

B.Sc. VI Semester Degree Examination, May/June - 2019

PHYSICS

Nuclear Physics, Solid state Physics, Astro Physics and Bio Physics

Paper No:6.1

(New)

Time : 3 Hours

Maximum Marks : 80

Instructions to Candidates:

Answer the questions of section A in first two pages only.

SECTION - A

Answer the following:

(15×1=15)

1. Define packing fraction.
2. What is the Dimension of the nucleus?
3. What is a neutrino?
4. What is the range of a α particle?
5. Define dead time of a G.M. counter.
6. How is quenching removed in a G.M. counter?
7. What is Quack model?
8. What is a meson?
9. What is a wind mill?
10. Define Bravais lattice.
11. What is hysteresis loop in magnetism?
12. What is super conductivity?
13. What is a Black hole?
14. Define membrane potential of a cell.
15. What are nucleic acids?

[P.T.O.]

(2)

SECTION - B

(5×5=25)

Answer any **Five** of the following:

16. Write and explain the characteristics of Nuclear forces.
17. Define half life and mean life of a radio active element. Obtain a relation between them.
18. Write a note on elementary particles.
19. Distinguish between Einstein and Debye's theories of specific heat of solids.
20. Write a note on ferro magnetism.
21. Explain type I & type II superconductors.
22. Discuss the spectral classification of stars.

SECTION - C

(4×10=40)

Answer any **Four** of the following:

23. a) With necessary theory explain the principle and working of a Betatron.
b) A cyclotron with dees of diameter 1.8m has a magnetic field of 2T. Calculate the energy to which the protons can be accelerated. Given

$$m_p = 1.672 \times 10^{-27} \text{ Kg} \quad Q = 1.602 \times 10^{-19} \text{ C}$$

(7+3)

24. a) Explain the features of liquid drop Nuclear model.
b) Write a note on Miller indices. (5+5)
25. a) Explain the construction and working of a Biogas plant.
b) Discuss the ecological perspective of non conventional energy sources. (7+3)
26. a) Deduce an expression for electrical conductivity of metals.
b) Explain the concept of Fermi energy. (7+3)
27. a) Discuss the Langevin's classical theory of dia magnetism.
b) Explain BCS theory of superconductivity. (6+4)
28. a) Draw and explain HR diagram.
b) Explain the structure and function of nucleic acids. (5+5)



B.Sc. VI Semester (CBCS) Degree Examination, May/June - 2019

PHYSICS

Nuclear Physics, Solid State Physics and Astrophysics

Paper - 6.1

Time : 3 Hours

Maximum Marks : 70

Instructions to Candidates:

Answer all questions in Section - A in first two pages only.

SECTION - A

Answer the following.

(15×1=15)

1. Define a Bohr magneton.
2. Write an expression for radius of nucleus.
3. Define mass defect of a nucleus.
4. What is the principle of Betatron?
5. Write an expression for cyclotron frequency.
6. What is nuclear fission?
7. Give any two examples of Non Conventional energy sources.
8. Define a unit cell.
9. State dulong and petit's law.
10. Write the expression for electrical conductivity of metals.
11. State curie's law.
12. What is ferromagnetism?
13. What is inter planar spacing?
14. Define critical field of a superconductor.
15. What is a neutron star?

[P.T.O]

SECTION - B

Answer any FIVE of the following.

(5×5=25)

16. State and explain the characteristics of Nuclear forces.
17. Explain the properties of α , β and γ particles.
18. Write a note on ecological and sociological perspective of energy sources.
19. Write a note on Miller Indices.
20. Write a note on Langevins classical theory of Diamagnetism.
21. Write a note on application of super conductors.
22. Write a short notes on spectral classification of stars.

SECTION - C

Answer any THREE of the following.

(3×10=30)

23. a) State Radio active decay law and deduce expression for Decay constant.
b) Explain Fermi theory of β decay. (5+5)
24. Explain the principle and working of a Geiger Muller counter. (10)
25. a) Write a note on wind mill.
b) Discuss how Bioenergy is used as an alternate energy source. (5+5)
26. a) Derive Bragg's law of x-ray diffraction.
b) Derive an expression for thermal conductivity of metals. (5+5)
27. a) Discuss the results of BCS theory in super conductivity.
b) Draw and explain H-R Diagram. (5+5)

B.Sc. VI Semester Degree Examination, May/June - 2019

PHYSICS

MATERIAL SCIENCE AND ELECTRONICS-II

PAPER NO : VIII-6.2

(New)

Time : 3 Hours

Maximum Marks : 80

Instructions to Candidates:

1. Answer All the Questions of Section A in the First two pages only.
2. Answer any Five Questions of Section B and Four Questions from Section C.

SECTION - A

I. Answer all of the following:

(15×1=15)

- 1) Write one property of Mechanical of ceramics.
- 2) Give one example for covalent bonding in materials.
- 3) Define Hooke's law.
- 4) Write the expression for electrical conductivity in metals.
- 5) Define thin Film.
- 6) Write one physical method for the preparation of thin Film.
- 7) Define Size effect of the nano materials.
- 8) What is an Amplifier?
- 9) Define negative Feedback.
- 10) Write Barkhausen criterion for Oscillation.
- 11) What is the base value of hexadecimal system?
- 12) Write the truth table for half adder.
- 13) What is Shift register?
- 14) Define Amplitude modulation.
- 15) What is dynamic range of a radio receiver?

[P.T.O.]



SECTION - B

(5×5=25)

II. Answer any Five of the following:

- 16) Explain engineering classification of materials.
- 17) Explain ionic bonding in materials with example.
- 18) Derive an expression for electrical conductivity of metals.
- 19) Explain briefly Strength and hardness of materials.
- 20) Describe sputtering technique for the preparation of thin film.
- 21) Explain full adder with neat diagram and truth table.
- 22) Write a note on need for modulation.

