



# MaaRula Entrance Classes

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ORIGINAL PAPAER

AMU #2012

- The points of inflexion of the curve  $y^2 = (x-a)^2(x-b)$  lie on the line  
(a)  $3x + a = 4b$  (b)  $3x + 2a = 4b$   
(c)  $3x - a = 6b$  (d)  $3x - 2a = 6b$
- The volume of the solid generated by the revolution of the curve,  $(a-x)y^2 = a^2x$  about its asymptote is :  
(a)  $\frac{1}{2}\pi^2 a^2$  (b)  $\frac{1}{2}\pi^3 a^2$  (c)  $\frac{1}{3}\pi^2 a^3$  (d)  $\frac{1}{3}\pi^3 a^2$
- If the curve  $r = a(2\cos\theta - 1)$ , then the  $\rho$  is equal to  
(a)  $\frac{a^2(3a+2r)^{3/2}}{3(2a-r)}$  (b)  $\frac{a^2(3a-2r)^{3/2}}{3(2a-r)}$   
(c)  $\frac{a^2(3a-r)^{3/2}}{3(a-r)}$  (d) None of these
- The conjugate point on the curve  $x^4 - ax^2y + a^2y^2 = 0$  is :  
(a) (0, 0) (b) (0, 1) (c) (0, 2) (d) (1, 2)
- If  $u = f\left(\frac{x}{y}\right)$  then the value of  $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y}$  is :  
(a) 1 (b) 0 (c) 2 (d) 3
- If  $\int_0^{\pi} \int_0^{\sqrt{2x-x^2}} x \cdot dy \cdot dx$  is equal to :  
(a)  $-\pi$  (b)  $-\frac{3}{2}\pi$  (c)  $\frac{1}{2}\pi$  (d)  $\pi$
- If  $\int_0^{\pi} \int_0^{a(1+\cos\theta)} \cos\theta \cdot r^2 dr d\theta$  is equal to :  
(a)  $\frac{5}{4}\pi a^3$  (b)  $\frac{5}{8}\pi a^3$  (c)  $\frac{5}{6}\pi a^2$  (d)  $\frac{5}{8}\pi a^2$
- The Pedal equation of  $y^2 = 4a(x+a)$  is :  
(a)  $p^2 = ar$  (b)  $p^2 = a/r$  (c)  $p^3 = ar$  (d)  $p^3 = a/r$
- The Cardioids  $r = a(1 + \cos\theta)$  and  $r = b(1 - \cos\theta)$  intersect at an angle of  
(a)  $30^\circ$  (b)  $60^\circ$  (c)  $90^\circ$  (d)  $120^\circ$
- If  $\sin y = x \sin(a+y)$  then the value of  $\frac{dy}{dx}$  is  
(a)  $\frac{\cos^2(a+y)}{\sin a}$  (b)  $\frac{\sin^2(a+y)}{\sin a}$   
(c)  $\frac{\sin^3(a-y)}{\sin a}$  (d)  $\frac{\cos^3(a-y)}{\sin a}$
- If the  $r^n = a^n \sin n\theta$ , then the  $\rho$  is equal to  
(a)  $\frac{a^{n+1}}{n}$  (b)  $\frac{a^{n+1}}{n+1}$  (c)  $a^{n+1}$  (d)  $\frac{a^{n+1}}{n+1}$
- If the Cardioid  $r = a(1 + \cos\theta)$ , then the  $\rho$  is equal to  
(a)  $\frac{4a}{3} \sin \frac{\theta}{2}$  (b)  $\frac{4a}{3} \cos \frac{\theta}{2}$  (c)  $\frac{4a}{3} \sec \frac{\theta}{2}$  (d)  $\frac{4a}{3} \sin \theta$
- If  $\int_0^{\pi} \int_0^{a(1+\cos\theta)} r dr \cdot d\theta$  is equal to :  
(a)  $\frac{3}{2}\pi a^2$  (b)  $\frac{3}{4}\pi a$  (c)  $\frac{3}{4}\pi a^3$  (d) None of these
- If  $\int_0^{\pi/2} \int_{\pi/2}^{\pi} \cos(x+y) dx dy$  is equal to :  
(a) 2 (b) -2 (c) -3 (d) 3
- If  $\int_0^2 \int_0^x \frac{dy dx}{x^2+y^2}$  is equal to :  
(a)  $\frac{1}{4}\pi \log 2$  (b)  $\frac{1}{4}\pi \log 3$  (c)  $\frac{1}{2}\pi \log \sqrt{2}$  (d)  $\frac{1}{4}\pi \log \sqrt{3}$
- Maclaurin's theorem is applicable for the expansion of the function which is  
(a) Discontinuous (b) Continuous  
(c) Both (a) and (b) (d) None of these
- Fourier series is applicable for the expansion of the function which is  
(a) Discontinuous (b) Continuous  
