



# MaaRula Entrance Classes

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ORIGINAL PAPAER

AMU #2011

- If  $A = -yi + xj$ , the line integral for the closed curve  $x^2 + y^2 = r^2$  will be  
(a)  $\pi r^2$  (b)  $2\pi r^2$  (c)  $\frac{\pi}{2}r^2$  (d)  $\frac{\pi}{4}r^2$
- Which of the following LCR series combinations connected to a DC source will oscillatory in nature?  
(a)  $R = 2k\Omega, L = 2mH, C = 2\mu F$   
(b)  $R = 10k\Omega, L = 5mH, C = 1\mu F$   
(c)  $R = 150k\Omega, L = 0.15H, C = 1\mu F$   
(d)  $R = 10^6k\Omega, L = 0.1H, C = 1\mu F$
- Semiconductor laser to be operated in continuous mode at room temperature is  
(a) Homo junction laser (b) Hetero junction laser  
(c) Si based p-n junction (d) Ge based p-n junction
- If the successive deflections to the right and left of the mean position in the case of ballistic galvanometer are found to be 25.0, 24.4cm and 24.8cm then the logarithmic decrement is  
(a) 0.0038 (b) 0.0039 (c) 0.0040 (d) 0.0041
- Henry/m is the SI unit of  
(a) resistivity (b) polarizability  
(c) permittivity (d) permeability
- Correct relationship for energy gap (Eg) for Ge, Si and GaAs is  
(a)  $(Eg)_{Si} > (Eg)_{GaAs} > (Eg)_{Ge}$  (b)  $(Eg)_{GaAs} > (Eg)_{Si} > (Eg)_{Ge}$   
(c)  $(Eg)_{Ge} > (Eg)_{GaAs} > (Eg)_{Si}$  (d)  $(Eg)_{GaAs} > (Eg)_{Ge} > (Eg)_{Si}$
- A circuit has an inductance of 10mH, capacitance  $0.1\mu F$  and resistance  $1k\Omega$ . if an emf  $10^5V$  is in the circuit, the final charge on the capacitor will be  
(a) 0.01C (b) 0.02C (c) 0.03C (d) 0.04C
- Two particles X and Y having equal charges, after being accelerated through the same potential difference, enter a region of uniform magnetic field and describe circular paths of radii  $R_1$  and  $R_2$  respectively. the ratio of mass of X to the mass of Y is  
(a)  $(\frac{R_1}{R_2})^{1/2}$  (b)  $(\frac{R_1}{R_2})$  (c)  $(\frac{R_2}{R_1})$  (d)  $(\frac{R_1}{R_2})^2$
- The Ruby laser is based on energy levels of  
(a)  $Al^{+3}$  ions (b)  $Cr^{+3}$  ions (c)  $La^{+3}$  ions (d)  $Y^{+3}$  ions
- The magnetization of a paramagnetic material will be maximum at  
(a) high temperature and high magnetic field  
(b) low temperature and high magnetic field  
(c) low temperature and low magnetic field  
(d) high temperature and low magnetic field
- The magnetic flux,  $\Phi_s$  (in weber) linked with a coil of resistance  $10\Omega$  varies in time t (in sec) as  $\Phi_s = 16t^2 - 8t + 5$ , the current induced in the coil at  $t = 0.2s$  is  
(a) 8A (b) 4A (c) 3.2A (d) 0.16A
- The first diffraction minimum due to a single slit diffraction is at  $\theta = 30^\circ$  for a light of wavelength  $5000\text{\AA}$ . The width of slit is  
(a)  $2.5 \times 10^{-5}cm$  (b)  $10.0 \times 10^{-5}cm$   
(c)  $5.0 \times 10^{-5}cm$  (d)  $1.25 \times 10^{-5}cm$
- If n units are selected in a sample from N units, the sampling fraction is given as:  
(a) N/n (b) 1/N (c) 1/n (d) n/N
