

RJC 1

RAMNIRANJAN JHUNJHUNWALA COLLEGE (Autonomous), GHATKOPAR (W), MUMBAI-400086

F.Y.B.Sc.

SEMESTER-II SE: EXAMINATION MARCH/APRIL- 2019

DAY Monday

SUBJECT:-CHEMISTRY-I RJSUCHE201

TIME:7.30am to 9.30 am

DATE:8.4.19

MAX MARKS: 60

1. Attempt all questions.
2. Figures to the right indicate full marks.
3. Use of log tables or non-programmable calculators is allowed.

Q1. Answer **any three** of the following.

[15]

- A i) Distinguish between ideal and real gas.
ii) State and Explain Boyle's law.
- B Explain Maxwell Boltzmann speed distribution of gas molecules with neat labeled diagrams.
- C Derive Van der Waal's equation.
- D Define- i) homogeneous reaction ii) heterogeneous reaction iii) reversible reaction
iv) irreversible reaction v) entropy
- E Derive the relationship between K_p and K_c .
Calculate the value of K_c for the following reaction:
 $A_{(g)} \rightleftharpoons B_{(g)} + C_{(g)}$ Given: $K_p = 4 \times 10^5$ at $T = 298K$, $R = 8.314 \text{ J.mol}^{-1}.K^{-1}$.

Q.2. Answer **any three** of the following.

[15]

- A. What is qualitative analysis? Explain the method of detection of carbon dioxide gas.
- B. Why paper reagents are more advantageous than liquid and solid reagents? Discuss method of preparation of starch iodide paper.
- C. Explain common ion effect with any one example.
- D. Discuss Lowry-Bronsted concept for acids and bases with suitable example.
- E. Define HSAB concept. Discuss any two applications of HSAB concept.

Q.3. Answer **any three** of the following.

[15]

- A. Explain the mechanism of nitration of benzene.
- B. Discuss the concept of aromaticity with suitable example.
- C. Give the mechanism of addition of HCl to 1-butene.
- D. What happens when propene is treated with?
 - i) per acid followed by H^+
 - ii) O_3 followed by Zn/H_2O .

[P.T.O.]

- E. Explain the following.
 i) Diels Alder reaction
 ii) Conversion of alkyne to cis and trans alkenes.

Q4. Answer **any five** of the following.

[15]

- a i) State the faulty postulates of "Kinetic Theory of Gases".
 ii) Give reason why they are faulty?
- b i) What is chemical equilibrium?
 ii) Calculate the temperature at which the reaction $\text{HgS}_{(\text{red})} \rightleftharpoons \text{HgS}_{(\text{black})}$ comes at equilibrium. The values of enthalpy change, entropy change at the equilibrium are $17.00 \text{ kJ.mol}^{-1}$ and $25.00 \text{ J.mol}^{-1}\text{K}^{-1}$.
- c i) What are spontaneous and non-spontaneous reactions? Explain in terms of ΔG .
 ii) When will be the value of ΔG zero?
- d. Give method of preparation and use of lead acetate paper.
- e. Describe the factors affecting the Lewis acid strength of simple cations.
- f. Explain solvent solute system concept of acids and bases with any one example.
- g) Label the following as aromatic/anti-aromatic/non aromatic.



- h) How will you convert an alkyne to higher alkyne?
 i) Explain Friedel Crafts alkylation.

DAY: Tuesday

TIME: 7.30 am to 9.30 am

DATE: 09.04.2019

MAX MARKS: 60

N.B.: 1. All questions are compulsory.

2. Figures to the right indicate full marks.

3. Use of logarithmic table/ non-programmable calculator is allowed.

1. Answer any three of the following:

[15]

- Explain buffer action and buffer capacity.
- Calculate the pH of a buffer solution containing 0.2 M NH_4OH and 0.25 M NH_4Cl .
(Given $K_b = 1.8 \times 10^{-5}$)
- What are the different energy levels? Explain in detail with the help of suitable diagram.
- Calculate the wavelength, frequency and energy associated with radiation of wave number $1.4 \times 10^5 \text{ m}^{-1}$.
- State and explain law of symmetry with the help of suitable diagrams.

