

Exam Seat No    
Total No. of Pages: 01

Total No. of Questions: 03

Anekant Education Society's  
Tuljaram Chaturchand College of Arts, Science and Commerce, Baramati  
(Autonomous)  
Affiliated to Savitribai Phule Pune University, Pune

Class: FYBA/FYBCom/FYBSc (Plain)/FYBSc (Computer)/FYBVoc/FYBBACA/FYBBA/FYBLib.  
Subject: Functional English : II  
Semester: II  
Subject Code (ENG-154-AEC): Functional English  
(NEP 2024 Pattern)

Time: 1 Hour

(No. of Credit: 2)

Marks: 30

Instructions: a. All questions are compulsory.  
b. Figures to right indicate full marks.

Q. 1. (A) Attempt each of the following.

(04)

1. I speak English. (Change into passive voice)
2. Caesar was killed by his friends. (Change into active voice)
3. They will help you. (Change into passive voice)
4. A case has been filed by the CBI. (Change into active voice)

(B) Attempt each of the following.

(06)

1. His father died. He was very young. (Join the sentences with 'when')
2. I feel happy. India has won the match. (Join the sentences with 'because')
3. Pray to God. You go to school. (Join the sentences with 'before')

Q. 2. Attempt any four of the following.

(12)

1. Sketch the character of Gangu in *The Child*.
2. Write about the character of the narrator in *The Child*.
3. Write about the journey of Najab across the desert in *Love Across the Salt Desert*.
4. Comment on the self assertiveness in the poem *Still I Rise*.
5. What message do you get from *Still I Rise*?
6. What is the significance of war imagery in *Success is Counted Sweetest*?

Q. 3. Attempt any two of the following.

(08)

1. Write a letter to invite your friend to your brother's marriage.
2. Write an email to a travel and tourism company to enquire about a week-long educational trip to Meenakshi temple.
3. Use the following Idioms/Phrasal Verbs in your own sentences:
  - a) to turn off
  - b) to keep well
  - c) to wake up
  - d) to keep well
4. Identify the following words as noun/verb/adverb/adjective:
  - a) walk
  - b) beautiful
  - c) intelligently
  - d) theatre

Exam Seat No.

Total No. of Questions: 3

Total No. of Pages: 1

Anekant Education Society's  
Tuljaram Chaturchand College of Arts, Science and Commerce, Baramati  
(Autonomous)

Affiliated to Savitribai Phule Pune University, Pune

Class: F.Y. B.Sc.

Environmental Science

Semester: II

ENV-151-GEN: Fundamentals of Environmental Biology

(2024 NEP Pattern)

Time: One Hours

(No. of Credits 02)

Max. Marks: 30

**Instructions to the Candidates:**

- I. All questions are compulsory.
- II. Figures to the right indicate full marks.
- III. Draw neat diagrams wherever necessary.

**Q1. (A) Attempt each of the following**

(1 Mark each)

- i. Define Ecology.
- ii. What is a food web?
- iii. What are ecological pyramids?
- iv. Enlist any two types of ecosystems.

**(B) Attempt each of the following**

(2 Marks each)

- i. Describe the concept of 'r' and 'k' species.
- ii. What are biological invasions?
- iii. Explain the importance of ecological adaptations in animals.

**Q2. Attempt any four of the following**

(3 Marks each)

- i. Explain the process of chemical evolution of life.
- ii. What is ecological succession? Give an example.
- iii. Describe the concept of keystone species.
- iv. Explain the structure and function of an ecosystem.
- v. What is predation? Give an example.
- vi. What are bioresources? Mention their types.

**Q3. Attempt any two of the following**

(4 Marks each)

- i. Explain the geological time scale with major eras and periods.
- ii. Describe the different types of terrestrial ecosystems with examples.
- iii. What are biofertilizers and biopesticides? Explain their importance.



Exam Seat No.: 

Total No. of pages: 02

Total No. of Questions: 5

Anekant Education Society's  
Tuljaram Chaturchand College of Arts, Science and Commerce, Baramati  
(Empowered Autonomous)

Affiliated to Savitribai Phule Pune University, Pune

Class: F.Y.B.Sc

Subject: Chemistry

Semester: I

Course Code: USCH111

Course Title: Physical and Inorganic Chemistry  
(2022 Pattern)

(No. of Credits 02)

Max. Marks: 60

Time: Two Hours

Instructions to the candidates:

- a. All questions are compulsory.
- b. Figures to the right indicate full marks.
- c. Neat diagrams must be drawn wherever necessary.
- d. Use of log table and scientific calculator is allowed.
- e. Actual calculations must be shown while solving problems.

Q1. A) Attempt **ALL** of the following. (1 mark each)

[04]

- i. Categorize the following parameters into variables and constants:  
Time, Pressure, Speed of light, Avogadro's number
- ii. What do you mean by compressibility factor?
- iii. What is isolated system?
- iv. Define oxidizing agent.

B) Attempt **ALL** of the following. (2 marks each)

[08]

- i. Determine the pH of 0.0001M HCl solution.
- ii. Give any two applications of liquid crystals.
- iii. Define the : a. Extensive property, b. Molar heat capacity
- iv. How many moles are present in 49 grams of H<sub>2</sub>SO<sub>4</sub>? (atomic mass: H= 1, S=32, O= 16 )

Q2. Attempt **ANY THREE** of the following.

[12]

- i. Give any four statements of first law of thermodynamics.
- ii. If  $\rho = \frac{PM}{RT}$  where P, M and R are constant. Find an equation that describes the slope of  $\rho$  versus T plot.
- iii. Solve  $\int_1^{10} RT \frac{dV}{V}$
- iv. Define vapour pressure of liquid. Discuss the method to measure vapour pressure of liquid by isoteniscope method.

P.T.O.

Q3. Attempt ANY TWO of the following.

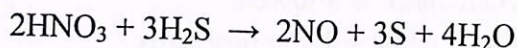
[12]

- Find the expression and draw the graph of linear function having;  
a)  $P_1(1, 1)$ , and  $P_2(2, 2)$ .      b)  $P_1(3, -1)$ , and  $P_2(1, -3)$ .
- 28 g of nitrogen gas are expanded isothermally and reversibly from 5 L to 25 L at 27 °C. Calculate  $q$ ,  $\Delta E$  and maximum work done. [Mol. Wt. of nitrogen = 14,  $R = 8.314 \text{ J K}^{-1} \text{ mol}^{-1}$ ].
- For a gas with van der Waals parameters,  $a = 0.451 \text{ atm L}^2 \text{ mol}^{-2}$ ,  $b = 0.022 \text{ L mol}^{-1}$ . Calculate  $P_C$ ,  $V_C$ , and  $T_C$ . (Given:  $R = 0.082 \text{ L atm K}^{-1} \text{ mol}^{-1}$ ).

Q4. Attempt ANY TWO of the following.

[12]

- Find oxidation state of a) Mn in  $\text{MnO}_2$       b) C in  $(\text{C}_2\text{O}_4)^{2-}$       c) S in  $\text{Na}_2\text{S}_2\text{O}_3$
- Define standard solution. Explain primary and secondary standard substance with suitable examples.
- Find the equivalent weight of oxidant and reductant in the following reaction.

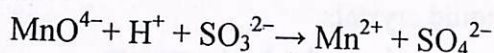


(Given: atomic mass of H=1, S=32, N=14, O=16)

Q5. Attempt ANY ONE of the following.

[12]

- What do you mean by gaseous state? Write ideal gas equation and van der Waals equation. Calculate the pressure exerted by 2 moles of water vapour in 20 liter at 373K using ideal gas equation and van der Waals equation.  
(Given  $a = 5.52 \text{ L}^2 \text{ atm mol}^{-2}$ ,  $b = 0.0304 \text{ L mol}^{-1}$ ,  $R = 0.082 \text{ L atm K}^{-1} \text{ mol}^{-1}$ )
- Give any six rules to find out oxidation number and balance the following reaction by ion-electron method.