- When a 100V DC is applied across a solenoid, a current of 1 A flows in it. When a 100 V AC is applied across the same coil, the current drops to 0.5 A. If the frequency of AC source is 20Hz, the impedance and inductance of the solenoid are  
(a)  $100\Omega, 0.95 H$  (b)  $200\Omega, 1.0 H$   
(c)  $200\Omega, 0.63 H$  (d)  $100\Omega, 0.85 H$
- When a transparent sheet of thickness t and refractive index  $\mu$  is introduced in the path of one of the interfering waves, then the entire fringe pattern is displaced by a distance  
(a)  $\frac{D}{2d}(\mu - 1)t$  (b)  $(\mu - 1)t$  (c)  $\frac{2d}{D}(\mu - 1)t$  (d)  $\frac{2d}{(\mu - 1)t}$
- An ideal coil of 10 H is connected in series with a resistance of  $5\Omega$  and a battery of 5V. 2s after the connection is made the current flowing (in ampere) in the circuit is  
(a)  $1 - e$  (b) e (c)  $e^{-1}$  (d)  $(1 - e^{-1})$
- Two identical slits are used in Young's double slit experiment. The intensity of the maximum at the centre of the screen is I. if one of the slits is closed, the intensity at the centre of the screen will be  
(a) I (b)  $\frac{I}{2}$  (c)  $\frac{I}{4}$  (d)  $\frac{I}{8}$
- On introducing dielectric medium between the plates of parallel plate, capacitor, electrostatic potential  
(a) increase (b) decrease  
(c) first increases then decrease (d) remains constant
- If the far point of a myopic eye is 10cm, the focal length of a lens for reading the normal distance is:  
(a)  $14\frac{2}{3}cm$  (b)  $15\frac{2}{3}cm$  (c)  $16\frac{2}{3}cm$  (d)  $17\frac{2}{3}cm$
- A smooth inclined plane of angle of inclination of  $30^\circ$  is placed on the floor of a compartment of a train moving with a constant accelerations a. when a block is placed on the inclined plane, it does not slide down or up the plane. The acceleration a will be  
(a) g (b)  $\frac{g}{2}$  (c)  $\frac{g}{\sqrt{2}}$  (d)  $\frac{g}{\sqrt{3}}$
- A general system of m linear equations in n unknowns has a solution if and only if  
(a)  $m = n$   
(b) the rank of coefficient matrix is m  
(c) rank of coefficient matrix is n  
(d) the rank of the coefficient matrix is equal to the rank of diagonal matrix
- If M is a  $3 \times 3$  matrix such that  $M^T M = I$  and  $|M| = 1$ , then  $|M - I|$  is  
(a) 0 (b)  $|M|$  (c)  $|M| - 1$  (d) None of these
- The function  $f(x, y) = |x| + |y|$  has an extreme value at (0, 0), the partial derivative  
(a)  $f_x$  and  $f_y$  exist at (0, 0)  
(b)  $f_x$  and  $f_y$  does not exist at (0, 0)  
(c)  $f_x = 0$   
(d)  $f_y = 0$
- If  $(a_1, a_2, \dots, a_n)$  is a stationary point, then  $df(a_1, a_2, \dots, a_n)$  is  
(a) 1 (b) 0 (c)  $\infty$  (d) Does not exist
- The area of that part of the surface of the cylinder  $x^2 + y^2 = a^2$  which is cut out by the cylinder  $x^2 + z^2 = a^2$  is  
(a) 0 (b)  $a^2$  (c)  $4a^2$  (d)  $8a^2$
- The solution of  $\sqrt{p} + \sqrt{q} = 1$ , where  $p = \frac{\partial z}{\partial x}$  and  $q = \frac{\partial z}{\partial y}$  is  
