Q1: 16 March (Shift 1) - Numerical

The decomposition of formic acid on gold surface follows first order kinetics. If the rate constant at 300 K is $1.0 \times 10^{-3}\ s^{-1}$ and the activation energy $E_a = 11.488\ kJ\ mol^{-1}$, the rate constant at 200 K is _____$\times 10^{-5}\ s^{-1}$. (Round of to the Nearest Integer).

$\left(\text{Given}: R = 8.314\ J\ mol^{-1}\ K^{-1}\right)$

Q2: 16 March (Shift 2) - Numerical

A and B decompose via first order kinetics with half-lives 54.0 min and 18.0 min respectively. Starting from an equimolar non reactive mixture of A and B, the time taken for the concentration of A to become 16 times that of B is ___ min. (Round off to the Nearest Integer).

Q3: 17 March (Shift 1) - Numerical

For a certain first order reaction 32% of the reactant is left after 570 s. The rate constant of this reaction is ____$\times 10^{-3}\ s^{-1}$. (Round off to the Nearest Integer).

[Given : $\log_{10} 2 = 0.301, \ln 10 = 2.303$]

Q4: 17 March (Shift 2) - Numerical

The reaction $2\ A + B_2 \rightarrow 2AB$ is an elementary reaction.

For a certain quantity of reactants, if the volume of the reaction vessel is reduced by a factor of 3, the rate of the reaction increases by a factor of ____. (Round off to the Nearest Integer).

Q5: 18 March (Shift 1) - Numerical

$2NO(g) + Cl_2(g) \rightleftharpoons 2NOCl(s)$

This reaction was studied at $-10^{\circ}C$ and the following data was obtained

run	$[NO]_0$	$[Cl_2]_0$	r_0
1	0.10	0.10	0.18
2	0.10	0.20	0.35
3	0.20	0.20	1.40

$[NO]_0$ and $[Cl_2]_0$ are the initial concentrations and r_0 is the initial reaction rate.The overall order of the reaction is____.
(Round off to the Nearest Integer).

Q6: 18 March (Shift 2) - Numerical

A reaction has a half life of 1 min. The time required for 99.9% completion of the reaction is_____ min. (Round off to the Nearest integer)

[Use : $\ln 2 = 0.69, \ln 10 = 2.3$]

Answer Key

Q1 (10) **Q2** (108) **Q3** (2) **Q4** (27)

Q5 (3) **Q6** (10)