SECTION - C

III. Answer any Four of the following:

(4×10=40)

- 23) a. Compare crystalline and non crystalline state of materials.
- b. Explain metallic bonding in materials with example. (5+5)
- 24) a. Write a note on Quantum structure of nanomaterials.
- b. Derive an expression for correlation with Quantum mechanical particle in a box. (5+5)
- 25) a. Explain the working of single state CE Amplifier.
- b. Explain equivalent circuit of common emitter amplifier using hybrid parameter. (5+5)
- 26) a. Explain working of phase shift oscillator.
- b. Write a note on Astable multivibrator. (5+5)
- 27) a. Explain Logic gates OR, AND and NAND gates using diode and transistor.
- b. Write a note on flip-flops. (5+5)
- 28) a. Derive the power relation in AM wave. (5+5)
- b. Describe Superheterodyne receiver with neat block diagram. (5+5)

B.Sc. VI Semester (CBCS) Degree Examination, May/June-2019

PHYSICS

Material Science and Electronics - II

Paper No. - VIII 6.2

Time : 3 Hours

Maximum Marks : 70

Instructions to Candidates:

1. Answer all the questions of Section A in the first two pages only.
2. Answer any Five questions of Section B and Three questions from Section C.

SECTION - A

I. Answer ALL of the following. (15×1=15)

1. What is Polymer?
2. Define metallic bonding in material.
3. Define lateral strain.
4. What is hardness of the material?
5. Define thin film.
6. Write one application of thin film.
7. Define size effect of nano materials.
8. Write the size of the protein.
9. Define negative feedback of the Oscillator.
10. What is multivibrators?
11. Define XOR gate.
12. Define Flip-Flop.

[P.T.O



13. What is ring counter?
14. Define frequency modulation.
15. Define selectivity of the Radio Receiver.

SECTION - B

II. Answer any FIVE of the following.

(5×5=25)

16. Explain engineering classification of materials.
17. Explain covalent bonding in materials with example.
18. Derive an expression for electrical conductivity of metals.
19. Describe an experiment for the preparation of thin film by sputtering technique.
20. Explain the working of phase shift Oscillator.
21. Explain the working of Monostable Multivibrator.
22. Write a note on Amplitude Modulation.

SECTION - C

III. Answer any THREE of the following.

23. a) Explain engineering requirement of materials.
b) Explain ionic bonding in material with example.
24. a) Write a note on fatigue.
b) Write a note on fracture.

(5+5)

(5+5)



25. a) Explain the technique of synthesis of nanomaterials.
b) Write the applications of nanomaterials. (5+5)
26. a) Explain full adder with neat diagram and truth table.
b) Illustrate full adder operation by Solving two example
i) $A=1$ $B=1$ $C_i=0$ ii) $A=1$ $B=1$ $C_i=1$ with neat diagram. (5+5)
27. a) Explain thermal expansion of materials.
b) Describe super heterodyne receiver with neat block diagram. (5+5)
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B.Sc. VI Semester Degree Examination, May/June - 2019

CHEMISTRY-VII

Paper No: 6.1

(NEW)

Time : 3 Hours

Maximum Marks : 80

Instructions to Candidates:

1. Section A contains questions from Inorganic, organic and physical chemistry.
2. Section B contains questions from Inorganic chemistry, Section C contains questions from organic, Section D contains questions from physical chemistry.
3. Answer all the FOUR sections A, B C and D.

SECTION - A

Answer any TEN of the following:

(10×2=20)

1. Define cement.
2. What is cullet?
3. What are different types of air pollution?
4. What are paints?
5. What are Terpenes?
6. What are peptides? Give an example.
7. Name the biological importance of vitamin A and vitamin C.
8. Mention the biological importance of thyroxin.
9. What do you meant by zero point energy?
10. What are stokes lines?
11. State Born-oppenheimer approximation.
12. What is the basic criteria for a molecule to show rotational spectra?

[P.T.O.]



SECTION - B

Answer any TWO of the following questions:

(2×10=20)

- 13. a) Explain the manufacture of glass by pot- furnace? (6)
- b) Write a note on setting action of cement. (4)
- 14. a) Print out the differences between Inorganic and organic polymers. (6)
- b) Write a note on constituents of paints. (4)
- 15. a) Explain the measures of control of water pollution. (6)
- b) Write a note on industrial effluents and their effects and treatment. (4)

SECTION - C

Answer any TWO of the following questions:

(2×10=20)

- 16. a) Discuss the mechanism of enzymatic action. (6)
- b) Write a note on primary structure of proteins. (4)
- 17. a) Elucidate the structure of nicotine. (6)
- b) Give the synthesis of a dipeptide glutamine (4)
- 18. a) Explain the biological importance of Thyroxin and Insulin. (6)
- b) Give the classification of Terpens. (4)

SECTION - D

Answer any TWO of the following questions:

(2×10=20)

- 19. a) What are electromagnetic radiations? Give the important characteristic properties of electromagnetic radiations. (6)
- b) Explain briefly the factors which affect the intensity of spectral lines. (4)
- 20. a) Write a note on pure rotational Raman spectra of a diatomic molecule. (6)
- b) Write a note on isotopic substitution in case of rotational spectrum. (4)
- 21. a) Derive energy expression for vibrational spectrum of an harmonic oscillator for a diatomic molecule. (6)
- b) Explain briefly the basic features of different spectrometer. (4)



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B.Sc. VI Semester (CBCS) Degree Examination, May/June - 2019

CHEMISTRY - VII

Paper No. - 6.1

(New)

Time : 3 Hours

Maximum Marks : 70

Instructions to Candidates:

- 1) **Section A** contains questions from Inorganic, organic and physical chemistry.
- 2) **Section B** contains questions from Inorganic chemistry. **Section C** contains questions from organic chemistry. **Section D** contains questions from physical chemistry.
- 3) Answer ALL the FOUR sections A, B, C and D.

SECTION - A

Answer any ten of the following:

(10×1=10)

1. Define cement.
2. What are the major ingredients of glass?
3. What are extenders used in paint.
4. Name the different types of water pollution.
5. What are alkaloids?
6. What are enzymes?
7. Write the structure of menthol.
8. What are vitamins and give an example.
9. State Born - oppenheimer approximation.
10. What is meant by zero point energy.
11. Define degree of freedom.
12. What are antistoke lines.

[P.T.O]

SECTION - B

Answer any two of the following questions.

13. a) Explain the manufacture of cement by dry process.
b) Write a note on types of glasses.
14. a) Describe the manufacture of white lead by Dutch process
b) Write a note on polyphosphazenes
15. a) Explain the measures of water pollution.
b) Explain types and sources of air pollution.

(2×10=20)

SECTION - C

Answer any two of the following questions.

