GATE MA 2015

$$M^{-1} = \frac{M^2 - M + I_3}{\alpha}$$

for some scalar $\alpha \neq 0$, then α is equal to ___________.

13) Let M be a 3×3 singular matrix and suppose that 2 and 3 are eigenvalues of M. Then the number of linearly independent eigenvectors of $M^3 + 2M + I_3$ is equal to ___________. GATE MA 2015

14) Let M be a 3×3 matrix such that $M \begin{pmatrix} -2 \\ 1 \\ 0 \end{pmatrix} = \begin{pmatrix} 6 \\ -3 \\ 0 \end{pmatrix}$ and suppose that $M^3 \begin{pmatrix} 1 \\ -1/2 \\ 0 \end{pmatrix} = \begin{pmatrix} \alpha \\ \beta \\ \gamma \end{pmatrix}$ for some $\alpha, \beta, \gamma \in \mathbb{R}$. Then $|\alpha|$ is equal to ___________. GATE MA 2015

15) Let $f : [0, \infty) \to \mathbb{R}$ be defined by

$$f(x) = \int_0^x \sin^2(t^2)\, dt.$$

Then the function f is: GATE MA 2015

a) uniformly continuous on $[0, 1]$ but NOT on $(0, \infty)$
b) uniformly continuous on $(0, \infty)$ but NOT on $[0, 1]$
c) uniformly continuous on both $[0, 1]$ and $(0, \infty)$
d) neither uniformly continuous on $[0, 1]$ nor uniformly continuous on $(0, \infty)$

16) Consider the power series $\sum_{n=0}^{\infty} a_n z^n$, where GATE MA 2015

$$a_n = \begin{cases} \frac{1}{3^n} & \text{if } n \text{ is even} \\ \frac{1}{5^n} & \text{if } n \text{ is odd} \end{cases}$$

The radius of convergence of the series is equal to ___________.

17) Let $C = \{z \in \mathbb{C} : |z - i| = 2\}$. Then GATE MA 2015

$$\frac{1}{2\pi i} \oint_C \frac{z^2 - 4}{z^2 + 4}\, dz$$

is equal to ___________.

18) Let $X \sim B\left(5, \frac{1}{2}\right)$ and $Y \sim U(0, 1)$. Then GATE MA 2015

$$\frac{P(X + Y \leq 2)}{P(X + Y \geq 5)}$$

is equal to ___________.

19) Let the random variable X have the distribution function GATE MA 2015

$$F(x) = \begin{cases} 0 & \text{if } x < 0 \\ \frac{x}{2} & \text{if } 0 \leq x < 1 \\ \frac{3}{5} & \text{if } 1 \leq x < 2 \\ \frac{1}{2} + \frac{x}{8} & \text{if } 2 \leq x < 3 \\ 1 & \text{if } x \geq 3 \end{cases}$$

Then $P(2 \leq X < 4)$ is equal to ___________.

20) Let X be a random variable having the distribution function GATE MA 2015

$$F(x) = \begin{cases} 0 & \text{if } x < 0 \\ \frac{1}{4} & \text{if } 0 \leq x < 1 \\ \frac{1}{3} & \text{if } 1 \leq x < 2 \\ \frac{1}{2} & \text{if } 2 \leq x < \frac{11}{3} \\ 1 & \text{if } x \geq \frac{11}{3} \end{cases}$$

Then $E(X)$ is equal to ___________.

21) In an experiment, a fair die is rolled until two sixes are obtained in succession. The probability that the experiment will end in the fifth trial is equal to GATE MA 2015

a) $\frac{125}{6^5}$ b) $\frac{150}{6^5}$ c) $\frac{175}{6^5}$ d) $\frac{200}{6^5}$

22) Let $x_1 = 2.2,\ x_2 = 4.3,\ x_3 = 3.1,\ x_4 = 4.5,\ x_5 = 1.1,\ x_6 = 5.7$ be the observed values of a random sample of size 6 from a $U(0 - \theta, 0 + \theta)$ distribution, where $\theta \in (0, \infty)$ is unknown. Then a maximum likelihood estimate of θ is equal to