2. Answer any three of the following:

[15]

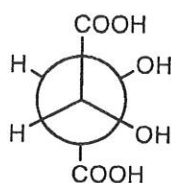
- On the basis of VSEPR theory, predict the shape and bond angle in NH_4^+ .
- What is a covalent bond? Mention the general characteristics of covalent bonds and covalent compounds.
- Discuss the factors affecting polarizing power a cation and polarizability of an anion.
- 20.0 cm^3 of 0.05M Fe^{2+} solution is titrated against 0.05M Ce^{4+} solution. Calculate the emf of the system when (a) 10.0 cm^3 & (b) 25.0 cm^3 of Ce^{4+} solution is added from a burette. (Given: $E^\circ_{\text{Fe}^{3+}/\text{Fe}^{2+}} = +0.77 \text{ V}$ & $E^\circ_{\text{Ce}^{4+}/\text{Ce}^{3+}} = +1.44 \text{ V}$).
- Showing all the steps, balance the following redox reaction occurring in acidic medium. $\text{MnO}_4^- + \text{Fe}^{2+} \rightarrow \text{Mn}^{2+} + \text{Fe}^{3+}$

3. Answer any three of the following:

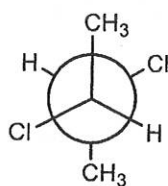
[15]

- Define conformation. Explain conformations of ethane with the help of energy profile diagram.
- Convert the following structures to Fischer and saw-horse projection formulae

a)

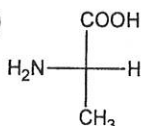


b)

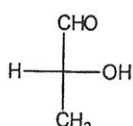


C. a) Assign D/L nomenclature to the following compounds

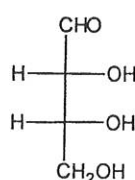
i)



ii)



iii)

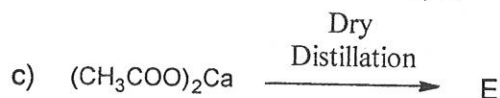
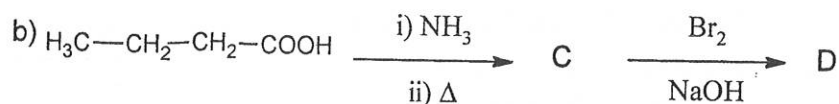
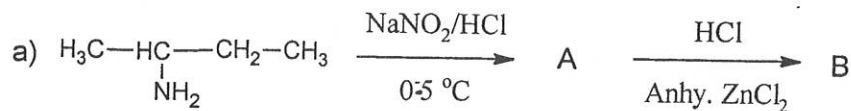


b) Draw the geometrical isomers of pent-2-ene.

D. How will you convert

- Propan-1-ol to 2-bromopropane
- Acetaldehyde to acetone
- Propene to propan-1-ol

E. Complete the following reactions

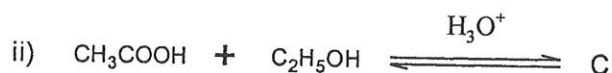
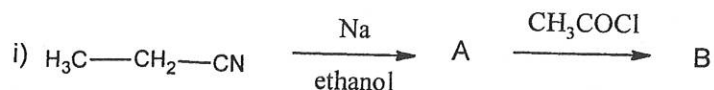


4. Answer **any five** of the following:

[15]

