

M Sc. (1st Semester) (Mid. Term)

Course Title: Mathematics for Chemists

Roll No:

(PCH-DCE-105)

Max. Marks: 30

Time: 40 min.

1. If $y = \frac{1}{x^{-4}}$, then $\frac{dy}{dx} = ?$
- $4x^3$
 - $2x^3$
 - x^3
 - None
2. If $y = \sin x + \log x$, then $\frac{dy}{dx} = ?$
- $\sin x + \log x$
 - $\sin x + \frac{1}{x}$
 - $\cos x + \frac{1}{x}$
 - $\cos x + \log x$
3. $y = e^{\log x}$, then $\frac{dy}{dx} = ?$
- $e^{\log x} \frac{1}{x}$
 - $e^{\log x} + \frac{1}{x}$
 - $e^{\log x} x$
 - $e^{\log x}$
4. If $\frac{d^2y}{dx^2} > 0$ and if $\frac{d^2y}{dx^2} < 0$ are characteristics of:
- Minimum and Maximum
 - Maximum and Minimum
 - Minimum and Minimum
 - Miximum and Maximum
5. The stationary points of $y = \frac{x^4}{4} - \frac{x^2}{2}$ are:
- 0; 1; -1
 - 0; 2; -2
 - 0; 4; -4
 - None of the above
6. If for an isobaric process $w = -\int_{v_1}^{v_2} P dv$, then $w = ?$
- $-P\Delta V$
 - $P\Delta V$
 - $-V\Delta P$
 - $V\Delta P$
7. Two moles of an ideal gas is expanded reversibly from 1 L to 10 L at 227^oC. Calculate work done in calories:
- 4606 cal.
 - 4606 cal.
 - 4660 cal.
 - 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?
- $\sqrt{\frac{2kT}{\pi m}}$
 - $\sqrt{\frac{2kT}{m}}$
 - $\sqrt{\frac{m}{2\pi kT}}$
 - None of the above
9. $\int xe^x dx = ?$:
- $xe^x - e^x + c$
 - $xe^x + e^x + c$
 - $xe^x + c$
 - None
10. $\int \log x dx = ?$
- $x \log x - x + c$
 - $x \log x + c$
 - $\log x + x + c$
 - None
11. $\int_0^4 x dx = ?$:
- 4
 - 6
 - 4
 - None
12. $\int x \ln x dx = ?$:
- $\frac{x^2}{2} \ln x - \frac{1}{4} x^2 + c$
 - $\frac{x^2}{4} \ln x - \frac{1}{2} x^2 + c$
 - $\frac{x^2}{4} \ln x - \frac{1}{4} x^2 + c$
 - 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. $k = A e^{\frac{-E_a}{RT}}$ 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 $\frac{d^2 P}{dV^2} = ?$

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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