Total No. of Questions: 5

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Anekant Education Society's  
Tuljaram Chaturchand College of Arts, Science and Commerce College, Baramati  
(Autonomous)

Affiliated to Savitribai Phule, Pune University, Pune

Class: F.Y.B.Sc

Subject: Organic and inorganic chemistry  
Semester - I

Course Code -CHEM-1102  
(2019 Pattern)

Max. Marks: 60

Time: 2.00 hr.

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**Instructions to the Candidate.**

- i. All questions are compulsory
- ii. Figures to the right indicate full marks
- iii. Neat diagram must be drawn wherever necessary

**Q.1 (A) Attempt the following.**

**(1 Marks each)**

- i. Draw the structures of cis and trans isomers of 2-chloro-butene.
- ii. Define bond length.
- iii. What are alkaline earth metals?
- iv. Draw the structure of 12-crown -4

**(B) Attempt the following.**

**(2 Marks each)**

- i. Define the Saytzeffs Rule with suitable examples
- ii. Draw resonating structures of aniline.
- iii. What is isomerism?
- iv. Give the general electronic configuration for alkali metal?

**Q 2) Attempt any Three of the following**

**(3 Marks each)**

- i. What is the nitration reaction? Explain nitration of benzene with suitable example.
- ii. What are ether? Give their classification with suitable examples.
- iii. What are alkenes? What is the action of following reagents on propene  
H<sub>2</sub>/Pt B. HBr
- iv. Discuss Huckl'e's rule of aromaticity with suitable examples.

**Q 3) Attempt any Two of the following**

**(6 Marks each)**

- i. What is hybridization? Discuss the formation of the Ethane molecule using the concept of hybridization.
- ii. What is the Friedel-Craft reaction? Explain F.C. alkylation with suitable example.
- iii. What are alkanes? How will you prepare n-butane from-  
a) 2-butene b) Ethyl chloride

**Q.4 Attempt any Two of the following**

**(6 Marks each)**

- i. Explain the industrial applications and biological application of alkali metal elements.
- ii. Give the name, symbols, atomic number, and electronics configuration of group IIAelement

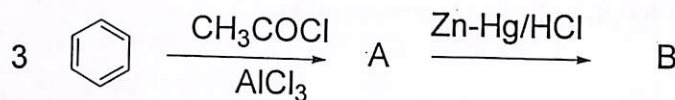
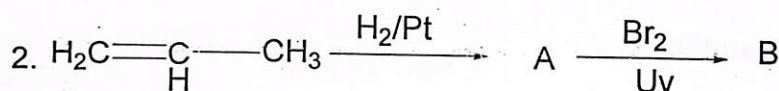
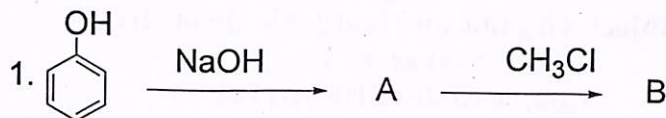
- iii. Draw the structure of 15-crown -5, and 18-crown -6. Explain their use in separation of alkali metals.

Q.5 Attempt any **One** of the following

(12Marks each)

A.i. What is the inductive effect? Explain + I & -I effect with suitable examples.

ii. Identify A and B Product and rewrite the reaction.



OR

A. Draw the skeleton of the long form of periodic table and show the position of following in it. a) s- block b) p- block c) d- block d) f- block element

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Exam. Seat No.

Total No. of Question: 3

Total No. of Pages: 1

Anekant Education Society's  
TuljaramChaturchand College of Arts, Science & commerce Baramati  
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Affiliated to SavitribaiPhule Pune University, Pune

F.Y.B.Sc. Chemistry (Sem. I)

Course Code: CHE- 121-VSC

Course Title: Introduction to Agricultural Chemistry

NEP 1.0 (2023Pattern)

Time :1.00Hours

(No. of Credit 02)

Max.Marks : 30

**Instruction to students:**

1. All questions are compulsory and carry equal marks.
2. Figures to the right indicate full marks.
3. Neat and labeled diagram must draw wherever necessary.

**Q.1. A) Attempt the following**

**( 4 Marks)**

- a) Name any two sources of water pollution.
- b) Define soil.
- c) In urea ..... Essential nutrient is present.
- d) ..... horizons are present in soil.

**B) Answer the following**

**( 6 Marks)**

- a) Give the composition of soil.
- b) Define and explain the water pollution.
- c) Give any two essentialmicronutrients with its function for the growth of plant.

**Q.2 Attempt any four of the following**

**( 12 Marks)**

- a) Write a note on organic pesticides.
- b) Explain how microbial activity affects the soil fertility.
- c) What are the different sources of soil pollution?
- d) Explain the term "Sustainable Agriculture".
- e) Write a note on soil solution.
- f) Give the importance of anion exchange reaction.

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

**( 8 Marks)**

- a) What is acid rain? Explain it with suitable example.
- b) What is fertilizer? Explain the different types of fertilizer.
- c) Write a note on soil colloids.
- d) Explain the factors affecting cation exchange capacity.

[Total No. of Questions: 5]

Seat No-

[Total No. of pages: 2]

Anekant Education Society's  
Tuljaram Chaturchand Arts, Science and Commerce College, Baramati,  
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Affiliated to Savitribai Phule, Pune University, Pune

F.Y.B. Sc CHEMISTRY

SEMISTER-II

USCH122: Organic and Inorganic Chemistry -II

(2022 Pattern)

Time: 2.00 hrs.

(No. of Credits 02)

Max. Marks: 60

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*Instructions to candidates*

1. All questions are compulsory.
2. Figures on the right indicate full marks.
3. Neat diagrams must be drawn wherever necessary.

Q. 1) A) Attempt **each** of the following

(1 marks each)

- i. Draw the structure of glyceraldehydes.
- ii. What are Jones reagents?
- iii. Define asymmetric carbon.
- iv. Define metalloids.

B) Attempt **each** of the following

(2 marks each)

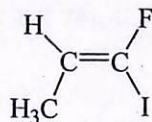
- i. What do you mean by enantiomers?
- ii. Give any two uses of  $H_2/Pt$  reagent.
- iii. How osmium tetroxide is prepared?
- iv. Give the electron configuration of carbon.

Q.2) Attempt **any three** of the following

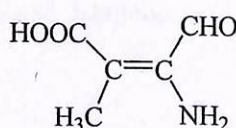
(4 marks each)

- i. What is geometrical isomerism? Give their necessary conditions.
- ii. Write a note on PCC.
- iii. How cis and trans 2-pentene is obtained from 2-pentyne?
- iv. Assign 'E' or 'Z' conformations of the following compound.

1.



2.

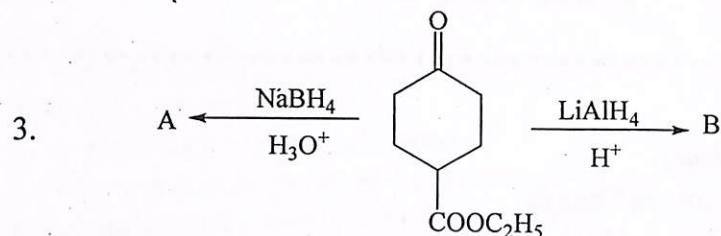
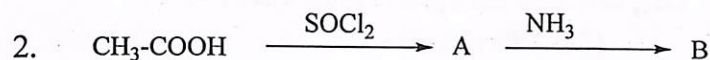
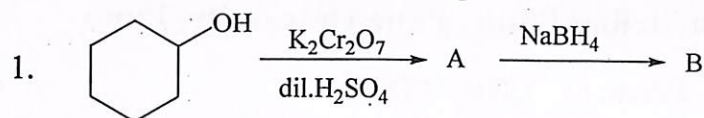




Q. 3) Attempt **any two** of the following

(6 marks each)

- Discuss the conformational isomerism in n-butane with energy profile diagram.
- How epoxide is formed? Give two important uses of epoxides.
- Predict the products from the following reactions.