(a)  $z = ax^2 + (1 - \sqrt{a})y + C$  (b)  $z = ax^2 + (1 - \sqrt{a})y^2 + C$   
(c)  $z = ax + (1 - \sqrt{a})y + C$  (d)  $z = ax + (1 - \sqrt{a})y^2 + C$
- The Laplace transform of  $\sin 2x \sin 3x$  is  
(a)  $\frac{12s}{(s^2+1)(s^2+25)}$  (b)  $\frac{12s}{(s^2-1)(s^2+25)}$   
(c)  $\frac{12s}{(s^2+1)(s^2-25)}$  (d)  $\frac{12s}{(s^2-1)(s^2-25)}$
- The particular integral of the differential equation  $(D^2 - 3D + 2)y = 2x^2 + 3e^{2x}$ , is  
(a)  $2x^2 + 3e^{2x} + 7/2$  (b)  $x^2 + 3xe^{2x} + 7/2$   
(c)  $x^2 + 3x + 3xe^{2x} + 7/2$  (d)  $x^2 + 3x + xe^{2x} + 7/2$
- The solution of the differential equation  $\frac{dy}{dx} + y \cot x = \cos x$ , is  
(a)  $y \sin x = \frac{\sin^2 x}{2} + C$  (b)  $y = \frac{\sin^2 x}{2} + C$   
(c)  $y = \sin^2 x + C$  (d)  $y \sin x + \sin^2 x + C$
- $\lim_{(x,y) \rightarrow (0,0)} \frac{\sqrt{x^2 y^2 + 1} - 1}{x^2 + y^2}$  is  
(a)  $\infty$  (b) 1 (c) 0 (d) Does not exist
- The degree of precision of Weddle's formula is  
(a) 1 (b) 2 (c) 3 (d) 5
- If  $P_n(x) = x^n + a_{n-1}x^{n-1} + \dots + a_1x + a_0$  is the characteristic polynomial of a square matrix A, then  
(a)  $A^n = I$  (b)  $A^n = 0$   
(c)  $A^n + a_{n-1}A^{n-1} + \dots + a_1A + a_0I \neq 0$   
(d)  $A^n + a_{n-1}A^{n-1} + \dots + a_1A + a_0I = 0$
- The solution of the differential equation  $y = 2px + y^2p^3, p = \frac{dy}{dx}$ , is  
(a)  $y = Cx + 1/8C^3$  (b)  $y^2 = Cx + 1/8C^3$   
(c)  $y = Cx^2 + 1/8C^3$  (d) None of these
- The expansion of the function  $f(x) = \frac{1}{1+x^2}$  is  
(a)  $\sum_{n=0}^{\infty} x^{2n}$ , where  $-1 < x < 1$   
(b)  $\sum_{n=0}^{\infty} (-1)^n x^n$ , where  $-1 < x < 1$   
(c)  $\sum_{n=0}^{\infty} (-1)^n x^{2n}$ , for all real x  
(d)  $\sum_{n=0}^{\infty} (-1)^n x^{2n}$ , where  $-1 < x < 1$
- The range of values of  $\tau$  for which the point  $(\tau, -1)$  is exterior to both the parabolas  $y^2 = |x|$  is  
(a)  $(-1, 1)$  (b)  $(0, 1)$  (c)  $(-1, 1)$  (d)  $(0, -1)$
- The velocity of a boat relative to a river is  $12i + 5j$  and the velocity of river is  $-9i - j$ . If i and j are the velocities of 1km/h along East and North respectively, then the velocity of boat is  
(a)  $5\sqrt{2} km/h$  (b) 5 km/h (c)  $13\sqrt{2} km/h$  (d) 13 km/h
- Of the following regions in the complex plane the only one that does not represent a circle is:  
(a)  $z\bar{z} + i(z - \bar{z}) = 0$  (b)  $Re(\frac{1+z}{1-z}) = 0$   
(c)  $\arg(\frac{z-1}{z+1}) = \pi/2$  (d)  $|\frac{z-1}{z+1}| = 1$
- If u is a homogeneous function of degree n,  
(a)  $(n-1)\frac{\partial u}{\partial x}$  (b)  $(n-2)\frac{\partial u}{\partial x}$  (c)  $n\frac{\partial u}{\partial x}$  (d) None of these
- The equation of a straight line passing through the point  $(-5, 4)$  which cuts off an intercept of  $\sqrt{2}$  units between the lines  $x + y + 1 = 0$  and  $x + y - 1 = 0$   
(a)  $x - y + 13 = 0$  (b)  $2x - y + 14 = 0$   
(c)  $x - y + 9 = 0$  (d)  $x - y + 10 = 0$
- Which of the following is not capable of being expanded as Maclaurin's infinite series?  