(c) Both (a) and (b) (d) None of these
- If  $\lim_{x \rightarrow \pi/2} (\sec x - \tan x)$  is equal to  
(a) 1 (b) 2 (c) 0 (d) -1
- If  $\lim_{x \rightarrow \pi/2} (\tan x)^{\tan 2x}$  is equal to  
(a) 2 (b) 1 (c) -1 (d) -2
- If  $\lim_{x \rightarrow \infty} (e^x + x)^{1/x}$  is equal to  
(a)  $e^3$  (b)  $e^2$  (c)  $e$  (d)  $e^4$
- If  $\lim_{x \rightarrow 0} \left(\frac{\sin hr}{x}\right)^{1/x^2}$  is equal to  
(a)  $e^{1/3}$  (b)  $e^{1/6}$  (c)  $e^{1/2}$  (d)  $e$
- If  $\int_0^1 (x \log x)^3 dx$  is equal to  
(a)  $-3/128$  (b)  $3/128$  (c)  $9/124$  (d) None of these
- If  $\int_0^{\pi/2} \sqrt{\cot \theta} d\theta$  is equal to :  
(a)  $\frac{1}{2} \sqrt{\frac{1}{4}} \sqrt{\frac{1}{4}}$  (b)  $\frac{1}{4} \sqrt{\frac{1}{2}} \sqrt{\frac{1}{2}}$  (c)  $\frac{1}{2} \sqrt{\frac{1}{3}} \sqrt{\frac{1}{3}}$  (d)  $\frac{1}{4} \sqrt{\frac{1}{3}} \sqrt{\frac{1}{3}}$
- Set A has n elements, then the number of binary composition on A is  
(a)  $n^n$  (b)  $n^{n+2}$  (c)  $n^{n-2}$  (d)  $n^{n^2}$
- The additive group  $z$  is a cyclic group generated by  
(a) 1 (b) 2 (c) 3 (d) None of these
- If A and B are two square matrices of the same order then  
(a)  $\det(AB) \neq \det(A) \det(B)$  (b)  $\det(AB) = \det(A) + \det(B)$   
(c)  $\det(AB) = \frac{\det(A)}{\det(B)}$  (d) None of these
- The function  $f(z) = \frac{1-e^{2z}}{z^4}$  has a pole at  $z = 0$ . The order of the pole is  
(a) 1 (b) 2 (c) 3 (d) 4
- Residue at the pole  $z = 0$  of the function  $f(z) = z \cos(1/z)$  is :  
(a) 1 (b) -1 (c)  $\frac{1}{2}$  (d)  $-\frac{1}{2}$
- If  $u = \tan^{-1} \left[ \frac{x^2+y^2}{(x-y)} \right]$ , then  $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y}$  equal to :  
(a)  $\sin 2u$  (b)  $\sin u$  (c)  $\cos u$  (d)  $\cos 2u$
- $u = \sin^{-1} \left( \frac{x}{y} \right)$ , then  $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y}$  equal to  
(a) 0 (b)  $u$  (c)  $2u$  (d) None of these
- Average energy of a Planck's oscillator is :  
(a)  $E = h\nu$  (b)  $E = nh\nu$   
(c)  $E = \frac{h\nu}{e^{h\nu/kT}-1}$  (d)  $E = mc^2$
- Electromagnetic radiation is emitted by  
(a) All bodies at all temperatures  
(b) All bodies at  $100^\circ C$   
(c) All bodies at absolute zero  
(d) Only a few bodies at all temperatures
- Zerth law of thermodynamics is :  
(a) Kinetic energy of molecules of a gas is zero  
(b) ideal gas does not contain molecules  
(c) if two systems are separated in thermal equilibrium with a third system then they themselves are in thermal equilibrium with each other  
(d) absolute zero temperature cannot be attained
- According to Vander waals gas equation, critical coefficient  $\frac{RT_c}{P_c V_c}$  is equal to  
(a) 8 (b)  $8/3$  (c) 8.3 (d) 1
- A transverse wave is represented by  $x = A \sin(kx - \omega t)$ . The velocity of the wave is given by  
(a)  $kx$  (b)  $\omega/t$  (c)  $\omega t$  (d)  $k/\omega$
- In an inelastic collision  
(a) Neither momentum nor kinetic energy is conserved  