. GATE MA 2015

a) 1.8 b) 2.3 c) 3.1 d) 3.6

23) Let $\Omega = \{(x, y) \in \mathbb{R}^2 \mid x^2 + y^2 < 1\}$ be the open unit disc in $\mathbb{R}^2$ with boundary $\partial\Omega$. If $u(x, y)$ is the solution of the Dirichlet problem

$$\begin{cases} u_{xx} + u_{yy} = 0 & \text{in } \Omega \\ u(x, y) = 1 - 2y^2 & \text{on } \partial\Omega \end{cases}$$

then $u\left(\frac{1}{2}, 0\right)$ is equal to GATE MA 2015

a) -1 b) $-\frac{1}{4}$ c) $\frac{1}{4}$ d) 1

24) Let $c \in \mathbb{Z}$ be such that

$$\frac{\mathbb{Z}(x)}{x^2 + x + c}$$

is a field. Then c is equal to ___________. GATE MA 2015

25) Let $V = C^1[0,1]$, $X = (C[0,1], \ \|\cdot\|\infty)$ and $Y = (C[0,1], \ \|\cdot\|2)$.
Then V is GATE MA 2015

a) dense in X but NOT in Y
b) dense in Y but NOT in X
c) dense in both X and Y
d) neither dense in X nor dense in Y

26) Let $T : (C[0,1], \|\cdot\|\infty) \to \mathbb{R}$ be defined by $T(f) = \int_0^1 2xf(x)\,dx$ for all $f \in C[0,1]$. Then $\|T\|$ is equal to ___________. GATE MA 2015

27) Let τ_1 be the usual topology on $\mathbb{R}$. Let τ_2 be the topology on $\mathbb{R}$ generated by

$$\mathcal{B} = \{[a,b) \subset \mathbb{R} : -\infty < a < b < \infty\}.$$

Then the set $\left\{x \in \mathbb{R} : 4\sin^2 x \leq 1\right\} \cup \left\{\frac{\pi}{2}\right\}$ is GATE MA 2015

a) closed in $(\mathbb{R}, \tau_1)$ but NOT in $(\mathbb{R}, \tau_2)$
b) closed in $(\mathbb{R}, \tau_2)$ but NOT in $(\mathbb{R}, \tau_1)$
c) closed in both $(\mathbb{R}, \tau_1)$ and $(\mathbb{R}, \tau_2)$
d) neither closed in $(\mathbb{R}, \tau_1)$ nor closed in $(\mathbb{R}, \tau_2)$

28) Let X be a connected topological space such that there exists a non-constant continuous function $f : X \to \mathbb{R}$, where $\mathbb{R}$ is equipped with the usual topology. Let $f(X) = \{f(x) : x \in X\}$. Then GATE MA 2015

a) X is countable but $f(X)$ is uncountable
b) closed in $(\mathbb{R}, \tau_2)$ but NOT in $(\mathbb{R}, \tau_1)$
c) both $f(X)$ and X are countable
d) both $f(X)$ and X are uncountable

29) Let d_1 and d_2 denote the usual metric and the discrete metric on $\mathbb{R}$, respectively. Let $f : (\mathbb{R}, d_1) \to (\mathbb{R}, d_2)$ be defined by $f(x) = x$, $x \in \mathbb{R}$. Then GATE MA 2015

a) f is continuous but f^{-1} is NOT continuous
b) f^{-1} is continuous but f is NOT continuous
c) both f and f^{-1} are continuous
d) neither f nor f^{-1} is continuous

30) If the trapezoidal rule with single interval $[0,1]$ is exact for approximating the integral

$$\int_0^1 (x^3 - cx^2)\,dx,$$

then the value of c is equal to ___________. GATE MA 2015

31) Suppose that the Newton-Raphson method is applied to the equation $2x^2+1-e^{x^2} = 0$ with an initial approximation x_0 sufficiently close to zero. Then, for the root $x = 0$, the order of convergence of the method is equal to ___________ . GATE MA 2015

32) The minimum possible order of a homogeneous linear ordinary differential equation with real constant coefficients having $x^2 \sin(x)$ as a solution is equal to ___________ . GATE MA 2015

33) The Lagrangian of a system in terms of polar coordinates (r, θ) is given by

$$L = \frac{1}{2}m\dot{r}^2 + \frac{1}{2}m(\dot{r}^2 + r^2\dot{\theta}^2) - mgr(1 - \cos(\theta)),$$

where m is the mass, g is the acceleration due to gravity and $\dot{s}$ denotes the derivative of s with respect to time. Then the equations of motion are GATE MA 2015

a) $2\ddot{r} = r\dot{\theta}^2 - g\,(1-\cos(\theta)),\ \frac{d}{dt}(r^2\dot{\theta}) = -g\,r\,\sin(\theta)$
b) $2\ddot{r} = r\dot{\theta}^2 + g\,(1-\cos(\theta)),\ \frac{d}{dt}(r^2\dot{\theta}) = -g\,r\,\sin(\theta)$
c) $\ddot{r} = r\dot{\theta}^2 - g\,(1-\cos(\theta)),\ \frac{d}{dt}(r^2\dot{\theta}) = g\,r\,\sin(\theta)$
d) $\ddot{r} = r\dot{\theta}^2 + g\,(1-\cos(\theta)),\ \frac{d}{dt}(r^2\dot{\theta}) = g\,r\,\sin(\theta)$