Q. 4) Attempt **any two** of the following

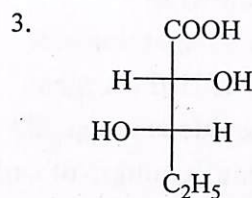
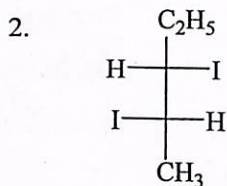
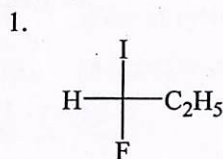
(6 marks each)

- What are allotropes? Explain in detail the different allotropes of carbon.
- Distinguish between diamond and graphite.
- Explain the trends in following properties of VA group elements:
  - Size of atoms and ions
  - Ionization potential

Q. 5) Attempt **any one** of the following

(12 marks each)

- Assign 'R' or 'S' configuration of following compounds



- What is oxyacid? Give the classification of oxyacid of sulphur on structural basis.

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Exam Seat No.:

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Anekant Education Society's  
Tuljaram Chaturchand College of Arts, Science and Commerce, Baramati  
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Affiliated to Savitribai Phule Pune University, Pune

Class: F.Y.B.Sc

Subject: Chemistry

Semester: II

Course Code: CHE-151-GEN

Course Title: Fundamentals of Chemistry II

(NEP 2.0 2024 Pattern)

Time: One Hours

(No. of Credits 02)

Max. Marks: 30

Instructions to the candidates:

- a. All questions are compulsory.
- b. Figures to the right indicate full marks.
- c. Neat diagrams must be drawn wherever necessary.
- d. Use of log table and scientific calculator is allowed.
- e. Actual calculations must be shown while solving problems.

Q1. (A) Attempt all of the following

(04)

- i. What is de Broglie's hypothesis?
- ii. Define oxidizing agent.
- iii. What is resonance effect?
- iv. Define the term tautomerism.

(B). Attempt all of the following

(06)

- i. Calculate the number of protons, number of electrons and number of neutrons are present in atom of a particular element having atomic number 53 and mass number 127.
- ii. Find oxidation number of:  
a. S in  $\text{H}_2\text{SO}_4$       b. Mn in  $\text{MnO}_2$
- iii. Draw the zig-zag structure of n-pentane and 2-butene.



Q2. Attempt any four of the following

(12)

- i. Calculate the uncertainty in the position of electron if uncertainty in its velocity is 0.01 % of velocity of electron. [Given: Mass of electron =  $9.11 \times 10^{-31}$  kg, velocity of electron =  $300 \text{ m s}^{-1}$ ].
- ii. Calculate the frequency, wave number and energy associated with the radiation of wavelength 300 nm. [ $h = 6.626 \times 10^{-34} \text{ J s}$ ,  $c = 3 \times 10^8 \text{ m s}^{-1}$ ]
- iii. Define the term 'mole'. How many moles are present in 49 grams of  $\text{H}_2\text{SO}_4$ ? (Atomic mass: H= 1, S= 32, O = 16).
- iv. Dentist's amalgam is 70% mercury and 30% copper by mass. Find out mole fraction of copper and mercury in dentist's amalgam. [Given: atomic weight of copper = 63.6 and atomic weight of mercury = 200.6]
- v. What is inductive effect? Explain +I and -I effects with suitable examples.
- vi. Discuss the formation of ethane molecule using the concept of hybridization.

Q3. Attempt any two of the following

(08)

- i. What are assumptions of Bohr's theory? Write the expression for the radius of the Bohr's atom.
- ii. What is photoelectric effect? Explain the experimental observations of photoelectric effect.
- iii. Balance the following reaction by ion electron method:  
 $\text{MnO}_4^- + \text{H}^+ + \text{SO}_3^{2-} \rightarrow \text{Mn}^{2+} + \text{SO}_4^{2-}$
- iv. What is intermolecular and intra molecular hydrogen bonding? Explain these with suitable examples.

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Seat No.

Anekant Education Society's  
TULJARAM CHATURCHAND COLLEGE OF ARTS, SCIENCE AND COMMERCE, BARAMATI  
(Autonomous Status)

(Affiliated to Savitribai Phule Pune University, Pune)

F.Y.B.Sc. PHYSICS

Semester-I

PHYSICS Paper-I : PHY-101-MJM: Mechanics and Properties of Matter  
(NEP 2023 Pattern)

Time: 1:00 Hour]

[Max. Marks: 30

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Instructions to the candidates:

- i) All questions are compulsory
  - ii) Draw neat labelled diagrams wherever necessary
  - iii) Figures to the right indicate full marks
  - iv) Use of calculator is allowed
- .....

Q1. Answer the following.

- A) All questions are compulsory. (4)
  - i. Define potential energy.
  - ii. What do you mean by inertia of the body?
  - iii. What is surface tension? Write its unit.
  - iv. State Newton's second law of motion.
- B) All questions are compulsory. (6)
  - i. Show that volume strain is equal to three times longitudinal strain.
  - ii. Name the factors which affect the property of elasticity of a solid.
  - iii. Which are the basic forces in nature.

Q2. Attempt ANY FOUR. (12)

- i. State Hook's law of elasticity and hence define modulus of elasticity.
- ii. State and prove work energy theorem.
- iii. Define Young's modulus, Bulk modulus and Poisson's ratio and obtain relation between them.
- iv. Discuss various applications of surface tension.
- v. What will be the work done in blowing a soap bubble of radius 2 cm, surface tension of soap solution is 0.035 N/m.



- vi. A load of 4 kg is suspended from a ceiling through a steel wire of length 20 m and radius 2mm. It is found that the length of increases by 0.031 mm. Find Young's modulus of steel.

Q2. Attempt ANY TWO.

(8)

- i. Explain change in potential energy in a rigid body motion.
- ii. Obtain an expression for work done during longitudinal strain.
- iii. What amount of energy is liberated if 1000 droplets of water each of diameter  $10^{-8}$  m coalesce to form a one large spherical drop.
- iv. What is the physical significance of Reynold's number?

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Seat No.

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F.Y.B.Sc. PHYSICS

Semester-I

PHYSICS Paper-II : PHY-102-MJM: Electromagnetics  
(NEP 2023 Pattern)

Time: 1:00 Hours]

[Max. Marks: 30

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Instructions to the candidates:

- i) All questions are compulsory
  - ii) Draw neat labelled diagrams wherever necessary
  - iii) Figures to the right indicate full marks
  - iv) Use of calculator is allowed
- .....

Q1. Answer the following.

A) Select correct alternative and rewrite the sentence.

(4)

i) Electric Intensity ( $\vec{E}$ ) is defined as.....

- a)  $\vec{F}/q_0$     b)  $\vec{B}/\mu_0$     c)  $\vec{F}/\epsilon_0$     d)  $\vec{F}/\phi$

ii) ..... is defined as two equal and opposite charges separated by a small distance.

- a) electric intensity    b) electric dipole    c) electric potential    d) dielectrics

iii) Total electric flux  $\phi_E$  by Guass's law in electrostatics is given by.....

- a)  $q_{enc}/\mu_0$     b)  $q_{enc}/\epsilon_0$     c)  $\epsilon_0/q_{enc}$     d)  $\mu_0/q_{enc}$

iv) CO<sub>2</sub> molecule is example of ----- type dielectric.

- a) Acid    b) Polar    c) Non-Polar    d) None

B) All questions are compulsory.

(6)

- i) Define terms line charge density and Surface charge density in electrostatics.
- ii) What is electrostatic force between two balls separated by 8 m apart and each having a charge of  $8\mu\text{C}$ ?
- iii) Define electric polarization ( $\vec{P}$ ) vector and give its SI unit.