- Calculate the pH of $1 \times 10^{-3} \text{ M NH}_4\text{OH}$ ($K_b = 1.85 \times 10^{-5}$).
- Write a short note on electromagnetic spectrum.
- Define Unit cell and space lattice.
- What do you mean by AB_4L_2 type species? Explain in brief.
- Mention any three limitations of VSEPR theory.
- Calculate : (i) E° for $\text{ClO}_4^- + 6e^- \rightarrow \text{OCl}^-$ & (ii) ΔG° for $\text{ClO}_3^- + 4e^- \rightarrow \text{OCl}^-$ (Given : $E^\circ = +0.36 \text{ V}$ for $\text{ClO}_4^- + 2e^- \rightarrow \text{ClO}_3^-$ & $E^\circ = +0.50 \text{ V}$ for $\text{ClO}_3^- + 4e^- \rightarrow \text{OCl}^-$).
- Draw the erythro and threo forms of 2,3-dichlorobutane.
- How will you convert
 - Ethyl alcohol to ethyl acetate
 - Acetaldehyde to acetaldehyde sodium bisulphite

i. Complete the following reactions



RJC19

RAMNIRANJAN JHUNJHUNWALA COLLEGE, GHATKOPAR (W), MUMBAI – 400 086
(AUTONOMOUS)

SEM II SEMESTER END EXAMINATION MARCH/APRIL 2019

PHYSICS-II

CLASS: F.Y.B.Sc

Course:RJSUPHYP202

DAY : Thursday

TIMINGS: 7:30 am – 9:30 am

DATE: 11 /04 /2019

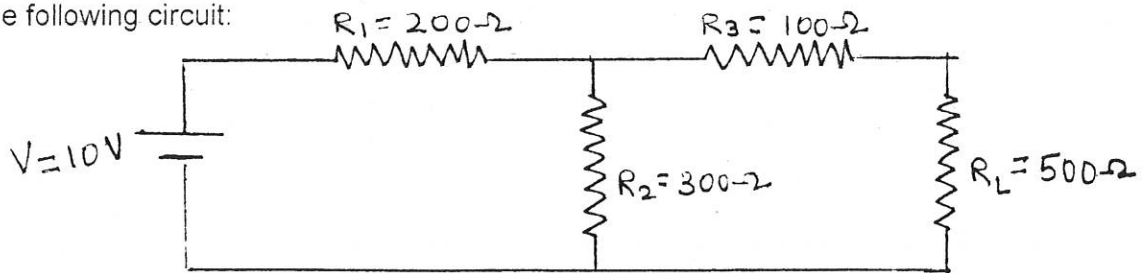
MAX MARKS : 60

- N.B.
1. All questions are compulsory
 2. Figures to the right indicate full marks
 3. Use of non-programmable calculator is permitted
 4. Symbols have their usual meanings unless otherwise stated.

- Q. 1 A Attempt ANY ONE. 8 M
- i. A sinusoidal voltage is applied across a series LR combination. Derive an expression for the total impedance and the current through the circuit. Draw the phasor diagram.
 - ii. Draw an AC bridge. Obtain the conditions required to balance an AC bridge.

- B Attempt ANY THREE. 12 M
- i. A 100 mH inductance is in series with a $100\ \Omega$ resistance and an AC voltage source of frequency 1000 Hz. The input voltage is 2 volt peak. Find the circuit impedance and the r.m.s current.
 - ii. In a De Sauty's bridge, the balance condition is obtained when $R_1 = 1100\ \Omega$, $R_2 = 1650\ \Omega$ and $C_1 = 0.33\ \mu\text{F}$. Find the value of the other capacitor.
 - iii. A series LCR circuit consists of an inductance of 100 mH and self resistance of $50\ \Omega$, a capacitor $0.1\ \mu\text{F}$ and an external resistance of $200\ \Omega$. The supply voltage is 5 volt. Find the resonant frequency, the circuit current at this frequency, Q-factor and bandwidth.
 - iv. Explain sharpness of series resonance hence define Q-factor.
 - v. Obtain the condition of balance for a Maxwell's inductance bridge. Explain sharpness of series resonance hence define Q-factor.