(b) Momentum is conserved but not kinetic energy  
(c) Momentum is not conserved but kinetic energy is conserved  
(d) Both the momentum and kinetic energy are conserved
- The moment of inertia of body depends upon  
(a) Mass of the body only  
(b) Distribution of mass only  
(c) Mass and distribution of mass both  
(d) None of the above
- The S.H.M. of a particle is given by the equation  $y = 3 \sin \omega t + 4 \cos \omega t$ . Its amplitude is :  
(a) 1 (b) 7 (c) 5 (d) 12
- If the mass of a planet is doubled and radius is halved, the acceleration due to gravity becomes  
(a) 4 time the original value (b) 8 times the original value  
(c) 2 times the original value (d) Equal to original value
- Four thermodynamical potentials are  
(a) Pressure, volume, Temperature and internal energy function  
(b) Pressure, volume, internal energy and Helmholtz function  
(c) Volume, internal energy function, enthalpy and Gibbs function  
(d) Internal energy function, Helmholtz function, enthalpy and Gibbs function
- Which of the following represents a reversible process ?  
(a)  $ds < 0$  (b)  $ds = 0$  (c)  $ds > 0$  (d) None of these
- In a reversible adiabatic process, entropy  
(a) Increase (b) Remains unchanged  
(c) Decreases (d) None of these
- The door of running refrigerator inside a room is left open. Mark the correct statement  
(a) the room will be cooled slightly  
(b) the room will be warmed up gradually  
(c) the room will be cooled to the temperature inside the refrigerator  
(d) the temperature of the room will remain unaffected
- Out of the following, the physical quantity that relates with first law of thermodynamics is :  
(a) Temperature (b) Pressure  
(c) Energy (d) No. of moles
- The mean free path of gas at pressure p and temperature T is  
(a)  $\frac{KT}{(\sqrt{2})\sigma^2 np}$  (b)  $\frac{KT}{(\sqrt{2})\sigma^2 \pi p}$  (c)  $\frac{\sqrt{KT}}{\pi \sigma^2 p}$  (d)  $\frac{1}{\sigma} \sqrt{\frac{KT}{2\pi p}}$
- At very low temperatures, the coefficient of viscosity of a gas  
(a) Decreases with decrease of pressure  
(b) Increases with decrease of pressure  
(c) Is independent of pressure  
(d) Is equal to pressure
- Viscosity of a gas is due to transport of  
(a) Momentum (b) Energy (c) Mass (d) None of these
- The ratio of two specific heats  $C_p/C_v$  of a diatomic gas is  
(a) 1.67 (b) 1.40 (c) 1.00 (d) 2
- According to kinetic theory of gases, the relation between pressure P and density  $\rho$  and mean square velocity C is  
(a)  $P = \frac{1}{2}\rho C^2$  (b)  $P = \frac{1}{3}\rho C^2$  (c)  $P = \frac{1}{2}\rho C$  (d)  $P = \frac{1}{3}\rho C$
- Secular trend of a time series is also known as  
(a)  $1.38 \times 10^{-16} J/K$  (b)  $1.38 J/K$   
(c)  $1.38 \times 10^{-23} J/K$  (d)  $8.314 J/K$
- For a sample survey, a city is divided into 100 wards. Ten wards are randomly selected and then each and every individual in the selected ward is interviewed. What method of sampling is being adopted ?  