**Q2. Attempt ANY FOUR.**

(12)

- 1) State and explain Coulomb's law in electrostatics with vector form.
- 2) State and explain Biot-Savart's law in magnetostatics.
- 3) State Ampere's circuital law with diagram and give its significance.
- 4) Obtain an expression for electric potential due to an electric dipole. Also find potential at any point on equatorial line.
- 5) Two charges of  $+20\text{ C}$  &  $+80\text{ C}$  are at  $18\text{ cm}$  apart from each other. Find the position of the point between them where electric intensity is zero.
- 6) A parallel plate capacitor of plate area  $A=100\text{ cm}^2$  and separation  $d=1.5\text{ cm}$  is charged by a potential of  $60\text{ V}$ . Then the battery is disconnected and the dielectric slab of thickness  $b=0.8\text{ cm}$  and  $k=5$  inserted. Calculate three vectors  $E$ ,  $D$  and  $P$  in the dielectric

**Q3. Attempt ANY TWO.**

(8)

- 1) Four point charges  $10\mu\text{C}$ ,  $15\mu\text{C}$ ,  $10\mu\text{C}$  and  $-20\mu\text{C}$  are placed on the four corners A, B, C, D respectively of a square ABCD of side  $4\text{ m}$ . Calculate the total force on charge  $15\mu\text{C}$  due to other three charges with vector diagram.
- 2) Find magnetic field at the surface of the wire, if an aluminium straight wire of diameter  $0.4\text{ cm}$  carries a current of  $25\text{ ampere}$ .
- 3) Explain with suitable diagram electric polarization in Polar and Non-polar dielectric materials.
- 4) Write comparative note on electrostatic and magnetostatic fields

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Total No. of Questions: 3

Total No. of Pages: 2

Anekant Education Society's  
**Tuljaram Chaturchand College of Arts, Science and Commerce, Baramati**  
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**F. Y. B. Sc.**  
**ELECTRONICS**  
**Semester I**

**ELE-101-MJM: Basic Electronics and Network Theorems**  
**(NEP) (2023 Pattern)**

Time: One Hour

(No. of Credits 02)

Max. Marks: 30

**Instructions to the candidates:**

- i. All questions are compulsory.
- ii. Neat labelled diagrams must be drawn wherever necessary.
- iii. Use of calculator and log table is allowed.

Q1. (A) Attempt **each** of the following

(1 Marks each)

- (i) Define the term: a) Loop b) Node.
- (ii) State working principle of resistor.
- (iii) State KVL.
- (iv) List various types of passive components.

(B) Attempt **each** of the following

(2 Marks each)

- (i) Two resistors of  $25\Omega$  connected in parallel combination, find their equivalent resistance.
- (ii) Draw symbol of ideal DC voltage and current source..
- (iii) State maximum power transfer theorem.

Q2. Attempt any **four** of the following

(3 Marks each)

- (i) Define the parameters frequency, time period, peak value and rms value for ac signal.
- (ii) Determine the value of resistor which are coded
  - A) Brown Red Red Gold
  - B) Brown Black Orange Silver
  - C) Yellow Violet Orange Gold

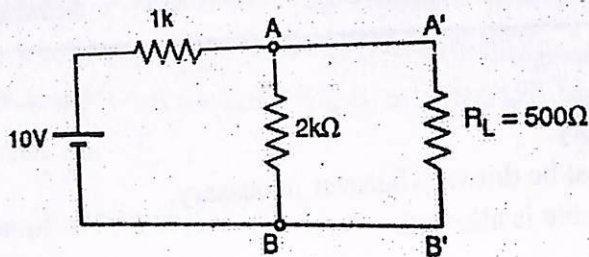


- (iii) Explain high pass filter with its frequency response.
- (iv) What is resonance? Explain working of series LCR circuit with phaser diagram.
- (v) Explain coaxial cable with neat labelled diagram. State its application.
- (vi) Define switch. State and explain types of switch.

Q3. Attempt any two of the following

(4 Marks each)

- (i) Explain 3 band, 4 band, 5 band and 6 band colour code system for resistance value.
- (ii) State thevenin's theorem. Draw the thevenin's equivalent circuit for the following and find current through  $R_L$ .



- (iii) With neat diagram explain the concept of ideal voltage source and current. How do real voltage and current source differ from ideal one?
- (iv) With neat labelled diagram explain working of transformer with its various types.

---XOX---

Seat No	
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Total No. of Pages: 2

**Anekant Education Society's**  
**Tuljaram Chaturchand College of Arts, Science and Commerce, Baramati**  
**(Autonomous)**  
**Affiliated to Savitribai Phule Pune University, Pune**

**Class : F.Y.B.Sc**  
**Subject-Electronics**  
**Semester:-II**  
**Course Code:-ELE -151-GEN**

**Course Title:- Analog and Digital Electronics.**

**(2024 NEP Pattern)**

**(No. of Credit 02)**

**Time: 1.00 hours]**

**[Max marks: 30**

**Instructions to the candidates:**

- 1) All questions are compulsory.
- 2) Neat labelled diagrams must be drawn wherever necessary.
- 3) Use of calculator and log table is allowed.
- 4) Figures to the right indicate full marks.

**Q 1. (A) Attempt each of the following**

**(1 Marks each)**

- i) Define term latch.
- ii) Draw symbol of LED.
- iii) Write Application of counter.
- iv) Define term Flipflop.

**(B) Attempt each of the following**

**(2 Marks each)**

- i) Draw symbol of JFET.
- ii) Give difference between Mux and Demux.
- iii) Write different types of transistor configuration.

**Q2. Attempt any four of the following.**

**(3 Marks each)**

- i) Give difference between register and counter.
- ii) Derive relation for  $\alpha$  of transistor.
- iii) Explain SISO register with suitable diagram.



- iv) Explain how transistor can be work as switch?
- v) With suitable diagram explain working J-K FF.
- vi) Give difference between combination and sequential circuit.

**Q3. Attempt any two of the following.**

**(4 Marks each)**

- i) Explain working of P-N Junction diode with suitable diagram.
- ii) Give difference between Encoder and Decoder.
- iii) Discuss Working 3-bit Up counter using suitable diagram.
- iv) Explain full wave rectifier circuit.

-----**BEST OF LUCK**-----

Total No. of Questions: 3

Exam. Seat No.

Total No. of Pages: 2

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F. Y. B. Sc.

**ELECTRONICS**

Semester II

**ELE-151-MJM: Semiconductor Devices and Circuits**  
(2023 Pattern)

Time: 1.00 Hour

(No. of Credits 02)

Max. Marks: 30

Instructions to the candidates:

- 1) All questions are compulsory.
- 2) Neat labelled diagrams must be drawn wherever necessary.
- 3) Use of calculator is allowed.
- 4) Figures to the right indicate full marks.

Q1. (A) Attempt **each** of the following

(1 Marks each)

- i) Why photodiode operated in reverse bias condition?
- ii) Draw circuit symbol of NPN and PNP transistor.
- iii) What is barrier potential of Si and Ge?
- iv) Draw the diagram of CE configuration for NPN transistor.

(B) Attempt **each** of the following

(2 Marks each)

- i) Give the names of trivalent and pentavalent impurities.
- ii) State fabrication material used for LED.
- iii) Draw energy level diagram of semiconductor and insulator.

Q2. Attempt any **four** of the following

(3 Marks each)

- i) Differentiate between avalanche breakdown and zener breakdown.
- ii) What do you mean by biasing? Explain potential divider biasing.
- iii) Draw the symbol of a) zener diode b) LED c) photodiode d) PN junction diode
- iv) Describe construction and working of PN junction diode with its IV characteristics.
- v) Explain the classification of amplifier on the basis of Q point.
- vi) With neat labelled diagram explain construction and working of NPN transistor.

P. T. O



Q3. Attempt any two of the following

(4 Marks each)

- i) Define doping. Explain how to form p type and n type extrinsic semiconductor in detail.
- ii) Define drain resistance, amplification factor and trans-conductance and obtain relation between them.
- iii) Explain construction and working of n channel depletion mode MOSFET with diagram.

Exam Seat No.

Total No. of Questions: 3

Total No. of Pages: 1

**Anekant Education Society's**  
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**F. Y. B. Sc.**  
**Electronics**  
**Semester II**  
**ELE-152-MJM: Digital Electronic Circuits**  
**(NEP Pattern) 2023**

Time: 01.00 Hours

(No. of Credits 02)

Max. Marks: 30

**Instructions to the candidates:**

- i. *All questions are compulsory.*
  - ii. *Use of calculator is allowed.*
  - iii. *Neat labeled diagrams must be drawn wherever necessary.*
  - iv. *Figures to the right show full marks.*
- 

**Q1. (A) Attempt each of the following**

(1 Marks each)

- (i) What is Demultiplexer?
- (ii) What is Decoder?
- (iii) What do you mean by T flip-flop?
- (iv) Define- Register

**(B) Attempt three of the following**

(2 Marks each)

- (i) Draw JK flip-flop with truth table
- (ii) Draw and explain down Counter
- (iii) Draw Multiplexer 4: 1 with truth table
- (iv) Define decade counter with example

**Q2. Attempt any four of the following**

(3 Marks each)

- (i) Draw and explain "Decimal to BCD Encoder"
- (ii) Draw and explain "1:4 Demultiplexer"
- (iii) With proper diagrams, write priority Encoder
- (iv) With proper example, explain master-slave JK flip-flop.
- (v) Write a note on "SIPO Register".
- (vi) Draw and explain "Ring Counter."

