ARMIET
Alamuri Ratnamala Institute of Engineering and Technology
(Run by Koti Vidya Charitable Trust)
ISO 9001:2015 CERTIFIED
NAAC ACCREDITED BY GRADE "B+"

Online Dec-exam 2020 [Sample Question Paper For Sem-1] Sub: AM-1

Note: Each Question is Compulsory (Each Question Carrying 2 Marks)

1) $The\ continued\ product\ of\ roots\ (1+i)^{1/3}\ is\ equals\ to$

a) 1

b) 1-i

c) 1+i

d) None of these

2) If $A = \frac{1}{9}\begin{bmatrix} -8 & 4 & 1 \\ 1 & 4 & -8 \\ 4 & 7 & 4 \end{bmatrix}$ is orthogonal then A^{-1} is

a) $\frac{1}{9}\begin{bmatrix} -8 & 4 & 1 \\ 1 & 4 & -8 \\ 4 & 7 & 4 \end{bmatrix}$

b) $\begin{bmatrix} -8 & 4 & 1 \\ 1 & 4 & -8 \\ 4 & 7 & 4 \end{bmatrix}$

c) $\frac{1}{9}\begin{bmatrix} -8 & 1 & 4 \\ 4 & 4 & 7 \\ 1 & -8 & 4 \end{bmatrix}$

d) $\begin{bmatrix} -8 & 1 & 4 \\ 4 & 4 & 7 \\ 1 & -8 & 4 \end{bmatrix}$

3) $If\ \ z = e^x Cosy\ then\ z_x$ is

a) $e^x Cosy$

b) $e^x(-siny)$

c) $e^x siny$

d) None of these

4) $\log(1 + itan\alpha) =$

a) $\log(sec\alpha)$

b) $\log(cos\alpha)$

c) $\log(cos\alpha) + i\alpha$

d) $\log(sec\alpha) + i\alpha$

5) $f(x, y) = x^3 + 3xy^2 - 3x^2 - 3y^2 + 4 \ then \ s = \frac{\partial^2 f}{\partial x \partial y} \ at \ (0,0) \ is$

a) 6

b) minus 6

c) 0

d) both option a and option b correct

6) $7coshx + 8sinhx = 1, \ for \ real \ value \ of \ x \ is$

$a)\ 2log5 \quad b) log5 \quad c)\ 3log2 \quad d)\ 2log3$

7) If $A = \begin{bmatrix} 1 & 2 & -1 & 3 \\ 2 & 4 & 0 & -1 \\ -1 & 0 & -2 & 7 \end{bmatrix}$ then Rank of A is

a) 1

b) 2

c) 3

d) None of these

8) $If\ u = x^2 + xyz + z\ then\ f_x(1,1,1)\ is$

a) 0

b) 1

c) 3

d) None of these

9) $sin^5\theta\ is$

a) $\frac{1}{16}[sin5\theta - 5sin3\theta + 10sin\theta]$

b) $\frac{1}{8}[sin5\theta - 5sin3\theta + 10sin\theta]$

c) $\frac{1}{16}[sin5\theta + 5sin3\theta + 10sin\theta]$

d) $\frac{1}{8}[cos5\theta - 5cos3\theta + 10cos\theta]$

10) $If\ \ z = cos\left(\frac{x}{y}\right) + sin\left(\frac{x}{y}\right), then\ x\ z_x +\ y\ z_y\ is\ equal\ to$

a) z

b) 2z

c) 0

d) 4z

11) $Newton\ Raphson\ formula\ for\ f(x) = 0\ is$

a) $x_{i+1} = x_i - \frac{f(x_i)}{f'(x_i)}$

b) $x = \frac{af(b)-bf(a)}{f(b)-f(a)}\ \ where\ f(a) < 0\ and\ f(b) > 0$

c) $x = \frac{a+b}{2}\ where\ f(a) < 0\ and\ f(b) > 0$

d) $x_{i+1} = x_i + \frac{f(x_i)}{f'(x_i)}$

12) $If\ cos\alpha.cosh\beta = \frac{x}{2}$, $sin\alpha sinh\beta = \frac{y}{2}$ $then\ \sec(\alpha - i\beta) + \sec(\alpha + i\beta)$

$a)\ \frac{4x}{x^2+y^2}$ $b)\ \frac{4y}{x^2+y^2}$ $c)\ \frac{4}{x^2+y^2}$ $d)\ None\ of\ these$