16. a) Elucidate the structure of nicotine.
b) Explain the secondary structure of proteins.
17. a) What are enzymes? Describe classification of enzymes.
b) Give the synthesis of citral.
18. a) Explain the biological importance of Thyroxine and Insulin.
b) What are vitamins? Give the synthesis of vitamin C.

(2×10=20)

SECTION - D

Answer any two of the following questions.

19. a) Write a note on pure rotational Raman spectra of a diatomic molecule.
b) What are electromagnetic radiations. Give the important characteristic properties of electromagnetic radiations.
20. a) Discuss briefly the rigid rotator for diatomic molecules.
b) Explain briefly the factors which affect the intensity of spectral lines.
21. a) Explain harmonic oscillator model of the vibrational spectra with energy level diagram.
b) How the intensity of the spectral lines in the microwave spectra are determined?

(2×10=20)



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B.Sc. VI Semester Degree Examination, May/June - 2019

CHEMISTRY - VIII

Paper : 6.2 (NEW)

Time : 3 Hours

Maximum Marks : 80

Instructions to Candidates:

1. *Section A* contains questions from Inorganic, organic & physical chemistry.
2. *Section B* contains questions from Inorganic chemistry
Section C contains questions from organic chemistry
Section D contains questions from physical chemistry.
3. Answer All the four sections A, B, C & D.

SECTION - A

Answer any Ten of the following;

(10×2=20)

- 1) What EAN (16 and 18 electron) rule.
- 2) What are non-essential trace elements.
- 3) What are composites?
- 4) Write any two examples of Metalloporphyrins.
- 5) Define Heterocyclic compound with an example.
- 6) Write any two common adulterants in food.
- 7) Write the structure of paracetamol.
- 8) What are antibiotics? Give example.
- 9) What is an electrode?
- 10) Define overvoltage.
- 11) Define standard electrode potential.
- 12) What are concentration cells.

[P.T.O.]

SECTION - B

Answer any Two of the following:

- 13) a. Write any two methods of preparation of organo-lithium compounds. (6)
 b. Write the preparation and structure of Ferrocene. (4)
- 14) a. Explain the structure and function of Haemoglobin. (6)
 b. Write a note on Metalloenzymes. (4)
- 15) a. Explain particle reinforced and fibre-reinforced composites. (6)
 b. Write a note on Nanomaterials. (4)

SECTION - C

Answer any Two of the following:

- 16) a. Write any two methods of synthesis of Furan. (6)
 b. Write any two substitution reactions of pyrrol. (4)
- 17) a. How do you analyse ash in honey. (6)
 b. Write a note on reasons for food analysis. (4)
- 18) a. Explain the different types of drugs with example. (6)
 b. Write the synthesis and uses of Gammexene. (4)

SECTION - D

Answer any Two of the following:

- 19) a. Describe the construction and working of standard Hydrogen Electrode. (6)
 b. Derive Nernst's equation for electrode potential. (4)
- 20) a. Explain the method of determination of pH of a solution using quinhydrone electrode. (6)
 b. Write a note on potentiometric Acid-Base titration. (4)
- 21) a. Explain construction and working of Hydrogen-oxygen fuel cell. (6)
 b. Explain secondary cells with examples. (4)

B.Sc. VI Semester (CBCS) Degree Examination, May/June - 2019

CHEMISTRY - VIII

Paper No. - 6.2

(New)

Time : 3 Hours

Maximum Marks : 70

Instructions to Candidates:

- 1) Section A contains questions from Inorganic, organic and physical chemistry.
- 2) Section B contains questions from Inorganic chemistry. Section C contains questions from organic chemistry. Section D contains questions from physical chemistry.
- 3) Answer ALL the FOUR sections A, B, C and D.

SECTION - A

Answer any ten of the following:

(10×1=10)

1. What are Heme proteins?
2. What are Nanomaterials?
3. What are non-essential trace elements?
4. What is phase transformation?
5. What is food contamination?
6. Define Adulteration.
7. What are Pesticides?
8. What are tranquilizers?
9. What is amalgam electrode?
10. Define Polarization.
1. Define standard electrode potential.
2. Electrode potentials of $Zn|Zn^{2+}$ and $Cu|Cu^{2+}$ electrodes are -0.76 V and 0.34 V respectively. Calculate the EMF of the cell constructed with them.

[P.T.O]

(2)

SECTION - B

Answer any two of the following questions.

13. a) Describe the structure and bonding in Metal carbonyls.
b) Explain EAN-16 & 18 electron rule with examples.
14. a) Describe the structure and function of Haemoglobin.
b) Describe the enzymatic properties of Cytochromes.
15. a) Explain Fe-C phase transformations with neat labelled diagram.
b) Write a note on Nanomaterials & their applications.

SECTION - C

Answer any two of the following.

16. a) Write any three electrophilic substitution reactions of pyrrole.
b) Write any two methods of synthesis of Furan.
17. a) How do you analyse crude fibres in spices.
b) How do you analyse moisture in vegetable oils.
18. a) Discuss the classification of Drugs.
b) Write the synthesis & uses of Aspirin.

SECTION - D

Answer any two of the following.

19. a) Explain the construction and working of standard Hydrogen Electrode.
b) Derive Nernst's equation for electrode potential.
20. a) Describe dry cell with a neat labelled diagram.
b) Explain potentiometric Acid-base titrations.
21. a) Derive an expression for EMF of the concentration cell with transference.
b) Explain importance of fuel cells.

B.Sc. VI Semester Degree Examination, May/June - 2019

MATHEMATICS

Trigonometry & Complex Analysis

Paper XII & 6.1 (NEW)

Time : 3 Hours

Maximum Marks : 80

Instructions to Candidates: Answer all sections.

SECTION - A

Answer any **TEN** of the following:

(10×2=20)

1. Prove that $\cosh^2 x - \sinh^2 x = 1$.
2. Prove that $\sinh(x - y) = \sinh x \cdot \cosh y - \cosh x \sinh y$.
3. Find the real and imaginary parts of $\cos(x + iy)$.
4. Find the general value of $\log i$.
5. Define conformal transformation.
6. Find the fixed points of the transformation $w = \frac{1-z}{1+z}$.
7. Find the Locus of the point z satisfying $\text{Im}(z+i) \geq 0$.
8. Show that $\text{amp}(z-1) = \frac{\pi}{2}$ represents a line parallel to imaginary axis.
9. Define limit of a function of a complex variable.
10. Define Analytic function.
11. Show that $u = x^2 - 3xy^2$ is harmonic.
12. Evaluate $\int_0^{i\pi} (x^2 - iy) dz$ along the path $y = x$.