**Q3. Attempt any two of the following**

(4 Marks each)

- (i) Write a note on "BCD to 7 segment encoder".
- (ii) Draw and explain "8:1 multiplexer."
- (iii) Write note on synchronous counter.
- (iv) Draw and explain "Modulus 5 Counter".



Exam Seat No.

Total No. of Questions: 03

Total No. of Pages: 01

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**F. Y. B. Sc.**  
**Zoology**  
**Semester-I**  
**ZOO-101-GEN: Non-chordates**  
**(2024 NEP Pattern)**

**Time: One Hour**

**(No. of Credits: 02)**

**Max. Marks: 30**

**Instructions to the candidates:**

- i. All questions are compulsory*
- ii. Draw neat labelled diagram wherever necessary*
- iii. Figures to the right side indicate full marks.*

**Q.1. (A) Attempt each of the following.** **(1 Mark each)**

- (i) Define Genus.
- (ii) What are ostia?
- (iii) What is diurnal organism?
- (iv) What is function of green glands?

**(B) Attempt each of the following.** **(2 Marks each)**

- (i) Give any four general characters of phylum Protozoa.
- (ii) What is the function of accessory glands?
- (iii) Give functions of buccal receptors of earthworm.

**Q.2 Attempt any four of the following.** **(3 Marks each)**

- (i) Explain six kingdom classification system.
- (ii) Give general characters of phylum Porifera.
- (iii) Give distinguishing features of class Insecta.
- (iv) Give general characters of phylum Mollusca
- (v) Give habit and habitat of earthworm.
- (vi) Sketch and label setae of earthworm.

**Q.3 Attempt any two of the following.** **(4 Marks each)**

- (i) State general characters of phylum Echinodermata and give any one example.
- (ii) State general characters of phylum Annelida and give any one example.
- (iii) Discuss on "General structure of male reproductive system of typical annelid".
- (iv) Discuss on "General structure of nervous system of typical annelid".

\*\*\*\*XOX\*\*\*\*

Exam Seat No.

Total No. of Questions: 03

Total No. of Pages: 01

**Anekant Education Society's**  
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**F. Y. B. Sc.**  
**Zoology**  
**Semester-II**  
**ZOO-151-GEN: Fundamentals of Cell Biology**  
**(2024 NEP Pattern)**

Time: One Hour

(No. of Credits: 02)

Max. Marks: 30

**Instructions to the candidates:**

- i. All questions are compulsory*
- ii. Draw neat labelled diagram wherever necessary*
- iii. Figures to the right indicate full marks.*

Q.1. (A) Attempt each of the following. (1 Mark each)

- (i) Define cell biology.
- (ii) What is exocytosis?
- (iii) Define cytoplasm.
- (iv) Give the function of nucleolus.

(B) Attempt each of the following. (2 Marks each)

- (i) Give the chemical composition of cytoplasm.
- (ii) Give the functions of mitochondria.
- (iii) Enlist the phases of cell cycle.

Q.2 Attempt any four of the following. (3 Marks each)

- (i) Draw a neat labeled diagram of plant cell.
- (ii) Describe the structure of Golgi complex.
- (iii) Describe the structure of peroxisome.
- (iv) Give functions of ribosomes.
- (v) Describe G2-phase of cell cycle.
- (vi) Give the significance of mitosis.

Q.3 Attempt any two of the following. (4 Marks each)

- (i) Give the functions of plasma membrane.
- (ii) Describe the structure of endoplasmic reticulum and give its functions.
- (iii) Give the functions of nucleus.
- (iv) Distinguish between mitosis & meiosis.

\*\*\*\*YOY\*\*\*\*



Seat No.

Total no. of Pages : 1

Total No. of Questions : 3

Anekant Education Society's  
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F. Y. B. Sc. BOTANY  
(Semester - I)  
BOT-101-GEN Plant Diversity  
(NEP 2.0 / 2024 pattern)

Time : 1.00 Hour)

No. of Credits (02)

(Max. Marks : 30

**Instructions to the candidates :**

- i. All questions are compulsory
- ii. Figures to right indicate full marks
- iii. Draw neat labeled diagrams wherever necessary

**Q.1 (A) Attempt each of the following :**

(1 Marks each)

- i) Write habitat of Algae.
- ii) Give definition of Cryptogams.
- iii) What are coralloid roots?
- iv) What is conjugation?

**(B) Attempt each of the following :**

(2 Marks each)

- i) Write types of lichens on the basis of thallus structure.
- ii) Give systematic position of *Rhizopus*.
- iii) Give classification of Gymnosperms.

**Q.2 Attempt any four of the following :**

(3 Marks each)

- i) Write economic importance of angiosperms.
- ii) Give characteristic features of Fungi.
- iii) Draw neat and well labeled diagram of T. S. of Apothecia in Lichen.
- iv) Explain structure of thallus in *Riccia*.
- v) Describe internal structure of stem in *Equisetum*.
- vi) Write economic importance of Gymnosperms.

**Q.3 Attempt any two of the following :**

(4 Marks each)

- i) Describe scalariform conjugation in *Spirogyra*.
- ii) Differentiate between dicotyledons and monocotyledons.
- iii) Describe external morphology of *Cycas*.
- iv) Comment on salient features and economic importance of Bryophytes.

Seat No.

Total No. of Questions: 3

Total No. of Page: 1

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**F. Y. B. Sc. BOTANY**  
**Semester - II**  
**BOT-151-GEN Industrial Botany**  
**(NEP 2.0, 2024 Pattern)**

Time: One Hour

(Number of Credits-02)

Max. Marks: 30

Instructions to the candidates:

- i. *All questions are compulsory.*
- ii. *Figures to right indicate full marks.*
- iii. *Draw a neat labelled diagrams wherever necessary.*

Q.1 (A) Attempt each of the following.

(1Mark each)

- i. Define the term of Industrial Botany.
- ii. Give any two importance of floricultural crops.
- iii. What is Biofertilizer?
- iv. Enlist the natural vegetative propagation.

(B) Attempt each of the following.

(2 Marks each)

- i. Give any four advantages of use of biofuel.
- ii. Comment on organic farming.
- iii. Comment on Dashparniark.

Q.2 Attempt any four of the following.

(3 Marks each)

- i. Write note on Agniashtra.
- ii. Give any four Commercial significances of Biofuel.
- iii. Comment on Ornamental nursery.
- iv. Give the plant resources of food and medicine (two of each resources).
- v. Comment on indoor cultivation practice of *Gerbera*.
- vi. Write any two types of organic Biofertilizer.

Q.3 Attempt any two of the following.

(4 Marks each)

- i. Write in short procedure of Asava preparation.
- ii. Give detailed account of Air layering.
- iii. Give detailed account of vegetable nursery.
- iv. Give advantages and limitations of organic biofertilizer.

\*



Seat No.

Total No. of Questions: 3

Total No. of Page: 1

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**F. Y. B. Sc. BOTANY**  
**Semester - II**  
**BOT-151-GEN Industrial Botany**  
**(NEP 2.0, 2024 Pattern)**

Time: One Hour

(Number of Credits-02)

Max. Marks: 30

Instructions to the candidates:

- i. *All questions are compulsory.*
- ii. *Figures to right indicate full marks.*
- iii. *Draw a neat labelled diagrams wherever necessary.*

**Q.1 (A)** Attempt each of the following.

(1Mark each)

- i. Define the term of Industrial Botany.
- ii. Give any two importance of floricultural crops.
- iii. What is Biofertilizer?
- iv. Enlist the natural vegetative propagation.