13) If $A = \begin{bmatrix} 2+3i & 2 & 3i \\ -2i & 0 & 1+2i \\ 4 & 2+5i & -i \end{bmatrix}$ is P + Q where P is Hermitian and Q is skew − hermitian is

a) $P = \begin{bmatrix} 2 & 1+i & \frac{4+3i}{2} \\ 1-i & 0 & \frac{3-3i}{2} \\ \frac{4-3i}{2} & \frac{3+3i}{2} & 0 \end{bmatrix}$ and $Q = \begin{bmatrix} 3i & 1-i & \frac{-4+3i}{2} \\ -1-i & 0 & \frac{-3+7i}{2} \\ \frac{4+3i}{2} & \frac{3+7i}{2} & -i \end{bmatrix}$

b) $P = \begin{bmatrix} 3i & 1-i & \frac{-4+3i}{2} \\ -1-i & 0 & \frac{-1+7i}{2} \\ \frac{4+3i}{2} & \frac{1+7i}{2} & -i \end{bmatrix}$ and $Q = \begin{bmatrix} 2 & 1+i & \frac{4+3i}{2} \\ 1-i & 0 & \frac{3-3i}{2} \\ \frac{4-3i}{2} & \frac{3+3i}{2} & 0 \end{bmatrix}$

c) $P = \begin{bmatrix} 2 & 1+i & \frac{4+3i}{2} \\ 1-i & 0 & \frac{3-3i}{2} \\ \frac{4-3i}{2} & \frac{3+3i}{2} & 0 \end{bmatrix}$ and $Q = \begin{bmatrix} 3i & 1-i & \frac{-4+3i}{2} \\ -1-i & 0 & \frac{-1+7i}{2} \\ \frac{4+3i}{2} & \frac{1+7i}{2} & -i \end{bmatrix}$

d) None of these

14) $If\ y = \frac{1}{ax+b}$ $then\ nth\ order\ derivative\ of\ y\ is$

a) $y_n = \frac{(-1)^n.(n-1)!a^n}{(ax+b)^{n+1}}$

b) $y_n = \frac{(-1)^n.n!a^n}{(ax+b)^{n+1}}$

c) $y_n = \frac{(-1)^{n-1}.n!a^n}{(ax+b)^n}$

d) None of these

15) $If\ u = x^2 f\left(\frac{y}{x}\right)\ then$:

a) $x\frac{\partial u}{\partial x} - y\frac{\partial u}{\partial y} = 0.$

b) $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} = 0.$

c) $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} = 1.$

d) $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} = 2u$

16) $With\ usual\ notations, r = \frac{\partial^2 f}{\partial x^2}\ ; s = \frac{\partial^2 f}{\partial x \partial y}\ ; t = \frac{\partial^2 f}{\partial y^2}\quad at\ x = a\ \&\ y = b$

$the\ properties\ of\ maximum\ and\ minima\ under\ various\ conditions\ are$

I	II
$(P)\ Maxima$	$(1)\ rt - s^2 = 0$
$(Q)\ Minima$	$(2)\ rt - s^2 < 0$
$(R)\ Saddle\ Point$	$(3)\ rt - s^2 > 0, r > 0$
$(S)\ Case\ of\ failure$	$(4)\ rt - s^2 > 0, r < 0$

a) $P \to 1, Q \to 3, R \to 4, S \to 2$

b) $P \to 2, Q \to 1, R \to 3, S \to 4$

c) $P \to 3, Q \to 4, R \to 2, S \to 1$

d) $P \to 4, Q \to 3, R \to 2, S \to 1$

17) $Which\ relation\ is\ correct$

a) $tanh^{-1}x = \frac{1}{2}log\left(\frac{1+x}{1-x}\right)$ b) $sinh^{-1}(x) = \log\left(x + \sqrt{x^2 - 1}\right)$

c) $cosh^{-1}(x) = \log\left(x + \sqrt{x^2 + 1}\right)$ d) $None\ of\ these$

18) $If\ u\ \&\ v\ are\ 2\ functions\ of\ x\ having\ nth\ order\ derivative\ then$

$$(uv)_n = u_n v + n u_{n-1} v_1 + \frac{n(n-1)}{2!} u_{n-2} v_2 + \frac{n(n-1)(n-2)}{3!} u_{n-3} v_3 \dots \dots \dots \dots \dots + u v_n$$

