PD – 165 CV-19
(531) M.Sc. Chemistry (I SEM.)
Term End Examination DEC. 2020
Compulsory/Optional Group- Paper-IV
SPECTROSCOPY & MATHS/BIO FOR CHEMISTRY

Time : Three Hours] [Maximum Marks : 080 [Minimum Pass Marks :029

नोटः– दोनों खण्डों से निर्देशानुसार उत्तर दीजिए। प्रश्नों के अंक उनके दाहिनी ओर अंकित हैं।

Note: Answer From Both the Section as Directed. The Figures in the right-hand margin indicate marks.

खण्ड /SECTION-A

1. Answer the following questions. 1x10

(a) Write the unit of wave number?

(b) Write the name of characterizaton parameters of electromagnetic radiation?

(c) Write the name of two asymmetric tops molecules?

(d) Write the Mathematical expression for moment of INERTIA with special reference to microwave spectroscopy?

(e) Mention Characteristics absorption bands of the carbonyl group in the IR spectra of CH_3COCH_3?

(f) How many normal vibrational modes are possible in the Linear molecule ethane and non-Linear molecule benzene?

[MATHEMATICS FOR CHEMISTS]
(For students without Mathematics in B.Sc)

(g) What is the Value of differential coefficient of $\underline{x + 3 \text{ Sin } x?}$

(h) How many Signals Caw be given by Five different Coloured flag?

(i) if $z = \text{Sin } (x^2y^2)$, then what will be the value of $\frac{dz}{dx} \cdot \frac{dz}{dy}$?

(j) Write differential form of first order reaction?

(BIOLOGY FOR CHEMISTRY)
(For Students without Biology in B.Sc.)

(g) Write the chemical formula of common table Sugar?

(h) Write the Structure of Zwitter z'ow?

(i) What is the number of asymmetric carbon atoms present in the { - D-glucopyranose molecule?

(j) What is the main product of protein upon hydrolysis?

2. Answer the following questions. 2x5 = 10

(a) Calculate quantum of energy, E in Joules, $Jmol^{-1}$, Cal mol^{-1} and ev?

(b) Write the limitations of Microwave Spectroscopy?

(c) State the factors that complicate IR Spectrum?

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(d) if $u = \frac{y}{x}$, Thew prove that $x\frac{du}{dx} + Y\frac{du}{dy} = 0$

(e) Define vector product of two vectors $\vec{A}$ and $\vec{B}$?

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(For students without Biology in B.Sc.)

(d) Explain the high Solubility of sucrose in water?

(e) Explain denaturation and renaturation of proteins?

खण्ड /SECTION-B

Answer the following questions. 12x5 = 60

UNIT - I

3. Explain the following terms.-

(a) Photoelectric effect.

(b) Selection Rules.

P.T.O.

(c) Uncertainty Relation and natural Line width.

OR

Write notes on the following:-
(a) Time Dependent perturbation Theory.
(b) Born - Oppenheimer Approximation.

UNIT - II

4. What is the principle of mutual exclusion? Describe the quantum theory of Raman Spectroscopy ? Why anti-Stokes Lines are weak than Strokes Lines?

OR

Write notes on the following:-
(a) Coherent Anti-Strokes Raman Scattering(CARS).
(b) Effect of Isotopic Substitution on the transition Frequency.

UNIT - III

5. (a) What are the factors affecting band position and intersities for IR region?
(b) Caleulate moment of inertia of CO molecule having isotopic combination $C^{12}O^{16}$? [Given $r_{co} = 1.13\ A^{\circ}$]

"OR"

Why are overtones and hot bands appeared in IR Spectra? Explain P-Q-R branches in IR spectroscopy? Name the Lines arising from $\Delta J = -2, -1, 0, +1\ and + 2\ respectively$?

UNIT - IV

[MATHEMATICS FOR CHEMISTS]

(For students without Mathematics in B.Sc.)

6. (a) Explain dot, cross and triple product?
(b) Find maximum and minimum Values of ; $Y = 2x^2 - 15x^2 + 36x + 10$

"OR"

(a) Define Gradient, Divergence and Curl?
(b) Integrate $\int x^2 \log x\, dx$

UNIT - V

7. (a) Solve the differential equation, $\frac{dx}{dx} = K(a-x)(b-x)$ and find out the valve of rate coustant K for the Second order reaction?
(b) A box contains. 4 red and 3 green balls, all balls are identical except colour. If a person takes out three balls in one attempt, what is the probability that all the three may be red?

OR

(a) The first order chemical reaction obeys the differential equation, $-\frac{dc}{dt} = KC$, Where c is the concentration of the reactant and K is a constant. If the initial concertration is CO moles per litre, find an expression for the time required for half the reactant to react.?
(b) Out of nine digists 1,2,3,4.....9, how many numbers of three digits can be formed?

UNIT - IV

[BIOLOGY FOR CHEMISTS)

(For stuedent without biology in B.Sc.)

6. Explain corbohydrate metabolism with Kreb's cycle?

OR

Write notes on the following:-
(a) Chemical evolution and rise of Living system.
(b) ATP - the Biological Energy currency.

UNIT - V

7. Establish Structure of Cholesterol and Write its functions?

OR

Write Short notes on the following:-
(a) Double helix model of DNA
(b) Secondary and Tertiary Structure of protein.

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