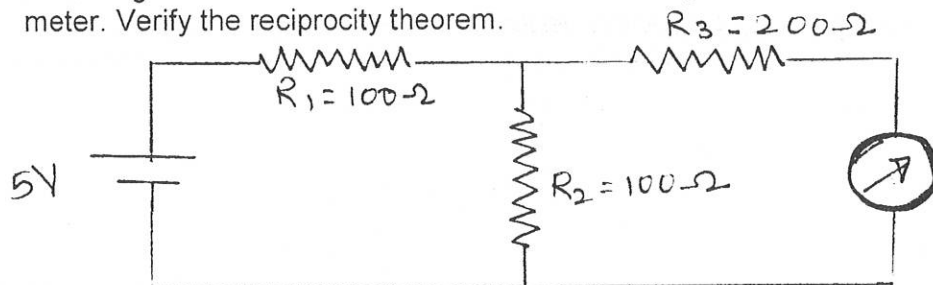
- Q. 2 A Attempt ANY ONE. 08 M
- i. State Thevenin's theorem. Using Thevenin's theorem, determine the load current in the following circuit:



- ii. Discuss construction and operation of full wave bridge rectifier. Obtain an expression for its ripple factor.

- B Attempt ANY THREE. 12 M
- i. Which are the commonly used filters in rectifier circuits? Discuss capacitor filter.
 - ii. Why are the NAND and NOR gates called as universal building blocks? Construct and explain NAND gate as OR gate.
 - iii. Which are the various configurations of a transistor amplifier? Define dc and ac current amplification factors (α_{dc} and α_{ac}) in a CB configuration.

- iv. In a bridge rectifier without filter, each diode has forward resistance 2Ω . The input ac voltage from secondary of transformer is $20\sin 314t$. If the load resistance is 500Ω , find the percentage efficiency of a rectifier.
- v. Following network of resistances has an ideal voltage source and an ideal current meter. Verify the reciprocity theorem.



Q. 3 A Attempt **ANY ONE**.

08 M

- i. Derive the expression for the magnetic field produced at a point, at certain distance from a straight wire of finite length, carrying current. Also, find the expression for the magnetic field, if it is infinitely long straight wire.
- ii. Derive the expression for the total work done in a system of N number of discrete point charges.

B Attempt **ANY THREE**.

12 M

- i. State and explain Coulomb's law. (Write it in both scalar and vector form).
- ii. What are Helmholtz coils? Draw a neat diagram. Show graphically, the variation of magnetic field midway between the coils.
- iii. Calculate the potential energy stored in the system of 3 point charges ($-30\mu\text{C}$, $10\mu\text{C}$, $20\mu\text{C}$), placed at the corners of a triangle with equal sides of 1.2 m.
Given: $\epsilon_0 = 8.85 \times 10^{-12}$ S.I. units.
- iv. State and explain Biot-Savart's law.
- v. Obtain the expression for the work done to move a point charge, from point A to point B, in an electric field of intensity \vec{E} .

*****Best of Luck*****

DAY: FRIDAY

SUBJECT: FOUNDATION COURSE -I

TIME: 7.30am To 9.30am

DATE: 12/04/2019

MAX. MARKS: 60

- Note:
1. Attempt all question
 2. All questions are compulsory.
 3. All questions have internal choice.

- Q.1. Explain the advantages and disadvantages of Globalisation on Indian industry. (15)
OR
- Q.1. Write in detail about the changes in agrarian sector due to globalisation. (15)
- Q.2. Define the term Human Right. Discuss the characteristics of Human Right. (15)
OR
- Q.2. What is Fundamental Right? Explain Right to Freedom in brief. (15)
- Q.3. Explain the term Environmental Degradation? Describe the causes responsible for it. (15)
OR
- Q.3. Define Sustainable Development. Mention important principles and guideline suggested for Sustainable Development. (15)
- Q.4. Describe the meaning and causes of conflict. (15)
OR
- Q.4. Discuss the significance of values in individual development, toward building peace and harmony in society. (15)

RJC19
RAMNIRANJAN JHUNJHUNWALA COLLEGE (AUTONOMOUS),
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F. Y. B. Sc. SEMESTER -II SEM. EXAMINATION, APRIL - 2019

SUBJECT: MATHEMATICS-I

DAY : MONDAY

TIME : 07.30 a. m. to 09.30 a. m.

