M.Sc. CHEMISTRY
Third Semester
PHYSICAL CHEMISTRY-III
(MSC - 303)

Duration: 20 minutes **Marks – 20**

(PART A - Objective Type)

I. Choose the correct answer: **1×20=20**

1. The electrocapillary maximum is defined as -
   (a) Potential of zero charge
   (b) Potential at which surface tension is maximum
   (c) Summit of the γ vs V curve (parabola)
   (d) All above

2. "The constant capacity with change of potential is a weakness of parallel-plate model", which theory overcame this weakness?
   (a) Helmholtz-Perrin Theory
   (b) Gouy-Chapman Theory
   (c) Stern Theory
   (d) Devanathan Theory

3. In Linear polarization resistance (LPR) technique for measuring corrosion monitoring, the probe used is
   (a) mechanical probe
   (b) electrical probe
   (c) electrochemical probe
   (d) microbial probe

4. Under low field approximation of *Butler-Volmer equation*, current density varies -
   (a) Exponentially with overpotential
   (b) Linearly with overpotential
   (c) Quadratically with overpotential
   (d) None above

5. In polarography DME acts as -
   (a) Reference electrode (b) Working electrode
   (c) Counter electrode (d) None of the above

6. In polarography, if 'm' is the mass of the mercury drop and 't' is the drop time, the diffusion current proportional to
   (a) $m^{2/3}t^{1/3}$ (b) $m^{3/2}t^{1/3}$
   (c) $m^{2/3}t^{1/6}$ (d) $m^{3/2}t^{1/6}$

7. Choose the correct statement.
   (a) production of ATP is exergonic process
   (b) ATP is thermodynamically unstable but kinetically stable
   (c) no ATP is produced in TCA cycle
   (d) all statements are correct

8. Main energy supply during muscle contraction happens from
   (a) ATP (b) Phospho-enol pyruvate
   (c) creatine phosphate (d) GTP

9. The main energy cycle in biological system involves
   (a) NAD^+-NADH (b) ATP-ADP
   (c) Creatine-Creatine phosphate (d) FAD-$FADH_2$

10. During glycolysis number of ATP molecule produced is
   (a) 6 (b) 2 (c) 3 (d) 1

11. The electronic transition corresponding to the highest energy is-
   (a) $\sigma \rightarrow \sigma^*$ (b) $\pi \rightarrow \pi^*$ (c) $n \rightarrow \pi^*$ (d) $n \rightarrow \sigma^*$

12. Intersystem crossing is favoured by-
   (a) Low $S_1 \rightarrow S_2$ energy gap (b) High $S_1 \rightarrow T_1$ energy gap
   (c) Low $S_1 \rightarrow T_1$ energy gap (d) High $S_0 \rightarrow S_1$ energy gap

13. Eosin shows-
   (a) Excimer (b) P-type delayed fluorescence
   (c) E-type delayed fluorescence (d) Both (i) and (ii)

14. Norrish type I cleavage is-
   (a) α-cleavage (b) β-cleavage
   (c) γ-cleavage (d) None of these

15. For P-type delayed fluorescence-
   (a) Low $S_0 \rightarrow S_1$ gap, (b) High $S_0 \rightarrow S_1$ gap,
   (c) Low $S_1 \rightarrow T_1$ gap, (d) High $S_1 \rightarrow T_1$ gap

16. For chemiluminescence, the chemical reaction must be
   (a) endothermic, (b) exothermic,
   (c) product is in the excited state (d) both (ii) and (iii)

17. Critical Forster distance is defined as the distance where energy transfer efficiency is-
   (a) 0.40 (b) 0.50 (c) 0.60 (d) 1.00

18. The rate constant for fluorescence is the lowest for-
   (a) Br (b) I (c) Cl (d) F

19. One Dobson unit (DU) is the thickness of ozone layer that consist of number ozone molecules per unit area is-
   (a) 2.69×10^{16} (b) 2.69×10^{10}
   (c) 3.0×10^{23} (d) 5.0×10^{23}

20. The role of promoter is-

(a) Increases the rate of the reaction
(b) Decreases the rate of the reaction
(c) Increases the activity of the catalyst
(d) Decreases the activity of the catalyst

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