**(B)** Attempt each of the following.

(2 Marks each)

- i. Give any four advantages of use of biofuel.
- ii. Comment on organic farming.
- iii. Comment on Dashparniark.

**Q.2** Attempt any four of the following.

(3 Marks each)

- i. Write note on Agniastara.
- ii. Give any four Commercial significances of Biofuel.
- iii. Comment on Ornamental nursery.
- iv. Give the plant resources of food and medicine (two of each resources).
- v. Comment on indoor cultivation practice of *Gerbera*.
- vi. Write any two types of organic Biofertilizer.

**Q.3** Attempt any two of the following.

(4 Marks each)

- i. Write in short procedure of Asava preparation.
- ii. Give detailed account of Air layering.
- iii. Give detailed account of vegetable nursery.
- iv. Give advantages and limitations of organic biofertilizer.

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Total No. of Questions: 03]

Seat No.

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Anekant Education Society's  
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F.Y.B.Sc.

STATISTICS

**STA-101-GEN : DESCRIPTIVE STATISTICS**

(2024 Pattern)

Time: 1 hour

(No. of Credits: 2)

[Max. Marks: 30

N.B. 1) All questions are compulsory.

2) Figures to the right indicate full marks.

3) Use of *statistical tables* and *calculator* is allowed.

Q.1) Attempt each of the following:

A) In each of the following cases, choose the correct alternative: (1 each)

i) If we add 15 in each observation of a set, then the arithmetic mean is..

- a) 15 times the original data                      b) not affected  
c) increased by 15                                      d) decreased by 15

ii) Which one of the following *is not* a measure of dispersion?

- a) Mean deviation                                      b) Range  
c) S.D.    d) First Quartile

iii) The class intervals of the grouped data :

5-9	10-14	15-19	20-24
-----	-------	-------	-------

are of the type.....

- a) inclusive classes                                      b) discrete classes  
c) exclusive classes                                      d) continuous classes

iv) Spearman's rank correlation coefficient lies between

- a) -1 to 1                      b) 0 to 1                      c)  $-\infty$  to  $\infty$                       d) 0 to  $\infty$

B) Answer the following:

(2 each)

i) State Whether the following statements are *True or False* :

- 1) The median is the same as the first quartile.  
2) The second order central moment is variance.

ii) Compute median for the following data:

10, 15, 52, 81, 50, 41, 53, 14, 54, 57, 80, 57, 73

iii) Define 'positively correlated variables' with one illustration.

P.T.O.



Total No. of Questions: 03]

Exam Seat No.

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**F.Y.B.Sc. (SEM-I)**  
**Statistics**

**STA-121-VSC: Introduction to R Programming Language**  
**(2023 Pattern)**

**Time Allowed: 1.00 hrs]**

**(No. of credits:02)**

**[Max Marks: 30**

**Instructions:**

- i) All questions are compulsory.
- ii) Symbols and abbreviations have their usual meaning.

**Q.1) A) Choose the correct alternative of the following:**

**(1 each)**

- i) If  $b = 2:5$ , what is the length of  $b$ ?
  - a) 4
  - b) 7
  - c) 6
  - d) 5
- ii) \_\_\_\_\_ is the function to set row names for a data frame.
  - a) row.names()
  - b) row.namespace()
  - c) row.nam()
  - d) None of the above
- iii) Which of the following is the colour argument?
  - a) cul
  - b) dol
  - c) col
  - d) acol
- iv) If  $y = c(1,5,1,2,3,7,1,2)$  then the result of `unique(y)` command is
  - a) 1 5 2 3 7
  - b) 5 3 7
  - c) 1 2
  - d) 1 7

**B) Answer each of the following:**

**(2 each)**

- i) Create a vector  $x$  of following observations: 60, 33, 24, 27, 40, 42, 41, 37.  
Write R code to sort the observations.
- ii) Create a vector  $y$  of numbers between 1 to 200 which are divisible by 5.
- iii) Write R code to create a file in MS-Excel containing roll number, name for three students and save it as text file. Import this text file in R.

**Q.2) Attempt any four of the following:**

**(3 each)**

- i) We have three vectors  $x = (2, 6, 9)$   $y = (2, 6, 7)$  and  $z = (1, 4, 8)$ . Combine the three vectors to become a  $3 \times 3$  matrix  $A$ , where each column represents a vector.

**[P.T.O]**

**Q.2)** Attempt any four of the following: **(3 each)**

- i) Find an average number of T.V. sets sold by dealer if the number of T.V. sets sold by the dealer on 10 working days are given below:  
1, 4, 0, 5, 2, 3, 4, 5, 0, 3.
- ii) The first four raw moments of a distribution are 1, 4, 10 and 46 respectively. Find mean and variance of the distribution.
- iii) A variable takes values 1, 2, ..., n with frequencies 1, 2, ..., n respectively. Find the standard deviation.
- iv) If  $\text{Var}(X) = 3 = \text{Var}(Y)$  and  $\text{Cov}(X, Y) = 2$  then, find  $\text{Corr}(X, Y)$  i.e. "r" and comment.
- v) Describe the scatter diagram and explain how it is used to measure positive correlation and negative correlation.
- vi) Spearman's rank correlation coefficient between X and Y is  $2/3$ . If the sum of squares of differences between ranks is 55, assuming no rank is repeated, find the number of pairs in the series.

**Q.3)** Attempt any two of the following: **(4 each)**

- i) Distinguish between primary data and secondary data with illustration. Also, discuss one of the methods of collecting primary data.
- ii) For a frequency distribution, Karl Pearson's Coefficient of skewness is -0.6, the mean is 70, the standard deviation is 2. Find mode and median.
- iii) Two samples of sizes 40 and 50 have the same mean but different standard deviations 19 and 8 respectively. Find the standard deviation of the combined group.
- iv) For two observations  $a$  and  $b$  arithmetic mean and geometric mean are 6.5 and 6 respectively. Find  $a$  and  $b$ . Also, find the harmonic mean.

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Total No. of Questions: 03]

Exam Seat No.

[Total No. of Pages: 02

**Anekant Education Society's  
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F.Y.B.Sc. (SEM-I)**

**Statistics**

**STA-121-VSC: Introduction to R Programming Language  
(2023 Pattern)**

**Time Allowed: 1.00 hrs]**

**(No. of credits:02)**

**[Max Marks: 30**

**Instructions:**

- i) All questions are compulsory.
- ii) Symbols and abbreviations have their usual meaning.

**Q.1) A) Choose the correct alternative of the following:**

**(1 each)**

- i) If  $b = 2:5$ , what is the length of  $b$ ?  
a) 4                      b) 7                      c) 6                      d) 5
- ii) \_\_\_\_\_ is the function to set row names for a data frame.  
a) row.names()                      b) row.namespace()  
c) row.nam()                      d) None of the above
- iii) Which of the following is the colour argument?  
a) cul                      b) dol                      c) col                      d) acol
- iv) If  $y = c(1,5,1,2,3,7,1,2)$  then the result of `unique(y)` command is  
a) 1 5 2 3 7                      b) 5 3 7  
c) 1 2                      d) 1 7

**B) Answer each of the following:**

**(2 each)**

- i) Create a vector  $x$  of following observations: 60, 33, 24, 27, 40, 42, 41, 37.  
Write R code to sort the observations.
- ii) Create a vector  $y$  of numbers between 1 to 200 which are divisible by 5.
- iii) Write R code to create a file in MS-Excel containing roll number, name for three students and save it as text file. Import this text file in R.

**Q.2) Attempt any four of the following:**

**(3 each)**

- i) We have three vectors  $x = (2, 6, 9)$   $y = (2, 6, 7)$  and  $z = (1, 4, 8)$ . Combine the three vectors to become a  $3 \times 3$  matrix  $A$ , where each column represents a vector.