DATE: 15th April, 2019

MAX. MARKS: 60

Instructions: 1. All questions are compulsory.

2. Figures to the right indicate full marks of the question.

3. Use of a calculator or any electronic device is not allowed.

Q.1. A) Attempt any one.

[08]

(i) Using $\varepsilon - \delta$ definition show that $\lim_{x \rightarrow p} (f \cdot g)(x) = \lim_{x \rightarrow p} f(x) \cdot \lim_{x \rightarrow p} g(x)$, given that $\lim_{x \rightarrow p} f(x)$ and $\lim_{x \rightarrow p} g(x)$ exist.

(ii) State and prove the sandwich theorem for limit of function at a point.

Q.1. B) Attempt any two.

[12]

(i) If $\lim_{x \rightarrow p} f(x) = l$ and $f(x) > 0 \forall x \in \text{domain of } f$, then show that $l \geq 0$.

(ii) Show that $\lim_{x \rightarrow 0} \sin\left(\frac{1}{x}\right)$ does not exist.

(iii) Draw the graph of f when (a) $f(x) = e^x$, $x \in \mathbb{R}$. (b) $f(x) = |2x - 7|$, $x \in \mathbb{R}$.

(iv) Using definition show that (a) $\lim_{x \rightarrow 0} \frac{1}{x^2} = \infty$. (b) $\lim_{x \rightarrow \infty} -5x = -\infty$.

Q.2. A) Attempt any one.

[08]

(i) If $f, g : \mathbb{R} \rightarrow \mathbb{R}$ are functions such that f is continuous at p and g is continuous at $f(p)$, then prove that $g \circ f$ is continuous at p . $p \in \mathbb{R}$. Is the converse true? Justify your answer.

(ii) If $f : [a, b] \rightarrow \mathbb{R}$ is continuous, then show that $\exists c \in [a, b]$ such that $f(c) = \inf_{x \in [a, b]} \{f(x)\}$.

Q.2. B) Attempt any two.

[12]

(i) If $g : [a, b] \rightarrow \mathbb{R}$ is continuous and $g(a) < \lambda < g(b)$, then show that $\exists c \in (a, b)$ such that $g(c) = \lambda$.

(ii) Let $f(x) = \begin{cases} x^2 + 2, & x \geq 0 \\ 8, & x < 0 \end{cases}$ and $g(x) = \begin{cases} 3, & x \geq 0 \\ -3, & x < 0 \end{cases}$. Discuss continuity of f , g , $|g|$, and $f + g$ at 0.

(iii) If $f : [a, b] \rightarrow [a, b]$ is a continuous function, then show that there exists $p \in [a, b]$ such that $f(p) = p$.

- (iv) Let $f(x) = \begin{cases} x^2 \cos \frac{1}{x}, & x \neq 0 \\ 0, & x = 0 \end{cases}$. Then show that f is continuous at 0 using $\varepsilon - \delta$ definition.

Q.3. A) Attempt any **one**.

[08]

- (i) State and prove Cauchy mean value theorem. Further find c in CMVT for $f(x) = \frac{1}{x}$, $g(x) = \frac{1}{x^2}$, $x \in [a, b]$.

- (ii) Let $f : (a, b) \rightarrow \mathbb{R}$ be a differentiable function. Then prove that

(a) f is increasing on (a, b) if $\forall x \in (a, b) f'(x) > 0$.

(b) f is decreasing on (a, b) if $\forall x \in (a, b) f'(x) < 0$.

Q.3. B) Attempt any **two**.

[12]

- (i) Find one sided derivatives of $f(x) = \begin{cases} 3x^2 - 10, & \text{if } x < 5 \\ 4x^2 + 3, & \text{if } x \geq 5 \end{cases}$ at $x = 5$ and state whether f is differentiable at $x = 5$.

- (ii) If $y = e^x \cos x$, then prove that $y_2 - 2y_1 + 2y = 0$ and hence show that $y_{n+2} - 2y_{n+1} + 2y = 0$.