(a) Stratified sampling (b) Two stage sampling



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- (c) Cluster sampling (d) Systematic Sampling
52. Secular trend of a time series is also known as  
(a) Long term movement (b) Short term fluctuations  
(c) Cluster sampling (d) Systematic Sampling
53. The value of mode of the Poisson distribution with mean 2.6  
(a) Cannot be determined (b) 2  
(c) 3 (d) 2 and 3
54. Find the moment generating function of the random variable whose moments are given by  $\mu_r^2 = (r + 1)! 2^r$   
(a)  $(1 - 2t)^{-2}$  (b)  $(1 - 2t)^{-1}$  (c)  $(1 - t)^{-1}$  (d)  $(1 - t)^{-2}$
55. The diameter of an electric cable,  $x$ , is assumed to be a continuous random variable with p.d.f  $f(x) = Kx(1 - x)$ ;  $0 \leq x \leq 1$   
The value of  $L$  is  
(a)  $1/6$  (b)  $1/2$  (c)  $C$  6 (d) 6
56. If the total degrees of freedom in a Latin square design is 15 then the order of the Latin square is  
(a)  $3 \times 3$  (b)  $4 \times 4$  (c)  $5 \times 5$  (d)  $6 \times 6$
57. In an  $m \times m$  latin square design the degrees of error is :  
(a)  $(m - 1)^2$  (b)  $(m - 1)(m + 1)$   
(c)  $(m - 1)(m - 2)$  (d)  $m^2 - 1$
58. Which one of the following is not a basis principle of design of experiments  
(a) Replication (b) Factorization  
(c) Randomization (d) Local control
59. Which of the following is a contrast  
(a)  $3T_1 + T_2 - 3T_3 + T_4$  (b)  $T_1 + 3T_2 - 3T_3 + T_4$   
(c)  $-3T_1 - T_2 + T_3 + 3T_4$  (d)  $T_1 + T_2 + T_3 - T_4$
60. For a bivariate data  $(X, Y)$  three can be at most  
(a) One regression lines  
(b) Two regression lines  
(c) Three regression lines  
(d) Infinite number of regression lines
61. The relation between the coefficient of variation (CV), standard deviation (SD) and mean ( $\bar{X}$ ) of a given data is  
(a)  $SD = CV \times \bar{X}$  (b)  $CV = SD \times \bar{X}$   
(c)  $\bar{X} = CV/SD$  (d) None of the above
62. If 0.1, 0.2, 0.4, 0.1 and 0.2 are the respective weight of the values 10, 15, 20, 25 and 30 then their weighted mean is  
(a) 205 (b) 20.5 (c) 20.0 (d) None of the above
63. Mode of the data can be computed from its  
(a) Bar diagram (b) Histogram  
(c) Ogive (d) Pie diagram
64. Two dice are thrown simultaneously. The probability that the number on the first die is a multiple of the number on the second die is :  
(a)  $13/36$  (b)  $15/36$  (c)  $17/36$  (d)  $19/36$
65. The mean and variance of a binomial distribution are 6 and 2.4 respectively. the probability of failure is  
(a) 0.6 (b) 0.5 (c) 0.4 (d) 0.3
66. For two events A and B from the same sample space the relation " $P(A \cup B) = P(A) + P(B) - P(A \cap B)$ " is called  
(a) additive theorem (b) Multiplication theorem  
(c) Bay's theorem (d) None of the above
67. 5 unbiased coins are tossed simultaneously the probability of getting either 4 heads or 4 tails is  
(a)  $5/8$  (b)  $5/16$  (c)  $5/32$  (d)  $5/64$
68. A coin and two dice are tossed together the number of points in the sample space will be  
(a)  $2 + 6 + 6$  (b)  $2 \times 6 \times 6$  (c)  $2^6$  (d)  $6^2$
69. In rolling a die two event are defined as  
 $E_1 = \{1, 2, 3, 4\}$ ,  $E_2 = \{3, 4, 5, 6\}$ . Consider the three types of events :  