**[P.T.O]**

- ii) Explain the following R command with an illustration
- rep
  - length
  - prod
- iii) Write R code to create a vector of age of 10 persons for the following data.  
25, 30, 31, 40, 22, 28, 48, 50, 27, 34
- What is the length of above vector.
  - List the persons whose age is greater than 30.
- iv) Write R code to draw stem and leaf plot for the following data on the box score of a basketball game.  
2 3 16 23 14 12 4 13 2 0 0 0 6 28 31 14 4 8 2 5
- v) Explain the R command with an illustration: sort(), unique(), prod().
- vi) Create a vector x with elements 1, 3, 2, 4, 7, 6, 8 and create vectors y, z, w from using  $y = x^2$ ,  $z = 1/x$ ,  $w = \log_{10} x$ .

Q.3) Attempt any two of the following:

(4 each)

- i) Write R code to draw Pie chart for the following data.

Housing	Food	Cloths	Entertainments	other
600	300	150	100	200

- ii) Write a R code to draw a histogram for the above data.

Outputs(Units)	200-225	225-250	250-275	275-300	300-325	325-350
No. of workers	12	21	25	40	49	28

- iii) Explain the following R command with illustration: Var(), fivenum(), prod(), unique().
- iv) Write a R code for the following :  
Create a data frame containing employee name, department and dearness allowance for 5 employees. Find the list of employees with dearness allowance > Rs.5000.

employee name	department	dearness allowance
Amrish	HR	7600
Divya	IT	5500
Sham	Finance	4700
Ram	Sales	6200
pavan	Marketing,	5000

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Total No. of Questions : 03]

Seat No.

[Total No. of pages: 03

Anekant Education Society's  
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F.Y.B.Sc.(Sem-II) Statistics  
STA-152-MJM: Discrete Probability and Probability Distributions - II  
(NEP Pattern)

Time Allowed: 1.30 Hrs

Max Marks: 30

**Instructions:**

- i) All questions are compulsory.
- ii) Figures to the right indicate full marks.
- iii) Use of scientific calculator and Statistical table is allowed.
- iv) Symbols and abbreviations have their usual meanings.

**Q.1 ) Attempt each of the following:**

- a) In each of the following cases, choose the correct alternative: [1 each]
- i) Two discrete random variables X and Y are said to be independent if
- |   |  |
|---|--|
| A] $P_{ij} = P_i + P_j$ for all i and j | B] $P_{ij} = P_i \times P_j$ for all i and j |
| C] $P_{ij} = P_i / P_j$ for all i and j | D] $P_{ij} = P_i - P_j$ for all i and j      |
- ii) In case of Binomial distribution the relation between mean and variance is
- |                    |                  |
|--------------------|------------------|
| A] Mean=Variance   | B] Mean>Variance |
| C] Mean=2×Variance | D] Mean<Variance |
- iii) If  $X \sim P(m=5)$ , then mode of the distribution is
- |        |        |
|--------|--------|
| A] 2.5 | B] 4,6 |
| C] 4,5 | D] 6   |
- iv) If X and Y are two discrete random variables with  $E(X)=4$  and  $E(Y)=10$  then  $E(2X-Y+5)$  will be
- |       |       |
|-------|-------|
| A] -6 | B] -3 |
| C] 2  | D] 3  |

P.T.O.

b) Attempt the following

[2 each]

- Show that when  $X$  and  $Y$  are independent, the conditional distribution of  $X$  given  $Y=y$ , is the marginal distribution of  $X$ .
- If  $X \sim B(n, p)$  with  $E(X)=6$  and  $\text{Var}(X)=2$  then find value of ' $n$ ' and ' $p$ '.
- What is meant by a Bernoulli trial? Give an illustration.

Q.2) Attempt any four of the following:

[3 each]

- State and prove additive property of Poisson distribution.
- Let  $(X, Y)$  be a bivariate discrete random variable with joint p.m.f.

$$P(x, y) = \frac{\binom{10}{x} \binom{5}{y} \binom{5}{4-x-y}}{\binom{20}{4}}; X = 0, 1, \dots, 10; Y = 0, 1, \dots, 4; X+Y \leq 4$$

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

Find marginal p.m.f.'s of  $X$  and  $Y$ .

- If  $X \sim B(n_1, p)$ ,  $Y \sim B(n_2, p)$ .  $X$  and  $Y$  are independent, then show that, the conditional distribution of  $X$  given  $X+Y \sim H(N, M, n)$  where  $N=n_1+n_2$  and  $M=n_1$ .
- Define Bernoulli distribution. Also show that all raw moments of a Bernoulli ( $p$ ) random variable are same and equal to ' $p$ '.
- The joint p.m.f. of  $(X, Y)$  is given below:

X \ Y	Y		
	1	2	3
-1	1/4	1/3	1/6
1	1/6	0	1/12

- Find
- conditional mean of  $X$  given  $Y=2$
  - conditional variance of  $X$  given  $Y=2$

- If a probability that a boy is throwing stones at a target and miss the target at any throw is 0.6. What is the probability that he will hit the target at 4<sup>th</sup> attempt for the first time? Also find expected number of throws required to hit the target for the first time.



Q.3) Attempt any two of the following:

- a) Let  $X$  and  $Y$  be two independent binomial variables with parameters  $(n_1=5, p=0.4)$  and  $(n_2=6, p=0.4)$  respectively. Find i)  $P(X+Y=4)$

ii)  $P(X=1/X+Y=7)$

- b) If  $M_X(t) = e^{5(e^t-1)}$  is m.g.f. of a discrete random variable, find  $P(X \geq 3)$  and modal value of  $X$ .

- c) A basket contains 5 Apples, 4 Mangoes and 3 Oranges. Two fruits are selected randomly from the basket with replacement. If the number of Apples and Oranges selected are denoted by  $X$  and  $Y$  respectively.

- i) Obtain joint probability distribution of  $(X, Y)$ .  
ii) Calculate probability of selecting at the most one apple.

- d) The joint probability distribution of  $(X, Y)$  is as given below :

$X/Y$	-1	0	1
0	0.1	0.2	0.3
1	0.1	0.1	0.2

Find

- i) Marginal probability distributions of  $X$  and  $Y$ .  
ii)  $E(X)$ ,  $E(Y)$ ,  $E(XY)$ ,  $\text{Corr}(X, Y)$

\*\*\*\*\*

Seat No.:

Total No. of Questions: 03

Total No. of Pages: 01

Anekant Education Society's  
**Tuljaram Chaturchand College of Arts, Science and Commerce, Baramati.**  
(Autonomous)

Affiliated to Savitribai Phule Pune University, Pune.

F.Y.B.Sc.

MATHEMATICS

Semester – I

MAT-101-GEN: *Algebra and Calculus*  
(2024 Pattern)

*Time: 1 Hours]*

*[Max. Marks: 30*

*Instructions to the Candidates:*

- 1) *All questions are compulsory.*
- 2) *Figures to the right indicate full marks.*
- 3) *Use of non-programmable scientific calculator is allowed.*

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**Q1) A)** Attempt the following. (1 mark each) [04]

- a) Define the binary relation.
- b) State the De Morgan's theorem.
- c) Show that if  $x$  and  $y$  are rational numbers then  $xy$  is also a rational number.
- d) Define: Sequence.

**B)** Attempt the following. (2 mark each) [06]

- a) Find the gcd of 56 and 72.
- b) Write all the elements of  $\mathbb{Z}_{15}^*$ .
- c) Prove that the following limit does not exist  $\lim_{x \rightarrow 0} \frac{|x|}{x}$ .

**Q2)** Attempt any *FOUR* of the following. (3 mark each) [12]

- a) Let  $A = \{1, 2, 3\}$  and  $B = \{a, b\}$ . Find  $A \times B$  and  $B \times A$ .
- b) State and prove Euclid's lemma.
- c) Solve  $(\overline{11})^{-1} \cdot_{15} \overline{7} +_{15} \overline{10}$ .
- d) Prove that  $\sqrt{7}$  is an irrational number.
- e) Find all  $x$  that satisfy the inequality  $|x + 1| < 3$ .
- f) Give an example of a bounded sequence which is not convergent.