- (iii) Show that the equation $x^3 + 4x + 1 = 0$, $x \in \mathbb{R}$ has exactly one real root.

- (iv) Evaluate the following limits.

(a) $\lim_{x \rightarrow 0} \frac{\ln(\sin x)}{\cot x}$.

(b) $\lim_{x \rightarrow 0} x^x$.

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F.Y.B.Sc.

SEMESTER – II

SE EXAMINATION MARCH/APRIL - 2019

SUBJECT – Botany I

Day : Monday

Date : 15/04 /2019

Time : 07.30 am. To 09.30 a.m.

TOTAL MARKS : 60

N.B.: 1) *All questions are compulsory.*

2) *Draw neat and labelled diagrams wherever necessary.*

3) *All questions carry equal marks.*

Q.1) Answer any TWO Of the following.

(15)

- a) Describe in detail the internal structure (T.S.) of rachis of *Nephrolepis*.
- b) Discuss in brief the asexual reproduction in *Nephrolepis*.
- c) Describe the T.S. of rhizome of *Nephrolepis*.
- d) Write an account on the life cycle of *Nephrolepis*.

Q.2) Answer any TWO Of the following.

(15)

- a) Give an outline of Chamberlain's classification of Gymnosperms. Add a note on general characteristics of Cycadophyta.
- b) With the help of neat labeled diagram, describe- Internal structure of *Cycas* pinna.
- c) Describe in detail – Microsporophyll and Megasporophyll in *Cycas*.
- d) Explain the process of fertilization in *Cycas* and add a note on *Cycas* ovule.

Q.3) Answer any TWO Of the following.

(15)

- a) What is meant by compound leaf? Discuss various types of pinnately compound leaf.
- b) Describe various types of modifications observed in adventitious roots for mechanical functions.
- c) Define stem. Describe various sub-aerial stem modifications.
- d) Give the morphological peculiarities, systematic position, floral formula and two plants of economic importance of family Amaryllidaceae.

Q.4) Answer any THREE Of the following.

(15)

- a) Ramentum
- b) Structure of prothallus in *Nephrolepis*.
- c) Schematic representation of *Cycas* life cycle.
- d) Epigeal seed germination
- e) Leaf modification in Pitcher plant.
- f) Anatomy of *Cycas* stem.

*******Best of Luck *******

DAY: THURSDAY

SUBJECT : STATISTICS - I

TIME: 7.30am – 9.30am

DATE: 18/04/2019

MAX. MARKS: 60

- N.B. 1. All questions are compulsory.
 2. Use of calculator is allowed.
 3. Figures to the right indicate marks.

Q.1 Attempt any TWO sub-questions.

- i) What is correlation analysis? Show that I) $-1 \leq r \leq 1$ II) correlation coefficient is independent of shift of origin and change in scale. (10)
- ii) a) What do you understand by regression analysis? Obtain the regression equation of y on x by method of least square. (07)
 b) How will you fit the equation of type $y = ax^b$? (03)
- iii) Following data is available on a bivariate variable (X,Y) (10)

	X	Y
Mean	40	125
S.D	25	16
	$r=0.85$	

- I) What are the slopes of the regression lines?
 II) Obtain coefficient of determination.
 III) Fit both the regression lines.
 IV) Obtain value of Y when X=45 and value of X when Y=135.
 V) What is the rate of change in Y when X change by 1 unit?
- iv) a) Derive the formula for Spearman's rank correlation coefficient using Karl Pearson's correlation coefficient. (06)
 b) Interpret the various values of r given below:-
 -0.85, 0.4, 0.25, -0.02 (04)

Q.2 Attempt any TWO sub-questions.

- i) Explain the various components of time series with examples. (10)
- ii) a) Explain ratio to moving average method to estimate seasonal variation with its merits and demerits. (08)
 b) Give uses of time series in various disciplines. (02)

P.T.O

- iii) a) Discuss briefly method of semi-averages with merits and demerits. (05)
 b) Draw a trend line by the method of semi-averages from the following data : (05)

Year	2001	2002	2003	2004	2005	2006	2007	2008
Sales (Thousand Units)	100	105	109	96	102	108	112	114

Also, predict the sales for the year 2011 from the graph.