$This\ theorem\ is\ known\ as$

a) $Cauchy's\ Theorem$

b) $Leibnitz's\ Theorem$

c) $Euler's\ Theorem$

d) $Lagrange's\ Theorem$

19) $If\ \cos^6\theta + \sin^6\theta = \alpha \cos 4\theta + \beta \quad then\ \alpha - \beta\ is$

a) -1

b) 1

c) $\frac{-1}{4}$

d) $\frac{1}{4}$

20) If $\mathrm{Ax} = \mathrm{B}$ is matrix form of system of equations then equation has unique solution if

a) Rank of $\mathrm{A} =$ Rank of $[\mathrm{A}:\mathrm{B}] \neq$ Number of unknown

b) Rank of $\mathrm{A} =$ Rank of $[\mathrm{A}:\mathrm{B}] =$ Number of unknown

c) Rank of $\mathrm{A} =$ Rank of $[\mathrm{A}:\mathrm{B}]$

d) None of these

21) $nth\ order\ derivative\ of\ y = \frac{x}{(x-1)(x-2)(x-3)}\ \ is$

a) $\frac{1}{2}\frac{(-1)^n.n!}{(x-1)^{n+1}} - 2\frac{(-1)^n.n!}{(x-2)^{n+1}} + \frac{3}{2}\frac{(-1)^n.n!}{(x-3)^{n+1}}$

b) $\frac{1}{2}\frac{(-1)^n.n!}{(x-1)^{n}} - 2\frac{(-1)^n.n!}{(x-2)^{n}} + \frac{3}{2}\frac{(-1)^n.n!}{(x-3)^{n}}$

c) $\frac{(-1)^n.n!}{(x-1)^{n+1}} - 2\frac{(-1)^n.n!}{(x-2)^{n+1}} + \frac{(-1)^n.n!}{(x-3)^{n+1}}$

d) $\frac{(-1)^n.n!}{(x-1)^{n}} - 2\frac{(-1)^n.n!}{(x-2)^{n}} + \frac{(-1)^n.n!}{(x-3)^{n}}$

22) $If\ y = \sin(ax+b)\ then\ nth\ order\ derivative\ of\ y\ is$

a) $-\cos(ax+b)$

b) $-sin(ax+b)$

c) $a^n sin\left(ax+b+n\frac{\pi}{2}\right)$

d) $a^n cos\left(ax+b+n\frac{\pi}{2}\right)$

23) $Log(3+4i)\quad is$

$a)\ Log5 + i\tan^{-1}\left(\frac{4}{3}\right)$ $b)Log5 - i\tan^{-1}\left(\frac{4}{3}\right)$ $c)Log5 +\ i\tan^{-1}\left(\frac{3}{4}\right)$ $d)None\ of\ these$

24) for what value of λ and μ the equations $x+y+z=6, x+2y+3z=10\ \&\ x+2y+\lambda z=\mu$ has unique solution

a) $\lambda = 3$ and $\mu = 10$

b) $\lambda = 3$ and $\mu \neq 10$

c) $\lambda \neq 3$ and any value of μ

d) $\mu = 10$ and any value of λ

25) $System\ of\ equation: a_1x+b_1y+c_1z=d_1; a_2x+b_2y+c_2z=d_2; a_3x+b_3y+c_3z=d_3$ $where\ |a_1| > |a_2|\&|a_3|\ ;\ |b_2| > |b_3\ |\ by\ Gauss\ Sciedal\ Method\ \ is$

a) $x_{i+1} = \frac{1}{a_1}[d_1 - b_1y_i - c_1z_i], y_{i+1} = \frac{1}{b_2}[d_2 - a_2x_i - c_2z_i]\ and\ z_{i+1} = \frac{1}{c_3}[d_3 - a_3x_i - b_3y_i]$

b) $x_{i+1} = \frac{1}{a_1}[d_1 - b_1y_i - c_1z_i], y_{i+1} = \frac{1}{b_2}[d_2 - a_2x_{i+1} - c_2z_i]\ and\ z_{i+1} = \frac{1}{c_3}[d_3 - a_3x_{i+1} - b_3y_{i+1}]$

c) $x_i = \frac{1}{a_1}[d_1 - b_1y_i - c_1z_i], y_i = \frac{1}{b_2}[d_2 - a_2x_{i+1} - c_2z_i]\ and\ z_i = \frac{1}{c_3}[d_3 - a_3x_{i+1} - b_3y_{i+1}]$

d) None of these