(a)  $10^x$  (b)  $a^x$  (c)  $e^x$  (d)  $\log x$
- The work done by the forces  $P = 2i - 3j + k$  and  $Q = i + 5j - 3k$  to displace the particle from point A to point B whose position vectors are  $-2i + 5j + 7k$  and  $3i + 7j + 2k$ , is  
(a) 31 units (b) 29 units (c) 9 units (d) 14 units
- If  $y^2 - 5x + 4x^2 = 8$ , then  $\frac{d^2y}{dx^2}$  is equal to  
(a) 0 (b) 2 (c)  $\frac{304}{3y^3}$  (d)  $-\frac{153}{4y^3}$
- The sum of n terms of the series  $\frac{1}{1.2} + \frac{1}{2.3} + \frac{1}{3.4} + \dots + ad inf$  is equal to  
(a)  $\frac{1}{(n+1)}$  (b)  $\frac{1}{n(n+1)}$  (c)  $\frac{(n+2)}{(n+1)}$  (d)  $\frac{n}{(n+1)}$
- The value of the definite integral  $\int_{0.2}^{1.4} (\sin x - \log_e x + e^x) dx$  is approximately (correct upto four places of decimal)  
(a) 4.0721 (b) 4.0515 (c) 4.0549 (d) 4.0510
- If  $y = x - x^2 + x^3 - x^4 + \dots$  and  $\inf |x| < 1$ , then n equals  
(a)  $e^{-y} + 1$  (b)  $\log(1 + Y)$  (c)  $Y/(1 + Y)$  (d)  $Y/(1 - Y)$



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46. The general solution of the differential equation  $x \log x \left(\frac{dy}{dx}\right) + y = 2 \log x$ , is  
(a)  $\log x^y = 2 \log x + C$  (b)  $2y \log x = \log x + C$   
(c)  $2y \log x = (\log x)^2 + C$  (d)  $y \log x = (\log x)^2 + C$
47. The eccentric angle of the extremities of the latusrecta of the ellipse  $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$  are given by  
(a)  $\tan^{-1} \left(\pm \frac{ae}{b}\right)$  (b)  $\tan^{-1} \left(\pm \frac{be}{a}\right)$   
(c)  $\tan^{-1} \left(\pm \frac{b}{ae}\right)$  (d)  $\tan^{-1} \left(\pm \frac{a}{be}\right)$
48. The particular solution of  $(D^2 + 2D + 5)y = 12e^x - 34 \sin 2x$ , where  $D = \frac{d}{dx}$  is  
(a)  $\frac{3}{2} e^{-x} + 2 \sin 2x + 8 \cos 2x$  (b)  $\frac{3}{2} e^x - 2 \sin 2x + 8 \cos 2x$   
(c)  $\frac{3}{2} e^{-x} + 8 \sin 2x + 2 \cos 2x$  (d)  $\frac{3}{2} e^x - 8 \sin 2x + 8 \cos 2x$
49. If  $f(x) = (\log_{\cot x} \tan x)(\log_{\tan x} \cot x^{-1}) + \tan^{-1} \left(\frac{4x}{\sqrt{4-x^2}}\right)$ , then  $f'(0)$  is equal to :  