- iv) Discuss briefly with its merits and demerits. (10)
 I) Method of moving averages II) Least square method to estimate linear trend.

Q.3 Attempt any TWO sub-questions.

- i) What are the types of index numbers? Explain I) Weighted aggregate method II) Weighted average of price relative method III) Simple aggregate method to calculate index numbers. (10)
- ii) Explain time reversal test and factor reversal test. Show that Fisher's Index number satisfies time reversal test and factor reversal test. (10)
- iii) a) Write a note on cost of living index number. (05)
 b) The following table gives per capita income and cost of living index for India from 1939 to 1947. Deflate the per capita income with reference to the cost of living index. (05)

Year	Per Capita Income	Cost of living Index (Base 1939)
1939	67	100
1940	70	105
1941	78	117
1942	112	160
1943	139	217
1944	139	216
1945	139	219
1946	137	219
1947	160	258

- iv) Explain the following price index number:- (10)
 I) Laspeyre's index number
 II) Paasche's index number
 III) Fisher's Index number
 IV) Dorbis-Bowley's index number
 V) Marshall-Edgeworth's index number

***** End *****

RAMNIRANJAN JHUNJHUNWALA COLLEGE (AUTONOMOUS), GHATKOPAR (W), MUMBAI- 86
F.Y.B.Sc. SEMESTER II EXAMINATION MARCH/ APRIL 2019

SUBJECT –ZOOLOGY
SUBJECT CODE RJSUZOO201

DAY: Thursday
DATE: 18-4-2019

TIME: 7.30am to 9.30am
MAX MARKS: 60

- NOTE: 1. All questions are compulsory and carry equal marks.**
2. Figures to the right indicate full marks.
3. Draw neat and labeled diagram wherever necessary.

Q.1 Answer the following.

- a) Discuss the general characters of phylum Hemichordata. (08)
b) Describe the salient features of class Cyclostomata. (07)

OR

Q.1 Write short notes on: (15)

- a) Class Ascidiacea
b) Sub-phylum Cephalochordata
c) Sub-phylum Urochordata

Q.2 Answer the following.

- a) Describe the components of ecosystem. (08)
b) State the Competitive exclusion principle. Describe the Gause's experiment to explain the concept. (07)

OR

Q.2 Explain the following: (15)

- a) Population density
b) Sex ratio
c) Natality

Q.3 Answer the following.

- a) Explain classical conditioning with suitable example. (08)
b) Describe the development of bird song. (07)

OR

Q.3 Discuss the following: (15)

- a) Taxes in innate behaviour
b) Habituation-as learned behaviour
c) Camouflage- as protective behaviour

Q.4 Write notes on : (15)

- | | | |
|-----------------------|-----------|---------------------------------|
| a) Class Osteichthyes | OR | a) Characters of class Reptilia |
| b) Food web | OR | b) Predation |
| c) Batesian mimicry | OR | c) Significance of mimicry |

DAY: Saturday

DATE: 20.04.2019

TIME: 7.30-9.30a.m

MARKS: 60

NOTE:

1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Draw neat and labeled diagrams wherever necessary.

Q1. Answer the following.

- a) Describe the various chemical bonds involved in proteins. (08)
- b) Give an account of overview of phospholipids. (07)

OR

Q1. Answer the following

- a) Discuss the functions of vitamin C and its deficiency. (05)
- b) Give brief account of fatty acids along with its nomenclature. (05)
- c) Describe secondary and tertiary structure of proteins. (05)

Q2. Answer the following.

- a) What is health education? Add a note on physical, psychological and social health issues. (08)
- b) Describe various sources of water. (07)

OR

Q2. Write short notes on the following;

- a) Malaria eradication. (05)
- b) Water purification at small scale. (05)
- c) Risk involved with radiations. (05)

Q3. Answer the following.