[P.T.O.]



(2)
SECTION - B

Answer any FIVE of the following:

13. Expand $\sin^7 \theta$ in a series of sines of multiples of θ .
14. Show that $\sin^6 \theta = \frac{-1}{2^5} [\cos 6\theta - 6 \cos 4\theta + 15 \cos 2\theta - 10]$.
15. Find the real and imaginary parts of $\operatorname{Sech}(x + iy)$
16. Sum the series $\cos \alpha + \cos(\alpha + \beta) + \cos(\alpha + 2\beta) + \dots$ to n terms.
17. Prove that if $f(z) = u + iv$ is an analytic function in the domain D of a complex plane, $u = c_1$ and $v = c_2$ where c_1 and c_2 are constants represent orthogonal family of curves.
18. Show that the transformation $w = \frac{1}{z}$ transforms a line not passing through the origin z -plane to a circle passing through the origin in w -plane.
19. Find the bilinear transformation which maps the points $z = 1, i, -1$ respectively onto points $w = i, 0, -i$.

SECTION - C

Answer any FIVE of the following:

20. State and prove the necessary condition for a function $f(z)$ to be analytic and establish them. (5x6=)
21. Show that $f(z) = \cosh z$ is analytic and $f'(z) = \sinh z$.
22. Show that $u = e^x \cos y + xy$ is harmonic and find its harmonic conjugate.
23. Find the analytic function $f(z) = u + iv$ given $u - v = (x - y)(x^2 + 4xy + y^2)$ by Thomson's method.

24. If $f(z) = u(r, \theta) + iv(r, \theta)$ is an analytic function then show that $\frac{\partial^2 u}{\partial r^2} + \frac{1}{r} \frac{\partial u}{\partial r} + \frac{1}{r^2} \frac{\partial^2 u}{\partial \theta^2} = 0$

and $\frac{\partial^2 v}{\partial r^2} + \frac{1}{r} \frac{\partial v}{\partial r} + \frac{1}{r^2} \frac{\partial^2 v}{\partial \theta^2} = 0$.

25. State and prove Cauchy's integral theorem.

26. Evaluate $\int_C \frac{z}{(z^2+1)(z^2-9)} dz$ where C is the circle $|z|=2$.



30625

B.Sc. VI Semester Degree Examination, May/June - 2019

MATHEMATICS

Trigonometry, Topology & Fuzzy Sets

PAPER NO : 6.1

Time : 3 Hours

maximum Marks : 80

SECTION - A

Answer any TEN of the following.

(10×2=20)

- 1) Define topology on a set.
- 2) Prove that in a discrete topological space every subset of X is closed.
- 3) Define closure of a set with an example.
- 4) Define base for a topology with an example.
- 5) Give an example to prove that $d(A \cap B) \neq d(A) \cap d(B)$.
- 6) Define T_1 and T_2 space.
- 7) Prove that $\sinh x$ and $\tanh x$ are odd functions.
- 8) Prove that $\sinh 2x = \frac{2 \tanh x}{1 - \tanh^2 x}$
- 9) Find general and principle value of $\log(4 + 3i)$.
- 10) Separate into real and imaginary parts of $\cosh(x + iy)$.
- 11) Define compliment of a fuzzy subset.

[P.T.O.]

12) Let $Y = \{y_1, y_2, y_3, y_4\}$

Let $A = \{(y_1, 0.1), (y_2, 0.9), (y_3, 0), (y_4, 1)\}$

$B = \{(y_1, 0.6), (y_2, 0.8), (y_3, 0.7), (y_4, 1)\}$

be two fuzzy subsets of Y then find $A \wedge B$ & $A \vee B$

SECTION - B

Answer any Five of the following.

13) Let N be set of all natural numbers and τ be family consisting of ϕ and all subsets of N which are of the form $\{n, n+1, n+2, \dots\}$ where $n \in N$ then prove that τ is a topology on N .

14) Let (X, τ) be a topological space. Let $x \in X$, if A is neighbourhood of x then prove that any superset of A is also a neighbourhood of x .

15) Let (X, τ) be a topological space. Let A, B be subsets of X then prove that

a) If $A \subset B$ then $\bar{A} \subset \bar{B}$

b) $\overline{A \cup B} = \bar{A} \cup \bar{B}$

c) $\overline{A \cap B} \subset \bar{A} \cap \bar{B}$

16) Define closed set. Let (X, τ) be a topological space. A subset A of X is open if and only if A' is closed.

17) Let (X, τ) be a topological space and a subset A of X is closed if and only if it contains all its limit points i.e. $d(A) \subset A$.

18) Let (X, τ) be an indiscrete topological space. Let A be non empty proper subset of X . Find

$A^0, (A')^0, \partial(A)$

19) Define T_1 and T_2 space and prove that each singleton set in a T_2 space is closed.



(3)

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SECTION - C

Answer any Five of the following.

(5×6=30)

- 20) Expand $\cos 8\theta$ in ascending powers of $\sin \theta$.
- 21) Prove that $2^{n/2} \cos\left(\frac{n\pi}{4}\right) = 1 - nC_2 + nC_4 - nC_6 + \dots$.
- 22) Show that $64[\cos^8 \theta + \sin^8 \theta] = \cos 8\theta + 28 \cos 4\theta + 35$.
- 23) Find general and principle values of $\log(1+i\sqrt{3})$
- 24) Sum the series $\cos \alpha + \cos 2\alpha + \cos 3\alpha + \dots + \cos n\alpha$
- 25) Let A, B be any two fuzzy subsets of X. Let $\alpha, \beta \in [0,1]$ then prove that
- a) $\alpha_{A \wedge B} = \alpha_A \cap \alpha_B$
- b) $\alpha_{A \vee B} = \alpha_A \cup \alpha_B$
-



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B.Sc. VI Semester (CBCS) Degree Examination, May/June-2019

MATHEMATICS

Trigonometry Topology and Fuzzy Sets

Paper No. - 6.1

Time : 3 Hours

Maximum Marks : 70

Instructions to Candidates:

Answer all Sections.

SECTION - A

Answer any Five of the following.