(i) Equally likely (ii) Mutual Exclusive  
(iii) Exhaustive  $E_1$  and  $E_2$  are  
(a) (i) and (ii) (b) (i) and (iii) (c) (ii) and (iii) (d) None of the above
70. For a normal probability distribution  $\beta_2$  is always  
(a) 0 (b) 1 (c) 2 (d) 3
71. Page fault occurs when  
(a) Page is corrupted by application software  
(b) Page is in main memory  
(c) Page is not in main memory  
(d) it tries to divide a number by zero
72. Tera is 2 to power of  
(a) 32 (b) 30 (c) 40 (d) 25
73. To modify existing rows of a table, which statement is used ?  
(a) UPDATE (b) ALTER (c) MODIFY (d) None of these
74. IPv6 has ..... Bit addresses.  
(a) 32 (b) 64 (c) 128 (d) Variable
75. How many layers does OSI reference model has :  
(a) 4 (b) 5 (c) 6 (d) 7
76. An inverter is also called a ..... gate  
(a) NOT (b) OR (c) AND (d) NAND
77. Normalization of database is used to  
(a) Eliminate redundancy (b) Improve security  
(c) Improve efficiency (d) errors
78. If a relation scheme is in BCNF, then it is also in  
(a) 1NF (b) 2NF (c) 3NF (d) None of these
79. What is bit size of 6800 microprocessor ?  
(a) 4 bit (b) 6 bit (c) 8 bit (d) 16 bit
80. Compiler and Interpreters are examples of  
(a) System software (b) Application Software  
(c) Both (a) and (b) (d) None of the above
81.  $(112)_8 \rightarrow ( )_{16}$   
(a) 4A (b) 5A (c) 15 (d) 20
82. The list of coded instructions is called  
(a) Computer Program (b) Algorithm  
(c) Flowchart (d) None of the above
83. A volatile memory is  
(a) Magnetic core (b) Disk  
(c) Drum (d) Flip-flop
84. Router operates in which layer of OSI reference model ?  
(a) Layer 1 (Physical layer) (b) Layer 3 (Network layer)  
(c) Layer 4 (Transport layer) (d) Layer 7 (Application layer)
85. What is a firewall in computer network ?  
(a) The physical boundary of network  
(b) An operating system of computer network  
(c) A system designed to prevent unauthorized access  
(d) A web browsing software
86. Which of the following is not a correct variable type under C/C++ ?  
(a) double (b) float (c) int (d) real
87. In which type of the following OS, the response time is very critical ?  
(a) Network operating system  
(b) Real time operating system  
(c) Batch operating system  
(d) None of the above
88. Which of the following file formats is supported by windows 7 ?  
(a) NTFS (b) BSD (c) EXT (d) All of the above
89. The total number of edges in a complete graph of  $n$  vertices is  
(a)  $n$  (b)  $n/2$  (c)  $n(n - 1)/2$  (d)  $n(n+1)/2$
90. The number of vertices of ODD degree in a graph is  
(a) Always even (b) Always odd  
(c) Always Zero (d) None of the above
91. Two boys were overheard discussing the number of pets each had.  
First boy : "If I had one of yours. I would have as many as you".  
Second boy : "If I had one of your, I would have twice as many as you".  
How many pets does each boy have ?  
(a) 5, 7 (b) 3, 5 (c) 2, 4 (d) 5, 3
92. Find the time between 5 and 6 O'clock when the hands of a clock are at right angles to each other  
(a) 10 min. past 5 (b)  $10 \frac{10}{11}$  min. past 5  
(c)  $43 \frac{7}{11}$  min. past 5 (d) Both (b) and (c)
93. Shyam travels 7 kms to North. Then again he turns to the right and walks 3 kms. Then again he turns to the right and moves 7 kms forward. How many km is he away from his starting point.  
(a) 7 (b) 3 (c) 8 (d) 4
94. If 'DEAR' is coded as 7 and 'BEARS' is coded as 9, what should be the code for 'WAX' ?  
(a) 10 (b) 12 (c) 16 (d) 20
95. Out of the given responses, which word can be formed, using the given word REGRESSION.  
(a) RAIN (b) GREEN (c) AGREE (d) GREASE
96. If Monday falls on the first of October, which day will fall three days after the 20<sup>th</sup> of the month ?  
(a) Monday (b) Tuesday (c) Wednesday (d) Sunday
97. Dilip's position from the left in a row of students is 10<sup>th</sup> and Jagdish's position is 20<sup>th</sup> from the right. Both of them interchange their position and Jagdish becomes 23<sup>rd</sup> from the right. How many students are there in the row ?  
(a) 33 (b) 32 (c) 41 (d) 42
98. How many 9's are there in the following number series which are immediately preceded by 3 and followed by 6 ?  
(a) 1 (b) 2 (c) 3 (d) 4
99. In a class of students, Ravi occupies fifth position from the top and 25<sup>th</sup> from the bottom. How many students are there in the class ?  
(a) 30 (b) 28 (c) 29 (d) 25
100. Somy, who is Dubey's saughter, says to Preeti, "Your mother Syama is the Youngest sister of my father, wo is third child of Prabhat. How is prabhat related to Preeti".  
(a) uncle (b) Father (c) Grandfather (d) Father-in-law