(a) 2 (b) 0 (c) 1/2 (d) -2
50.  $\lim_{(x,y) \rightarrow (0,0)} xy \frac{x^2-y^2}{x^2+y^2}$  is equal to  
(a) 1 (b)  $\infty$  (c) 0 (d) Does not exist
51. For any continuous distribution the mean deviation is minimum when measured from  
(a) mean (b) median (c) mode (d) None of these
52. A number is chosen randomly out of (1, 2, 3, ..., 60). Probability that the number is divisible by 3 or 4 or 5.  
(a)  $\frac{1}{60}$  (b)  $\frac{7}{12}$  (c)  $\frac{3}{5}$  (d)  $\frac{47}{60}$
53. If the range of correlation coefficient is between (0, 1), then it is  
(a) simple correlation (b) partial correlation  
(c) rank correlation (d) multiple correlation
54. A random variable X follows chi square distribution with 4 degrees of freedom, then  $E(X^2)$  is equal to  
(a) 4 (b) 6 (c) 12 (d) 24
55. The confidence interval (c.i) FOR  $\sigma^2$  in  $N(5, \sigma^2)$  is based on the statistic  
(a)  $\Psi_{n-1}^2$  (b)  $\Psi_2^2$  (c) F (d) t
56. In a stratified random sampling  $N_1 = 3N_2$  and  $n_1 = 2n_2$  then  $s_1 : s_2$  is equal to  
(a) 1 : 6 (b) 2 : 3 (c) 3 : 2 (d) 6 : 1
57. UMP test is obtained if for  $H_0$  : null hypothesis  $H_1$  : alternative hypothesis  
(a)  $H_0$  is simple and  $H_1$  is simple hypothesis  
(b)  $H_0$  is simple and  $H_1$  is composite hypothesis  
(c)  $H_0$  is composite and  $H_1$  is simple hypothesis  
(d) None of the above
58. The cumulative frequency curve is also called  
(a) a growth curve (b) an ogive  
(c) a frequency curve (d) Lorentz curve
59. A RBD has  
(a) a three way classification  
(b) a two way classification  
(c) a one way classification  
(d) no classification
60. To test  $H_0 : \mu = \mu_0$  against  $H_1 : \mu > \mu_0$  when population standard deviation is known as the appropriate test is  
(a) t-test (b) normal (c) chi square (d) d-test
61. Mean deviation is minimum when deviations are taken from  
(a) mean (b) median (c) mode (d) zero
62. The mean weight of boys and girls in a class are respectively 60kg and 39 kg and their combined mean weight is 53, then the proportion of girls in the class is  
(a) 2/3 (b) 1/3 (c) 1/4 (d) 3/4
63. If a constant k is added to every observation of a data the standard deviation  $\sigma$  of the new data will be  
(a)  $\sigma + k$  (b)  $\sigma - k$  (c)  $\sigma k$  (d)  $\sigma$
64. Shift of the original and scale does not affect the value of  
(a) mean (b) standard deviation  
(c) correlation coefficient (d) coefficient of variation
65. Which one of the following relations between Pearson's  $\beta$  and  $\gamma$  coefficients and first four moments about mean is incorrect  
(a)  $\beta_1 = \frac{\mu_3^2}{\mu_2^3}$  (b)  $\gamma_1 = +\sqrt{\beta_1}$  (c)  $\beta_2 = \frac{\mu_4}{\mu_2^2}$  (d)  $\gamma_2 = \beta_2 + 3$
66. In stratified sampling in usual notations proportional allocation is that in which  
(a)  $n_h \propto s_h$  (b)  $n_h \propto w_h s_h$  (c)  $n_h \propto w_h$  (d)  $n_h \propto c_h$
67. In a randomized block design (RBD) with 't' treatments and 'r' replication the error degree of freedom is  
(a)  $t - 1$  (b)  $r - 1$  (c)  $rt - 1$  (d)  $(t - 1)(r - 1)$
68. In a Latin square design, the error degrees of freedom is half of the total degrees of freedom, then the number of treatment is  