(5×2=10)

1. Define Interior point, exterior point of a set.
2. Let (X, τ) be a topological space Let $x \in X$, N_1 & N_2 be two neighbourhoods of x then prove that $N_1 \cap N_2$ is also a neighbourhood of x .
3. Give an example to show that $\overline{A \cap B} \neq \overline{A} \cap \overline{B}$.
4. Prove that $\cosh(x-y) = \cosh x \cdot \cosh y - \sinh x \cdot \sinh y$.
5. If $\sin(A+iB) = x+iy$. Prove that $\frac{x^2}{\cosh^2 B} + \frac{y^2}{\sinh^2 B} = 1$.
6. Define compliment of a fuzzy subset with an example.
7. Let $Y = \{y_1, y_2, y_3, y_4\}$. Let $A = \{(y_1, 0.1), (y_2, 0.8), (y_3, 0), (y_4, 1)\}$
 $B = \{(y_1, 0.5), (y_2, 0.7), (y_3, 0.2), (y_4, 1)\}$. Then find $A \vee B, A \wedge B$.

[P.T.O.]

SECTION - B

Answer any FIVE of the following.

(5×6=30)

8. Let R be the set of all real numbers and u be the family of subsets of R defined as follows i) $A = \emptyset$ or ii) if A is non empty then for every $x \in A \exists$ an open interval I_x such that $x \in I_x \subset A$ then prove that u is a topology on R .
9. Let (X, τ) be a topological space then a subset A of X is open if and only if A is a neighbourhood of each of its points.
10. Let (X, τ) be a topological space. A, B be subsets of X then prove that
i) $d(\emptyset) = \emptyset$ ii) If $A \subset B$ then $d(A) \subset d(B)$.
11. Let (X, τ) be a topological space. Let A, B be subsets of X then prove that
i. If $A \subset B$ then $\overline{A} \subset \overline{B}$.
ii. $\overline{A \cup B} = \overline{A} \cup \overline{B}$
iii. $\overline{A \cap B} \subset \overline{A} \cap \overline{B}$.
12. Let $X = \{a, b, c, d, e\}$, $\tau = \{\emptyset, X, \{a\}, \{a, b\}, \{a, b, c\}, \{a, b, c, d\}\}$ be a topology on X . Find $A^\circ, (A')^\circ, \partial(A)$ where $A = \{a, c, d\}$.
13. Let (X, τ) be a topological space and A be a subset of X which is neither empty nor a singleton set. Find $d(A)$.
14. Prove that every finite T_1 space is discrete.



SECTION - C

Answer any Five of the following.

(5×6=30)

15. Expand $\sin 7\theta$ in ascending powers of $\sin \theta$.

16. Prove that $2^{n/2} \cos\left(\frac{n\pi}{4}\right) = 1 - nC_2 + nC_4 - nC_6 + \dots$ where n is a +ve integer.

17. Show that $16\sin^5 \theta = \sin 5\theta - 5\sin 3\theta + 10\sin \theta$.

18. Find all the values of $\log \left[\frac{1 + \cos \alpha + i \sin \alpha}{1 + \cos \alpha - i \sin \alpha} \right]$.

19. Sum the series $1 + \frac{\cos \theta}{1!} + \frac{\cos 2\theta}{2!} + \frac{\cos 3\theta}{3!} + \dots \infty$.

20. Let A, B be any two fuzzy subsets of X . Let $\alpha, \beta \in [0, 1]$ then prove that

i) $\alpha_{A \wedge B} = \alpha_A \cap \alpha_B$.

ii) $\alpha_{A \vee B} = \alpha_A \cup \alpha_B$.

21. Let $f: X \rightarrow Y$ be a function where X, Y are two sets. Prove that $f(A \vee B) = f(A) \vee f(B)$.



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B.Sc. VI Semester (CBCS) Degree Examination, May/June - 2019

MATHEMATICS

Numerical Analysis

Paper - XIII & 6.2(New)

Time : 3 Hours

Maximum Marks : 70

Instructions to Candidates:

- 1) Answer all the sections.
- 2) Non-programmable calculator may be used.

SECTION - A

I. Answer any FIVE of the following : (5×2=10)

1. Define absolute and percentage error.
2. Write reduced form of matrix of Gauss elimination method to find the values of x, y, z of system of Equation.
3. Construct backward difference table for given data.

x	5	10	15	20	25
y	9962	9848	9659	9397	9063

4. Prove that $\nabla = 1 - E^{-1}$
5. State lagrange Inverse interpolation formula.
6. Evaluate $\int_0^1 e^x dx$ using trapezoidal rule from the following table & h=0.2.

x	0	0.2	0.4	0.6	0.8	1.0
y	1	1.2114	1.4918	1.8221	2.2255	2.7183

7. State Euler Modified Method.

[P.T.O]

SECTION - B

II. Answer any FIVE of the following :

(5×6=30)

8. Find a real root of the Equation $x^3 - x - 1 = 0$ using Bisection method in four stages

9. Find the root of the Equation $2x - \log_{10} x = 7$ which lies between 3.5 & 4 by Regula falsi method.

10. Apply Gauss - Jordan method to solve the system of Equation

$$2x + 5y + 7z = 52$$

$$2x + y - z = 0$$

$$x + y + z = 9$$

11. From the following data estimate the number of students who have scored less than 70 marks

Marks	0-20	20-40	40-60	60-80	80-90
No. of Students	41	62	65	50	17

12. Prove that $u_0 + u_1 \frac{x}{1!} + u_2 \frac{x^2}{2!} \dots = e^x [u_0 + x \Delta u_0 + \frac{x^2}{2!} \Delta^2 u_0 + \dots]$

13. Find the value of $f(6)$ using Newton divided difference formula Given

x	3	7	9	10
$f(x)$	168	120	72	63

SECTION -C

III. Answer any FIVE of the following

(5×6=30)

14. Find $\frac{dy}{dx}$ & $\frac{d^2y}{dx^2}$ at $x = 54$ from the following table.

x	50	51	52	53	54
y	3.6840	3.7084	3.7325	3.7563	3.7798

15. Using Simpson 1/3rd rule evaluate $\int_0^1 \frac{dx}{1+x^2}$ by dividing the interval $[0,1]$ into six equal parts.

16. Calculate $\int_4^{5.2} \log_e x dx$ by using Weddle rule taking step size 0.2.

17. Solve the differential equation $\frac{dy}{dx} = x - y^2$ by using Picard's method. Given $y(0)=1$ for $x=0.1$ upto 2nd approximation.