**Q3)** Attempt any *TWO* of the following. (4 mark each) [08]

- a) Prove that the sum of first  $n$  positive integers is  $\frac{n(n+1)}{2}$ .
- b) Prove that  $z\bar{z} = |z|^2$ .
- c) Evaluate  $\lim_{x \rightarrow 1} (x - 4)/(3x + 1)$ . Justify your answer.
- d) Using the definition of a limit of a sequence, prove that  $\lim_{n \rightarrow \infty} \frac{1}{n^2 + 1} = 0$ .





Total No. of Questions: 03

Exam Seat No.

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Anekant Education Society's  
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F. Y. B. Sc.

**MICROBIOLOGY Semester: I**  
**MIB-101-GEN: Introduction to Microbiology**  
(2024 NEP Pattern)

Time: 01 Hour

(No. of Credits – 02)

Max. Marks: 30

*Instructions to the candidates:*

1. All questions are compulsory.
2. Draw neat labelled diagrams wherever necessary.

**Q1. (A) Attempt each of the following:**

[1 Mark each]

- i) Define: Probiotics
- ii) Write an example of archaeobacteria.
- iii) Who discovered cells?
- iv) What is the normal flora of the human body?

**(B) Attempt each of the following:**

[2 Marks each]

- i) State whether the following statements are true or false:
  - a) Biofertilizers promote plant growth.
  - b) The classification of bacteria is described in Bergey's manual of determinative bacteriology.
- ii) Match the following:

a) Alexander Flemming	- Sulfonamides
b) Gerhard Domagk	- Streptomycin
	- Penicillin
- iii) Fill in the blanks:
  - a) Which of the following microbes are used in the preparation of biopesticides?
    - i) *Escherichia coli*    ii) *Lactobacillus bulgaricus*    iii) *Bacillus thuringiensis*
    - iv) None of the above
  - b) \_\_\_\_\_ are obligate intracellular parasites.
    - i) Bacteria    ii) Fungi    iii) Protozoa    iv) Viruses

**Q2. Attempt any four of the following:**

**[3 Marks each]**

- i) Describe Louis Pasteur's Swan-necked flask experiment.
  - ii) Write any four general characters of bacteria.
  - iii) Write any four general characters of Protozoa.
  - iv) Draw a neat, labelled diagram of eukaryotic cell.
  - v) Describe methanogens.
  - vi) Diagrammatically represent a fermenter.
- 

**Q3. Attempt any two of the following:**

**[4 Marks each]**

- i) Describe Redi's three-jar experiment.
- ii) Describe Koch's postulates.
- iii) Draw a neat, labelled diagram of the steps in genetic engineering.
- iv) Describe the general characteristics of viruses.



Exam. Seat No.

Total No. of Questions :3

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Anekant Education Society's  
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Class: FYBSc  
Subject: Microbiology  
Semester -I  
Course Code: MIB-102-MJM  
Course Title: Basic Techniques in Microbiology  
(NEP Pattern)

Time: 1 Hour

(No. of Credits 02)

Max. Marks:30

Instructions to the candidates: (If any)

- i. All questions all compulsory
- ii. Draw a neat labeled diagram whenever necessary

Q1. (A) Attempt each of the following

(1 Marks each)

- (i) Define: Microscope.
- (ii) Give two examples of basic stain.
- (iii) \_\_\_\_\_ method is used for capsule staining.
- (iv) Define: Sterilization

(B) Attempt each of the following

(2 Marks each)

- (i) Write the role of mirror in microscope.
- (ii) Give two examples of halogen compounds used for sterilization.
- (iii) Define: Accentuator.

Q2. Attempt any four of the following

(3 Marks each)

- (i) Explain sterilization by filtration.
- (ii) Write the principle of negative staining.
- (iii) Write down the mode of action on alcohol as disinfectant.
- (iv) Write a short note on mechanical parts of dark field microscope.
- (v) Write the procedure of monochrome staining.
- (vi) Draw a neat labeled diagram of bright field microscope.

Q3. Attempt any two of the following

(4 Marks each)

- (i) Explain working of autoclave.
- (ii) Write down the principle of Gram staining.
- (iii) Write a note on ideal characters of disinfectant
- (iv) Explain the image formation in bright field microscopy.



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**MICROBIOLOGY Semester: I**  
**MIB-121-VSC: Agricultural microbiology**  
(2023 NEP 1.0 Pattern)

Time: 1 Hour

(No. of Credits – 02)

Max. Marks: 30

**Instructions to the candidates:**

1. All questions are compulsory.
2. Draw neat labelled diagrams wherever necessary.

**Q1. A) Attempt each of the following**

(1 Marks each)

- (i) Which type of soil has low nutrient content and low water-holding capacity?
- (ii) \_\_\_\_\_ is a symbiotic nitrogen fixing bacterium.  
a. *Azotobacter*   b. *E. coli*   c. *Rhizobium*   c. *Penicillium*
- (iii) Write any two examples of plant pathogenic molds.
- (iv) State whether the following statement is true or false: *Xanthomonas citri* is a pathogen of citrus fruits and causes citrus canker disease.

**B) Attempt each of the following**

(2 Marks each)

- (i) Define: Biofertilizers.
- (ii) Enlist the essential elements required for plant growth promotion.
- (iii) Write the methods of soil formation.

**Q2. Attempt any four of the following**

(3 Marks each)

- (i) Write a note on blue-green algae biofertilizer.
- (ii) Draw a neat, labelled diagram showing different zones of the rhizosphere.
- (iii) Describe briefly about 'Sandy' type of soil.
- (iv) Write a note on genetically modified crops.
- (v) Write the role of different plant growth-promoting microorganisms in fertility improvement.
- (vi) Write a note on the use of advanced techniques for crop improvement.

**Q3. Attempt any two of the following**

(4 Marks each)

- (i) With a suitable example write the importance of biofertilizer in agriculture.
- (ii) Write the advantages of the use of biocontrol agents in agriculture.
- (iii) Describe briefly the scope of agricultural microbiology.
- (iv) With a suitable example, explain the difference between symbiotic and non-symbiotic nitrogen fixation.



Total No. of Questions: 03

Exam Seat No.

Total No. of pages: 02

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**F. Y. B. Sc.**  
**MICROBIOLOGY Semester: II**  
**MIB-151-MJM: Basic Biochemistry and Bacterial Cytology (NEP Pattern)**  
**(No. of Credits – 02)**

Time: 01.30 Hours

Max. Marks: 30

**Instructions to the candidates:**

1. All questions are compulsory.
2. Draw neat labelled diagrams wherever necessary.

**Q1. (A) Attempt each of the following:**

**[1 Mark each]**

- i) What are enzymes?
- ii) Write an example of anabolic reaction.
- iii) What is spirochetal motility in bacteria?
- iv) What does DNA and RNA stands for?

**(B) Attempt each of the following:**

**[2 Marks each]**

**i) Match the following:**

- |                           |                       |
|---------------------------|-----------------------|
| a) Endospore              | - inorganic phosphate |
| b) Metachromatic granules | - resting cell        |
|                           | - vegetative cell     |

**ii) State whether true or false:**

- a) Gas vesicles in cyanobacteria help bacteria to float on the water surface.
- b) Production of energy by degradation of fatty acids is an example of a catabolic reaction.

**iii) Fill in the blanks:**

- a) Which of the following organ is involved in conjugation in bacteria?

i) flagella   ii) capsule   iii) pili   iv) slime layer

- b) Identify the organic acid from following:

i) Acetic acid   ii) Hydrochloric acid   iii) Sulfuric acid   iv) Nitric acid

Total No. of Questions: 03

Exam Seat No.

**Q2. Attempt any four of the following:**

**[3 Marks each]**

- i) Draw a neat labelled diagram of cell membrane of bacteria.
- ii) Define buffer. Give any two examples.
- iii) What are the different flagellar arrangements present in bacteria?
- iv) Write any four functions of proteins.
- v) What are plasmids? Write its function.
- vi) Explain covalent bond formation.

**Q3. Attempt any two of the following:**

**[4 Marks each]**

- i) Describe the structure and functions of bacterial flagella in Gram positive bacteria.
- ii) What are carbohydrates? Describe polysaccharides.
- iii) Describe the structure and functions of cell wall of Gram positive bacteria.
- iv) Describe ionic bond formation.