(a) 3 (b) 4 (c) 5 (d) 6
69. The mean of regression lines  $4x - 5y + 33 = 0$  and  $20x - 9y - 107 = 0$ , is  
(a) (13, 7) (b) (7, 13) (c) (-13, 7) (d) None of these
70. Arithmetic mean of first n natural numbers in A, arithmetic mean of first n whole numbers in B, then  
(a)  $A = B$  (b)  $A - B + 1 = 0$   
(c)  $A - B - 1 = 0$  (d)  $A + B = n + 1$
71. Looping is a fundamental technique and is one of the most powerful tools of  
(a) programming (b) computer (c) analyzing (d) commanding
72. A volatile memory is  
(a) magnetic core (b) disk  
(c) flip-flop (d) drum
73. Which of the following network access standard is used for connecting hosts to packet-switched network ?  
(a) X.400 (b) X.21 (c) X.25 (d) X.3
74. The "Father of punched Card processing" was  
(a) J presper Eckert (b) Charles Babbage  
(c) Blaise Pascal (d) Dr Herman Hollerith
75. The time required for a pulse to change from 10 to 90 percent of its maximum value is defined as  
(a) rise time (b) decay time  
(c) propagation time (d) operating speed
76. Stacks cannot be used  
(a) evaluate an arithmetic expression in postfix form  
(b) implement recursion  
(c) convert a given arithmetic expression in infix form to its equivalent postfix form  
(d) allocate resources by the operating system
77. A temporary storage area, attached to the CPU, for I/O operations is a  
(a) channel (b) buffer (c) register (d) core
78. Which of the following computers is least powerful ?  
(a) Mini computer (b) Micro computer  
(c) Main frame computer (d) Super computer
79. In half-duplex data transmission  
(a) data can be transmitted in one direction only  
(b) data can be transmitted in both directions  
(c) data can be transmitted in both directions simultaneously  
(d) data cannot be transmitted
80. Context-free grammar can be recognized by  
(a) finite state automata  
(b) 2-way linear bounded automata  
(c) push down automata  
(d) Both (b) and (a) above
81. In C programming language, which of the following operators has the highest precedence ?  
(a) Unary + (b) \* (c)  $\geq$  (d) =
82. The number of symbols necessary to simulate a turing machine with m symbols and n states is  
(a) mn (b)  $2m(n + m)$   
(c)  $4mn + m$  (d)  $8mn + 4m$
83. Which of the following are the two main components of the CPU?  
(a) Control unit and registers  
(b) Registers and main memory  
(c) Control unit and ALU  
(d) ALU and BUS
84. What will be the value of x and y after execution of the following statements ?  
(C language)  $n = 5; x = b++; y = --x;$   
(a) 5, 4 (b) 6, 5 (c) 6, 6 (d) 5, 5
85. .... introduced the first microprocessor.  
(a) Fairchild (b) Motorola  
(c) Intel (d) National semiconductors
86. The octal equivalent of 111010 is  
(a) 81 (b) 72 (c) 71 (d) 24
87. The process of identifying and correcting mistakes in a computer program is referred to as  
(a) debugging (b) desk checking (c) validation (d) verification
88. Which of the following is not a DBMS ?  
(a) DB2 (b) SYSTEM 2000 (c) CORBA (d) DMS 1100
89.  $2^{50}$  bytes is equivalent to  
(a) 1 tebibyte (b) 1 rubibyte (c) 1 pebibyte (d) 1 yoobibyte
90. Which two files are used during the query operation of DBMS ?  
(a) Data dictionary and transaction log.  
(b) Data dictionary and query language.  
(c) Query language and utilities.  
(d) Data manipulation language and query language
91. If CHAIR is coded as 54321 and TABLE is coded as 63789, how will you write THREE in the same code ?  
(a) 65199 (b) 64199 (c) 56199 (d) 61599
92. If M is N's brother, K is M's sister, O is M's daughter and P is O's brother then, P's uncle will be  
(a) N (b) O (c) M (d) None of these
93. Identify the pattern or order of the category in the following question replace "?" by the appropriate letters provided in the options :  
ADB, EHF, ILJ, ?  
(a) MNO (b) MON (c) MPN (d) OMN
94. UJH is decoded as THE, what word would be decode as OQVMYOVV ?  
(a) NOSITION (b) ADVANCED (c) QUESTION (d) GOODNESS
95. Today is Sunday. After 50 days it will be  
(a) Wednesday (b) Monday (c) Friday (d) Saturday
96. Which of the following is not a parametric test ?  
(a) t-test (b) ANOVA  
(c) Multiple regression (d) Chi square
97. Eight years from now Sita will be twice the age she was six years ago. What is her present age ?  
(a) 4 (b) 8 (c) 12 (d) 20
98. In a certain code TARGET is written as 8 then how will OBJECT be written ?  
(a) 12 (b) 14 (c) 10 (d) 18
99. Choose the pair that shows the same relationship as shown at the top. BEAST : DEN.  
(a) MAN : HOUSE (b) RAT : RABBIT  
(c) CAT : MOUSE (d) TREE : PLANT
100. Find out the missing letter in the following series of letters.  
Y, X, V, U, S, R, P, O, ..... ?  
(a) M, L (b) L, M (c) K, L (d) L, K