34) If $y(x)$ satisfies the initial value problem GATE MA 2015

$$(x^2 + y)dx = x\,dy, \qquad y(1) = 2,$$

then $y(2)$ is equal to ___________

35) It is known that Bessel functions $I_n(x)$, for $n \geq 0$, satisfy the identity

$$e^{\frac{x}{2}(t-\frac{1}{t})} = J_0(x) + \sum_{n=1}^{\infty} J_n(x)\left(t^n + \frac{(-1)^n}{t^n}\right)$$

for all $t > 0$ and $x \in \mathbb{R}$. The value of $J_0\left(\frac{\pi}{2}\right) + 2\sum_{n=1}^{\infty} J_{2n}\left(\frac{\pi}{2}\right)$ is equal to ___________ . GATE MA 2015

Q.36 to Q.65 carry two marks each.

36) Let X and Y be two random variables having the joint probability density function

$$f(x,y) = \begin{cases} 2 & \text{if } 0 < x < y < 1 \\ 0 & \text{otherwise} \end{cases}$$

Then the conditional probability $P\left(X \leq \frac{2}{3} \;\middle|\; Y = \frac{3}{4}\right)$ is equal to GATE MA 2015

a) $\frac{5}{9}$ b) $\frac{2}{3}$ c) $\frac{7}{9}$ d) $\frac{8}{9}$

37) Let $\Omega = [0, 1]$ be the sample space and let $P(\cdot)$ be a probability function defined by

$$P((0,x]) = \begin{cases} \frac{1}{2} & \text{if } 0 \leq x \leq \frac{1}{2} \\ x & \text{if } \frac{1}{2} < x \leq 1 \end{cases}$$

Then $P\left(\left(0, \frac{1}{2}\right]\right)$ is equal to ___________ GATE MA 2015

38) Let X_1, X_2, X_3 be independent and identically distributed random variables with $E(X_1) = 0$ and $E(X_1^2) = \frac{15}{4}$. If $\psi : (0, \infty) \to (0, \infty)$ is defined through the conditional expectation

$$\psi(t) = E(X_1^2 \mid X_1^2 + X_2^2 + X_3^2 = t), \quad t > 0,$$

then $E\left(\psi((X_1^2 + X_2^2))\right)$ is equal to ___________ GATE MA 2015

39) Let $X \sim \text{Poisson}(\lambda)$, where $\lambda > 0$ is unknown. If $f(X)$ is the unbiased estimator of $g(\lambda) = e^{-\lambda}(3\lambda^2 + 2\lambda + 1)$, then $\sum_{k=0}^{\infty} \delta(k)$ is equal to ___________ . GATE MA 2015

40) Let $x_1, \ldots, x_n$ be a random sample from $N(\mu, 1)$ distribution, where $\mu \in \{0, \frac{1}{2}\}$. For testing the null hypothesis $H_0 : \mu = 0$ against the alternative hypothesis $H_1 : \mu = \frac{1}{2}$, consider the critical region

$$R = \left\{(x_1, x_2, \ldots, x_n) : \sum_{i=1}^{n} x_i > c\right\}$$

where c is some real constant. If the critical region R has size 0.025 and power 0.7054, then the value of the sample size n is equal to ___________ . GATE MA 2015

41) Let X and Y be independently distributed central chi-squared random variables with degrees of freedom m (≥ 3) and n (≥ 3) respectively. If $E\left(\frac{X}{X+Y}\right) = \frac{3}{7}$ and $m + n = 14$, then $E\left(\frac{Y}{X+Y}\right)$ is equal to GATE MA 2015

a) $\frac{2}{7}$ b) $\frac{3}{14}$ c) $\frac{4}{7}$ d) $\frac{5}{7}$

42) Let $X_1, X_2, \ldots$ be a sequence of independent and identically distributed random variables with

$$P(X_1 = 1) = \frac{1}{4} \quad \text{and} \quad P(X_1 = 2) = \frac{3}{4}.$$

If $X_n = \frac{1}{n}\sum_{i=1}^{n} X_i$, for $n = 1, 2, \ldots$, then $\lim_{n\to\infty} P(X_n \leq 1.8)$ is equal to ___________ GATE MA 2015