18. Using Taylor's series method solve $x \frac{dy}{dx} = x - y$ Given $y(2) = 2$ at $x = 2.1$.

19. Find the approximate solution at $x = 1.2$ of the Equation $\frac{dy}{dx} = xy$ given $y(1) = 2$ by Runge-Kutta method

B.Sc. VI Semester Degree Examination, May/June - 2019

MATHEMATICS

NUMERICAL ANALYSIS (New)

PAPER : XIII & 6.2

Time : 3 Hours

Maximum Marks : 80

Instructions to Candidates:

1. Answer all the sections.
2. Non-programmable calculator may be used.

SECTION - A

Answer any **Ten** of the following.

(10×2=20)

- 1) Define Error in subtraction & $|E_D|$.
- 2) Find number of trustworthy figures in $(476)^{1/5}$ where 476 is correct to three significant figure.
- 3) State Bisection Method.
- 4) Find the Interval in which the real root lies $x \log_{10} x = 1.2$.
- 5) Prove that $\Delta^3 y_0 = y_3 - 3y_2 + 3y_1 - y_0$.
- 6) Evaluate $\Delta^{10}[(1-2x)(1-3x^2)(1-4x^3)(1-5x^4)]$ taking $h=1$.
- 7) Prove that $(1+\Delta)(1-\nabla) = 1$.
- 8) Evaluate $\Delta \tan^{-1}(ax)$.
- 9) State Simpson 1/3rd rule.
- 10) State Trapezoidal rule.

[P.T.O.]

11) Find $\frac{d^2y}{dx^2}$ at $x=1$ from the table

x	1	2	3	4
y	3	7	9	13

12) Find K_1 of R-K method. Given $y' = 3xy$ $y(0) = 1$ & $h = 0.2$.

SECTION - B

Answer any Five of the following.

(5×6=30)

13) Approximate value of $2/3$ and $1/7$ corrected to four decimal places are 0.6667 and 0.1429 respectively. Find the possible relative error and absolute error in the sum of the approximate value.

14) Find the root of the equation $\tan x = x$ near $x = 4.5$ correct to four decimal places.

15) Using Gauss-Seidel iteration Method solve the system of equation

$$27x + 6y - z = 85$$

$$6x + 15y + 2z = 72 \text{ \& carry in three stages.}$$

$$x + y + 54z = 110$$

16) Find the polynomial whose first difference is $g(x) = 9x^2 + 11x + 5$ [using factorial notation].

17) Given

x	30	34	38	42
y	-30	-13	3	18

Find x corresponding to $y=0$ by Lagrange Inverse formula.

18) Using Newton's divided difference formula find the value of $f(6)$ from the following table.

x	-2	1	3	7	8
y	10	4	40	424	620

SECTION - C

Answer any Five of the following.

(5×6=30)

19) Find $f'(x)$ at $x=0.4$ Given

x	0.1	0.2	0.3	0.4
y	1.10517	1.22140	1.34986	1.49182

20) Evaluate $\int_0^1 \frac{1}{1+x^2} dx$ using the Simpson 3/8 rule by dividing the Interval into 3 equal parts.

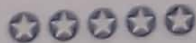
Hence find an approximate of $\log \sqrt{2}$

21) Evaluate $\int_0^6 3x^2 dx$ dividing the Interval (0,6) into six equal parts by Applying Weddle's rule.

22) Solve $\frac{dy}{dx} = 1 + y^2$ using picards method of successive approximation upto 3rd approximation with $y(0) = 0$ find $y(0.2)$.

23) Use Taylor's series method to solve $\frac{dy}{dx} = 1 + xy$ given $y(0) = 2$ find $y(0.3)$.

24) Use Euler modified method $\frac{dy}{dx} = \log(x+y)$ $y(1) = 2$ at the point $x = 1.2$ taking $h = 0.2$.



B.Sc. VI Semester Degree Examination, May/June-2019

MATHEMATICS-XIV(A)

Graph Theory - II

Paper No. - 6.3

(New)

Time : 3 Hours

Instructions to Candidates:

Answer all Sections.

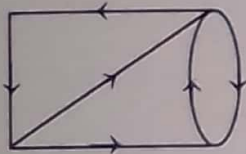
Maximum Marks : 80

SECTION - A

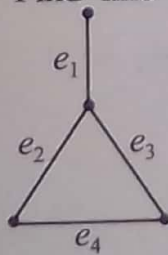
Answer any Ten of the following

(10×2=20)

1. Define a asymmetric digraph with an example
2. Define balanced digraph with an example
3. Find out degree and in degree of the digraph



4. Define Line graph. Find line graph of



5. Define total graph and draw $T(K_2)$
6. Define inner vertex set and find the inner vertex set of $K_{2,4}$
7. Define planar graph and give an example of planar graph.
8. A connected planar graph G has 9 vertices with degrees 2,2,3,3,3,4,5,6,6. Find the number of faces of G .
9. Give two different 2-chromatic graphs

[P.T.O

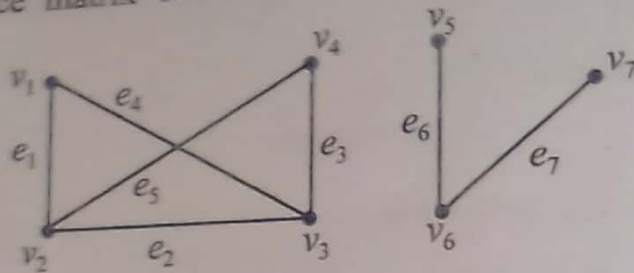
- 10. Find chromatic number of K_2 and C_5 .
- 11. Explain why the following is not chromatic polynomial $\lambda^5 - 4\lambda^4 + 3\lambda^3$
- 12. Give two different graphs such that each satisfies $\chi(G) = \Delta(G) + 1$

SECTION - B

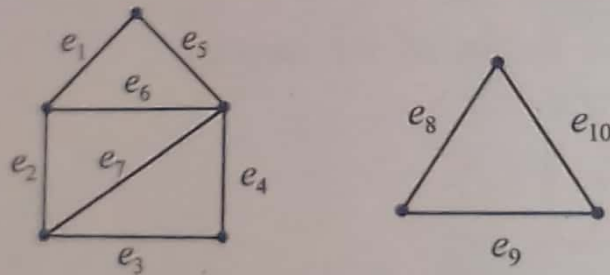
Answer any five of the following.