- a) Describe in detail Polyacrylamide Gel electrophoresis. (08)
- b) Give an account of adsorption chromatography. (07)

OR

Q3. Write short notes on the following;

- a) Incubator. (05)
- b) Working of centrifuge (05)
- c) Microscope- principle and working. (05)

Q4. Write short note on the following;

- | | | | |
|----------------------------------|----|-----------------------------------|------|
| a) Vitamin K | OR | a) Ninhydrin test for aminoacids. | (05) |
| b) Sexually transmitted diseases | OR | b) Dog bite and its treatment. | (05) |
| c) Spectroscopy | OR | c) Applications of pH meter | (05) |
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SUBJECT :- STATISTICS-II

DAY: Saturday

DATE: 20/04/2019

TIME: 7.30am to 09.30am

MAX. MARKS: 60

N.B. (1) All questions are compulsory.

(2) Figure to the right indicate marks.

Q.1 Attempt any TWO sub questions:

20

- (a) (i) If X is a continuous random variable, then $P(X=x) = \dots\dots\dots$
 (ii) Define cumulative distribution function (c.d.f.) for continuous random variable. State its important properties.
 (iii) Which of the following are continuous random variables
 (I) Size of family (II) age in years
 (III) Weight of person (IV) time required to complete task.
- (b) (i) If X is continuous random variable then define
 (I) r^{th} raw moment about zero (II) r^{th} central moment
 (III) skewness and kurtosis.
 (ii) State the relationship between 1st four central moments and 1st four raw moments about zero.
- (c) If X is continuous random variable then define the following terms
 (i) mean (ii) mode (iii) quartiles (iv) deciles (v) Percentile.
- (d) The probability density function of continuous random variable is given by,
 $f(x) = k(2-x) ; 0 \leq x \leq 2$
 $= kx(x-2) ; 2 \leq x \leq 3$
 $= 0 ; \text{otherwise}$
 Find k , mean, c.d.f. and $P(x > 2)$.

Q.2 Attempt any TWO sub-question:

20

- (a) Define rectangular (Uniform) distribution. Obtain its cumulative distribution function and median. Sketch the graph of p.d.f. and c.d.f.
- (b) Define exponential distribution with parameter m . Obtain an expression for mean and variance of the distribution.
- (c) (i) State the p.d.f. of normal distribution.
 (ii) State important properties of normal distribution.
 (iii) State the condition when Binomial distribution can be approximated to Normal distribution.

- (d) (i) Obtain that constant C such that

$$f(x) = C e^{-\frac{1}{2}(x^2 - 4x + 4)} ; \quad -\infty \leq x \leq \infty$$

$$= 0 ; \quad \text{otherwise}$$

is probability density function of normal variate. Also find mean, variance and second quartile (Q_2).

- (ii) "If $X \sim N(\mu, \sigma^2)$ then $P(X > c) = P(X < c)$, where c is any constant". State true or false with reason.

Q.3 Attempt any TWO sub- question:

20

- (a) Explain the following terms with suitable examples (i) parameter (ii) unbiased estimate (iii) estimator (iv) statistic.
- (b) (i) Explain Sampling distribution of sample mean.
(ii) State confidence interval for population Proportion 'P'.
- (c) (i) Define (I) Level of significance (II) Critical region and (III) power of the test.
(ii) Let $x > 0.6$ be the critical region for testing $H_0: \theta = 2$ against $H_1: \theta = 3$ on the basis of a single observation from the population having Probability distribution function,

$$f(x, \theta) = \theta x^{\theta-1} ; \quad 0 < x < 1$$

$$= 0 ; \quad \text{otherwise}$$
Obtain the value of the size of type I and type II error.
- (d) Explain the procedure to test $H_0: \mu = \mu_0$ (specified) considering alternative hypothesis as (i) $H_1: \mu > \mu_0$ (ii) $H_1: \mu < \mu_0$, where μ is population mean.