43) Let $u(x, y) = 2f(y)\cos(x - 2y)$, $(x, y) \in \mathbb{R}^2$, be a solution of the initial value problem

$$2u_x + u_y = u,$$
$$u(x, 0) = \cos(x).$$

Then $f(1)$ is equal to GATE MA 2015

a) $\frac{1}{2}$ b) $\frac{i}{2}$ c) e d) $\frac{3e}{2}$

44) Let $u(x, t)$, $x \in \mathbb{R}$, $t \geq 0$, be the solution of the initial value problem

$$u_{tt} = u_{xx}$$
$$u(x, 0) = x$$
$$u_t(x, 0) = 1$$

Then $u(2,2)$ is equal to ___________ GATE MA 2015

45) Let $W = \text{Span}\left\{\frac{1}{\sqrt{2}}(0,0,1,1), \frac{1}{\sqrt{2}}(1,-1,0,0)\right\}$ be a subspace of the Euclidean space $\mathbb{R}^4$. Then the square of the distance from the point $(1,1,1,1)$ to the subspace W is equal to ___________ GATE MA 2015

46) Let $T : \mathbb{R}^4 \to \mathbb{R}^4$ be a linear map such that the null space of T is

$$\left\{(x,y,z,w) \in \mathbb{R}^4 : x + y + z + w = 0\right\}$$

and the rank of $(T - 4I_4)$ is 3. If the minimal polynomial of T is $x(x-4)^2$, then α is equal to ___________ GATE MA 2015

47) Let M be an invertible Hermitian matrix and let $x, y \in \mathbb{R}$ be such that $x^2 < 4y$. Then GATE MA 2015
   a) both $M^2 + xM + yI$ and $M^2 - xM + yI$ are singular
   b) $M^2 + xM + yI$ is singular but $M^2 - xM + yI$ is non-singular
   c) $M^2 + xM + yI$ is non-singular but $M^2 - xM + yI$ is singular
   d) both $M^2 + xM + yI$ and $M^2 - xM + yI$ are non-singular

48) Let $G = \{e, x, x^2, x^3, y, xy, x^2y, x^3y\}$ with $o(x) = 4, o(y) = 2$ and $xy = yx^3$. Then the number of elements in the center of the group G is equal to GATE MA 2015

   a) 1 b) 2 c) 4 d) 8

49) The number of ring homomorphisms from $\mathbb{Z}_2 \times \mathbb{Z}_2$ to $\mathbb{Z}_4$ is equal to ___________ . GATE MA 2015

50) Let $p(x) = 9x^5 + 10x^3 + 5x + 15$ and $q(x) = x^3 - x^2 - x - 2$ be two polynomials in $\mathbb{Q}[x]$. Then, over $\mathbb{Q}$, GATE MA 2015
   a) $p(x)$ and $q(x)$ are both irreducible
   b) $p(x)$ is reducible but $q(x)$ is irreducible
   c) $p(x)$ is irreducible but $q(x)$ is reducible
   d) $p(x)$ and $q(x)$ are both reducible

51) Consider the linear programming problem
   Maximize $3x + 9y$, subject to GATE MA 2015

$$\begin{aligned} 2y - x &\le 2 \\ 3y - x &\ge 0 \\ 2x + 3y &\le 10 \\ x, y &\ge 0 \end{aligned}$$

   Then the maximum value of the objective function is equal to ___________

52) Let $S = \{(x, \sin\frac{1}{x}) : 0 < x \le 1\}$ and $T = S \cup \{(0,0)\}$. Under the usual metric on $\mathbb{R}^2$,
   a) S is closed but T is NOT closed GATE MA 2015
   b) T is closed but S is NOT closed
   c) both S and T are closed

d) neither S nor T is closed

53) Let GATE MA 2015

$$H = \left\{ (x_n) \in \ell^2 : \sum_{n=1}^{\infty} \frac{x_n}{n} = 1 \right\}.$$