- 13. Find the incidence matrix of the disconnected graph

(5x6=)



- 14. Find the cycle matrix of the disconnected graph



- 15. If G is (p, q) graph whose vertices have degree d_i then show that $L(G)$ has p vertices and q_k edges where

$$q_k = \sum_{i=1}^p d_i^2 - q$$

- 16. If $G = (V, E)$ is a connected planar graph with $|V| = p$ vertices, $|E| = q$ edges and r regions then prove that

i) $q \geq \frac{3}{2}r$

ii) $q \leq 3p - 6$

- 17. Show that the Kuratowski's graphs are non-planar

18. Let G be a connected planar graph with p vertices, q edges and r regions (or faces) then prove that $q-p+2=r$
19. Find the graph G whose incident matrix is

$$\begin{pmatrix} 0 & 0 & 1 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 1 & 0 & 1 \\ 1 & 0 & 0 & 1 \\ 1 & 1 & 0 & 0 \end{pmatrix}$$

SECTION - C

Answer any **Five** of the following

(5×6=30)

20. Prove that a tree with atleast two vertices is bichromatic
21. For any graph G , show that $\chi(G) \leq \Delta(G) + 1$
22. If G is k -critical graph then prove that $\delta(G) \geq k - 1$
23. Define chromatic polynomial and find the chromatic polynomial of $K_{1,4}$
24. If D is a digraph of order p and size q with $V(D) = \{V_1, V_2, V_3, \dots, V_p\}$ then prove that $\sum_{i=1}^p odv_i = \sum_{i=1}^p idv_i = q$
25. Prove that every connected simple planar graph G is 6-colorable
26. If $G=(V,E)$ is connected graph and $e=\{a,b\} \in E$ then prove that $P(G_e, \lambda) = P(G, \lambda) + P(G'_e, \lambda)$
-

B.Sc. VI Semester (CBCS) Degree Examination, May/June - 2019

MATHEMATICS

Graph Theory - II

Paper - 6.3 (New)

Time : 3 Hours

Instructions to Candidates:

Answer all Sections.

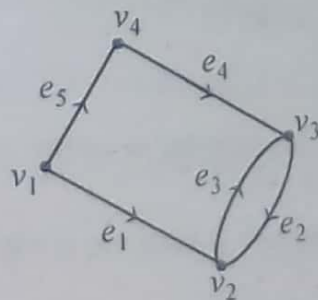
Maximum Marks : 70

SECTION - A

Answer any FIVE of the following :

(5×2=10)

1. Define balanced digraph with an example.
2. Find the out degree and indegree of the digraph

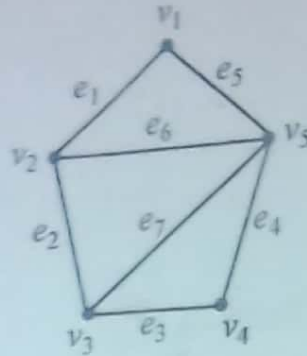


3. Draw line graph of $K_{1,5}$.
4. Define inner vertex set. Find the inner vertex set of $K_{2,4}$.
5. A connected planar graph G has 9 vertices with degrees 2, 2, 3, 3, 3, 4, 5, 6, 6. Find the number of regions or faces of G .
6. Draw two different bi-chromatic graphs.
7. Define underlying graph.

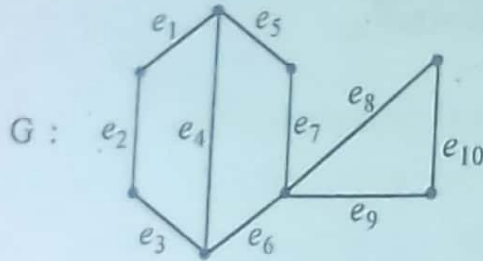
[P.T.O]

Answer any FIVE of the following :

8. Find the incidence matrix of the graph.



9. Define cycle matrix. Find the cycle matrix of the graph G shown below.



10. Show that a connected graph G is isomorphic to its line graph $L(G)$ if and only if G is a cycle.
11. Let G be a connected planar graph with p vertices, q edges and r regions (or faces) then prove that $q - p + 2 = r$.
12. Let G be a connected graph with p vertices and q edges. If G is triangle free then prove that
 - i) $q \geq 2r$
 - ii) $q \leq 2p - 4$
13. Show that K_5 and $K_{3,3}$ are non-planar.
14. Find the graph G whose incidence matrix is

$$\begin{bmatrix} 1 & 0 & 1 & 1 & 0 & 0 \\ 0 & 1 & 1 & 0 & 1 & 0 \\ 0 & 1 & 0 & 0 & 0 & 1 \\ 1 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 1 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

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SECTION - C

Answer any FIVE of the following.

(5×6=30)

15. Prove that a graph is bicolorable if and only if it has no cycle of odd length.
16. If $\Delta(G)$ is the maximum of the degrees of the vertices of a graph G , then prove that $\chi(G) \leq 1 + \Delta(G)$.

17. If D is a digraph of order p and size q with

$$V(D) = \{v_1, v_2, v_3, \dots, v_p\} \text{ then}$$

$$\text{prove that } \sum_{i=1}^p \text{od } v_i = \sum_{i=1}^p \text{id } v_i = q$$

18. Prove that every connected simple planar graph G is 6-colorable.
19. Determine the chromatic polynomial of the cycle C_4 .
20. Prove that a graph G is 2-chromatic if and only if it is a non-null bipartite graph.
21. If $G = (V, E)$ is connected graph and $e = \{a, b\} \in E$ then prove that $P(G_e, \lambda) = P(G, \lambda) + P(G_e', \lambda)$
-

B.Sc. VI Semester (CBCS) Degree Examination, May/June - 2019

BOTANY

Plant Breeding Bio-Technology & Plant Tissue Culture

(Paper - 6.1)

Time : 3 Hours

Maximum Marks : 70

Instructions to Candidates:

- 1) Answer all sections.
- 2) Draw diagram wherever necessary.

SECTION - A

Answer the following.

