Serial No. PCH-17-

ISLAMIC UNIVERSITYOF SCIENCE & TECHNOLOGY
DEPARMENT OF CHEMISTRY

M Sc. (1st Semester) (Mid. Term) **Max. Marks: 30**
Course Title: Mathematics for Chemists (PCH-DCE-105) **Time: 40 min.**
Roll No:

1. If $y = \frac{1}{x^{-4}}$, then $\frac{dy}{dx} = ?$
   a) $4x^3$
   b) $2x^3$
   c) x^3
   d) None

2. If $y = \sin x + \log x$, then $\frac{dy}{dx} = ?$
   a) $\sin x + \log x$
   b) $\sin x + \frac{1}{x}$
   c) $\cos x + \frac{1}{x}$
   d) $\cos x + \log x$

3. $y = e^{\log x}$, then $\frac{dy}{dx} = ?$
   a) $e^{\log x}\frac{1}{x}$
   b) $e^{\log x} + \frac{1}{x}$
   c) $e^{\log x}x$
   d) $e^{\log x}$

4. If $\frac{d^2y}{dx^2} > 0$ and if $\frac{d^2y}{dx^2} < 0$ are characteristics of:
   a) Minimum and Maximum
   b) Maximum and Minimum
   c) Minimum and Minimum
   d) Mixiumum and Maximum

5. The stationary points of $y = \frac{x^4}{4} - \frac{x^2}{2}$ are:
   a) 0; 1; -1
   b) 0; 2; -2
   c) 0; 4; -4
   d) None of the above

6. If for an isobaric process $w = -\int_{v_1}^{v_2} P dv$, then w =?
   a) $-P\Delta V$
   b) $P\Delta V$
   c) $-V\Delta P$
   d) $V\Delta P$

7. Two moles of an ideal gas is expanded reversibly from 1 L to 10 L at 227^0C. Calculate work done in calories:
   a) -4606 cal.
   b) 4606 cal.
   c) 4660 cal.
   d) None

8. If $P_C dc = 4\pi\left(\frac{m}{2\pi kT}\right)^{3/2} e^{\frac{-mc^2}{2kT}} C^2 dc$, the most probable speed is?
   a) $\sqrt{\frac{2kT}{\pi m}}$
   b) $\sqrt{\frac{2kT}{m}}$
   c) $\sqrt{\frac{m}{2\pi kT}}$
   d) None of the above

9. $\int xe^x dx = ?:$
   a) $xe^x - e^x + c$
   b) $xe^x + e^x + c$
   c) $xe^x + c$
   d) None

10. $\int \log x dx = ?$
    a) $x\log x - x + c$
    b) $x\log x + c$
    c) $\log x + x + c$
    d) None

11. $\int_0^4 x dx = ?:$
    a) 4
    b) 6
    c) -4
    d) None

12. $\int x\ln x dx = ?:$
    a) $\frac{x^2}{2}\ln x - \frac{1}{4}x^2 + c$
    b) $\frac{x^2}{4}\ln x - \frac{1}{2}x^2 + c$
    c) $\frac{x^2}{4}\ln x - \frac{1}{4}x^2 + c$
    d) None

Signature of Student **Signature of Invigilator**

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13. $\int \frac{x^3}{\sqrt{1-x^4}} dx = ? :$
    a) $-\frac{1}{2}(1-x^4)^{1/2} + c$
    b) $\frac{1}{2}(1-x^4)^{1/2} + c$
    c) $-\frac{1}{2}(1+x^4)^{1/2} + c$
    d) None

14. $\int \frac{dp}{p} = \int \frac{\Delta H}{RT^2} dT :$
    a) $\ln p = -\frac{\Delta H}{RT} + C$
    b) $\ln p = \frac{\Delta H}{RT} + C$
    c) $\ln p = -\frac{\Delta H}{RT^2} + C$
    d) None

15. $\int e^{-\Delta E/kT} \left(\frac{\Delta E}{kT^2} \right) dT = ?$
    a) $e^{-\frac{\Delta E}{kT}} + c$
    b) $e^{+\frac{\Delta E}{kT}} + c$
    c) $e^{-\frac{\Delta E}{k}} + c$
    d) None of the above

16. If $\psi = A\sin\frac{n\pi x}{a}$, then $\frac{d\psi}{dx} = ?$
    a) $A\left(\frac{n\pi}{a}\right)\cos\frac{n\pi x}{a}$
    b) $A\left(\frac{n\pi}{a}\right)\sin\frac{n\pi x}{a}$
    c) $A\left(\frac{a}{n\pi}\right)\cos\frac{n\pi x}{a}$
    d) None

17. $k = Ae^{\frac{-E_a}{RT}}$ then $\frac{d\ln k}{dT} = ?$
    a) $\frac{E_a}{RT^2}$
    b) $\frac{E_a}{RT^2} + \frac{1}{T}$
    c) $-\frac{E_a}{RT^2}$
    d) None

18. $P = \frac{k}{V}$, then $\frac{d^2P}{dV^2} = ?$
    a) $2kV^{-3}$
    b) $2kV^3$
    c) $2V^{-3}$
    d) None

19. $\frac{dy}{dx} + \sin\left(\frac{dy}{dx}\right) = 0$; order and degree respectively are:
    a) 1, 2
    b) 1, 1
    c) 1, Not defined
    d) None

20. $\int e^x \sin x dx = ?$
    a) $e^x\left(\frac{\sin x - \cos x}{2}\right) + c$
    b) $e^x\left(\frac{\sin x + \cos x}{2}\right) + c$
    c) $\left(\frac{\sin x - \cos x}{2}\right) + c$
    d) $\left(\frac{\sin x + \cos x}{2}\right) + c$

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