Then H

a) is bounded
b) is closed
c) is a subspace
d) has an interior point

54) Let V be a closed subspace of $L^2[0,1]$ and let $f, g \in L^2[0,1]$ be given by $f(x) = x$ and $g(x) = x^2$. If $V = \text{Span}\{f\}$ and Pg is the orthogonal projection of g on V, then

$$(g - Pg)(x), \;\; x \in [0,1], \;\; \text{is:}$$

Options: GATE MA 2015

a) $\frac{3}{4}x$ b) $\frac{1}{4}x$ c) $\frac{3}{4}x^2$ d) $\frac{1}{4}x^2$

55) Let $p(x)$ be the polynomial of degree at most 3 that passes through the points $(-2, 12), (-1, 1), (0, 2)$ and $(2, -8)$. Then the coefficient of x^3 in $p(x)$ is equal to ___________. GATE MA 2015

56) If, for some $\alpha, \beta \in \mathbb{R}$, the integration formula

$$\int_0^2 p(x)\, dx = p(\alpha) + p(\beta)$$

holds for all polynomials $p(x)$ of degree at most 3, then the value of $3(\alpha - \beta)^2$ is equal to ___________. GATE MA 2015

57) Let $y(t)$ be a continuous function on $[0, \infty)$ whose Laplace transform exists. If $y(t)$ satisfies GATE MA 2015

$$\int_0^t (1 - \cos(t - \tau))\, y(\tau)\, d\tau = t^4,$$

then $y(1)$ is equal to ___________.

58) Consider the initial value problem GATE MA 2015

$$x^2 y'' - 6y = 0, y(1) = a, \quad y'(1) = 6.$$

If $y(x) \to 0$ as $x \to 0^+$, then Then a is equal to ___________.

59) Define $f_1, f_2 : [0,1] \to \mathbb{R}$ by

$$f_1(x) = \sum_{n=1}^{\infty} \frac{\sin(n^2 x)}{n^2}$$
$$f_2(x) = \sum_{n=1}^{\infty} x(1-x^2)^n.$$

Then GATE MA 2015

a) f_1 is continuous but f_2 is NOT continuous
b) f_2 is continuous but f_1 is NOT continuous
c) Both f_1 and f_2 are continuous
d) Neither f_1 nor f_2 is continuous

60) Consider the unit sphere $S = \{(x,y,z) \in \mathbb{R}^3 : x^2 + y^2 + z^2 = 1\}$ and the unit normal vector $\hat{n} = (x,y,z)$ at each point (x,y,z) on S. The value of the surface integral

$$\iint_S \left(\frac{2x}{\pi} + \sin(y^2)\right) x + \left(e^x - \frac{y}{\pi}\right) y + \left(\frac{2z}{\pi} + \sin^2(y) z\right) d\sigma$$

is equal to ____________. GATE MA 2015

61) Let $D = \{(x,y) \in \mathbb{R}^2 : 1 \leq x \leq 1000,\ 1 \leq y \leq 1000\}$. Define

$$f(x,y) = \frac{xy}{2} + \frac{500}{x} + \frac{500}{y}$$

Then the minimum value of f on D is equal to ____________. GATE MA 2015

62) Let $D = \{z \in \mathbb{C} : |z| < 1\}$. Then there exists a non-constant analytic function f on D such that for all $n = 2, 3, 4, \ldots$ GATE MA 2015

a) $f(\sqrt[n]{-1}) = 0$
b) $f\left(\frac{1}{n}\right) = 0$
c) $f\left(1 - \frac{1}{n}\right) = 0$
d) $f\left(\frac{1}{2} - \frac{1}{n}\right) = 0$

Selected answer: $\boxed{C}$

63) Let $\sum_{n=-\infty}^{\infty} a_n z^n$ be the Laurent series expansion of

$$f(z) = \frac{1}{z^2 - 13z + 15}$$

in the annulus $\frac{3}{2} < |z| < 5$. Then $\frac{a_4}{a_2}$ is equal to ____________. GATE MA 2015

64) The value of

$$\frac{i}{4-\pi} \oint_{|z|=4} \frac{dz}{z\cos(z)}$$

is equal to ____________. GATE MA 2015

65) Suppose that among all continuously differentiable functions $y(x)$, $x \in \mathbb{R}$ with $y(0) = 0$ and $y(1) = \frac{1}{2}$, the function $y_0(x)$ minimizes the functional

$$\int_0^1 \left(e^{-y'(x)-x} + (1+y)y'(x)^2\right) dx.$$

Then $y_0\left(\frac{1}{2}\right)$ is equal to GATE MA 2015

a) 0
b) $\frac{1}{8}$
c) $\frac{1}{4}$
d) $\frac{1}{2}$

END OF THE QUESTION PAPER