(15×1=15)

1. What is Heterosis?
2. Expand the term "YAC".
3. What is Liposome?
4. What is Tissue Culture?
5. What is Gene gun?
6. What is Emasculation?
7. Write the steps involved in PCR?
8. What is DNA ligase?
9. What is Intraspecific hybridization?
10. What are Transgenic plants? Give an example.
11. Mention the different types of Polymerases.
12. Define the term Biotechnology?
13. Write the characteristics of Ideal vector?
14. What is callus?
15. What is Totipotency?

**SECTION - B**

Answer any **FIVE** of the following.

(5×5=25)

16. Enumerate the main objectives of hybridization in plant breeding.
17. Distinguish between phages, cosmids and phagemids as vector's, using suitable examples.
18. What is Tissue culture? Discuss the application of tissue culture in agriculture and human welfare.
19. Explain the recombinant DNA technology.
20. What is layering? Explain the different types with neat labeled diagram.
21. Write a short note on DNA finger printing and it's applications .
22. What is plant breeding? Add a note on their scope and objective's.

SECTION - C

Answer any **THREE** of the following.

(3×10=30)

23. What are Binary vectors? Discuss these vectors along with Ti-plasmid vectors used for Gene transfer in Plants.
 24. What are the characteristic features of Ideal vector and add a note on their role in recombinant DNA - technology.
 25. Write a note on; Somatic embryogenesis and it's factors.
 26. Discuss the different available methods for preparing chimeric DNA.
 27. Write the procedure for the preparation of MS media and add a note on their significance.
-

B.Sc. VI Semester (New CBCS) Degree Examination, May/June-2019

BOTANY

Plant Physiology

Paper No. - B:6.2

Time : 3 Hours

Maximum Marks : 70

Instructions to Candidates:

- a) Answer all the Sections
- b) Draw diagrams wherever necessary.

SECTION - A

Answer the following.

(15×1=15)

1. Who proposed the Transpiration pull theory of Ascent of Sap?
2. Define the term Growth.
3. What are Phycobillins?
4. Name the enzyme necessary for the oxidation of 3PGAL.
5. What is Imbibition?
6. Write the Empirical formula of Chla and Chlb.
7. Define Incipient plasmolysis.
8. What is Chlorosis?
9. What is Seismonastic Movement?
10. What is Gravitational Water?
11. What are photons or Quantasomes?
12. What are the Enzymes?
13. What are the end products of light reaction of photosynthesis?
14. What is Ascent of Sap?
15. What are Phytohormones?

[P.T.O]

SECTION - B

(5×5=25)

Answer any FIVE of the following.

16. Establish the relationship between OP, TP and DPD.
17. Explain the Hatch-Slack Pathway.
18. Explain the mechanism of light reaction.
19. Explain the Cohesion Tension theory of Ascent of Sap in Plants.
20. Explain the Malate hypothesis.
21. Explain the various steps and enzymes involved in Krebs's Cycle.
22. Explain the Plasmolysis with example.

SECTION - C

Answer any THREE of the following.

(3×10=30)

23. What is R.Q? Why does it differs in various plant tissues? How will you measure it.
 24. Explain the C_3 cycle.
 25. 'Transpiration is a necessary Evil'. Discuss.
 26. Tabulate the differences between C_3 and C_4 plants.
 27. Describe the Mechanism of Water absorption in plant.
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B.Sc. VI Semester (CBCS) Degree Examination, May/June - 2019

ZOOLOGY

Genetics & Biotechnology

Paper - Z - 6.1

Time : 3 Hours

Maximum Marks : 70

Instructions to Candidates:

- 1) Answer all the Sections.
- 2) Draw labelled diagrams wherever necessary.

SECTION - A

Answer any FIVE of the following :

(5×2=10)

1. What is terminator codon? Give example.
2. Define chromatid and Kinetochore.
3. Expand RNA and REN.
4. Define phenotype and Genotype.
5. Define Lethal gene and Parthenogenesis.
6. What is y-linked inheritance? Give example.

SECTION - B

Answer any SIX of the following :

(6×5=30)

7. Write a short note on the Mendel's laws of inheritance.
8. Why did Mendel select garden pea plant (*Pisum sativum*) for his experiments?
9. Explain the polytene chromosome with a neat labelled diagram.
10. Write a short note on Lac-operon concept.
11. What is criss - cross inheritance? Explain it with reference to color blindness in man.

[P.T.O]

(2)



12. What is Turner's syndrome? Give an account of the causes and symptoms of Turner's syndrome.
13. Write a short note on any two inborn errors of metabolism.
14. When both father and mother are heterozygous for 'A' and 'B' blood groups, what would be the blood group of their progeny?

SECTION - C

Answer any **THREE** of the following.

(3×10=30)

15. Describe the inheritance of supplementary factors (9:3:4) in Mice.
 16. Explain the double helical structure of DNA with a neat labelled diagram.
 17. Explain the inheritance of complimentary factors (9:7) by taking inheritance of flower colour in sweet pea plant.
 18. Define Dihybrid cross. Explain the dihybrid cross inheritance with suitable example.
 19. Explain the mechanism of protein bio-synthesis in detail.
-

B.Sc. VI Semester (CBCS) Degree Examination, May/June - 2019

ZOOLOGY

Ethology, Evolution and Zoogeography

Paper : 2 - 6.2

Time : 3 Hours

Maximum Marks : 70

1. Answer all the Sections
2. Draw diagrams wherever necessary.

Section - A

Answer any five of the following.

(5×2=10)

1. What do you mean by instinct behaviour? Give an example.
2. What is nuptial flight?
3. What are homologous organs?
4. Define biogenesis? Who proposed this theory?
5. Define gene flow.
6. What are barriers?

Section - B

Answer any Six of the following :

(6×5=30)

7. Explain briefly about sympatric speciation.
8. Write a short note on anadromous migration with suitable example.
9. Write a note on parental care in fishes.
10. Explain about the postulations of Darwin.
11. Write a note on conditional reflexes and imprinting.
12. Describe the social organization in Termites.
13. Write a note on mutation theory.
14. Explain briefly about homologous organs.

[P.T.O.]



(2)

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Section - C

Answer any **Three** of the following.

(3×10=30)

15. Describe the nesting behaviour in birds and types of nests.
16. Write an explanatory note on types of mimicry.
17. Explain in detail about the origin of life at molecular level.
18. Write a note on continuous and discontinuous distribution with examples.
19. Give a detailed account on embryological evidences in favour of organic evolution.

