

19BOT301

Reg No :

CHOICE BASED CREDIT SYSTEM
B.Sc. THIRD SEMESTER DEGREE EXAMINATION FEBRUARY 2022
BOTANY
Botany Theory III

Duration:3 Hours

Max Marks:80

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

1. What is an offset? Give an example.
2. What is a Follicle? Give an example.
3. What is Perianth? Mention its units.
4. List the types of Inflorescences in the family Euphorbiaceae.
5. Write the merits of natural system of classification.
6. Draw a neat labeled sketch of Spikelet inflorescence.

II. Answer any FIVE of the following : **(5×6= 30 Marks)**

7. Name the type of roots found in *Avicennia*, *Jussiaea*, Pepper. What is their function?
8. Define Binomial Nomenclature. Rewrite the following scientific names following the rules of binomial nomenclature i) *Mangifera Indica* ii) *Cocosnucifera* iii) *OryzaSativa* iv) *gossipium Hirsutum* v) *vincaRosea*
9. Explain the Gynoecium and Androecium in *Hibiscus rosa-sinensis*. Draw a neat labelled diagram of its ovary T.S.
10. Write a short note on floral characters of family Asteraceae.
11. Mention the economically important plants under the family Mrytaceae with common name and scientific name.
12. Explain the male flower and female flower of *Gnetum* with a labelled diagram.

III. Answer any FOUR of the following : **(4×10= 40 Marks)**

13. Describe the male cone of *Pinus* with a labelled diagram.
14. Give the detailed account of L.S of *Cycas* ovule.
15. Give a comparative account of family Acanthaceae and Lamiaceae.
16. Give an account of diagnostic features of family Apocynaceae.
17. Give the diagnostic characters of family Papilionaceae.

19ZOO301

Reg No :

CHOICE BASED CREDIT SYSTEM

B.Sc. THIRD SEMESTER DEGREE EXAMINATION FEBRUARY 2022

ZOOLOGY

Zoology Theory III

Duration:3 Hours

Max Marks:80

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

1. Define capsular hydrostatic pressure.
2. Define internal respiration.
3. What is a polarised condition with reference to muscle fibre?
4. What is diastolic pressure?
5. What are Disacharrides? Give two examples.
6. Define proteins.

II. Answer any FIVE of the following : (5×6= 30 Marks)

7. Write a note on hibernation and aestivation.
8. What are osmoconformers? Name the types with one example each.
9. Describe an intestinal villus and add a note on its functions.
10. What is a synapse? Explain it with the help of a neatly labelled diagram.
11. Give an account of competitive and non competitive inhibition.
12. Write a note on types and factors affecting innate immunity.

III. Answer any FOUR of the following : (4×10= 40 Marks)

13. Give an account of different branches of Physiology.
14. Explain the principle types of muscle fibres & add a note on their functional significance.
15. With a neat labelled diagram explain the structure of human eye.
16. Give an account of cells of the immune system.
17. Enumerate the functions of vitamin K. Comment on their sources and deficiency disorders.

19CHE301

Reg No :

CHOICE BASED CREDIT SYSTEM

B.Sc. THIRD SEMESTER DEGREE EXAMINATION FEBRUARY 2022

CHEMISTRY

Chemistry Theory III

Duration:3 Hours

Max Marks:80

PART - A

I. Answer any Five of the following

(2×5= 10 Marks)

- 1 Give reason- F does not form F^+ cation.
- 2 Give reason: NF_5 is not known while PF_5 is well known.
- 3 What is inversion temperature? How is it related to Vanderwaals constants?
- 4 Explain dipole-dipole interaction with an example.
- 5 Write the applications of crown ethers.
- 6 Give one method of preparation of carboxylic acid.

PART - B

II. Answer any Seven of the following choosing at least one from each unit: (10×7= 70 Marks)

UNIT I

- 7 a. Write a note on the types of oxyacids of Halogens.
b. Write a short note on clathrates.
c. Explain the formation of PtF_6 complexes. **(4+3+3)**
- 8 a. What are silicates? Explain any three types of silicates .
b. Explain the stability of hydrides in group 15.
c. Explain the banana bonding in diborane. **(4+3+3)**
- 9 a. What are the different types of oxides formed as we move across the period from group 13 to group 17?
b. Explain the preparation of XeO_3 and XeF_2 .
c. Write a note on hydrides of group 14. **(4+3+3)**

UNIT II

- 10 a. Explain the determination of Avogadro number by Braggs method.
b. Write a note on Joule - Thomson effect.
c. Calculate the Miller indices of the crystal plane which cuts through the axes at $(2a, -3b, -3c)$. **(4+3+3)**

- 11 a. Derive the expression for critical constants T_c, P_c & V_c in terms of Vander Waals constants.
b. Write a note on critical phenomena. **(6+4)**
- 12 a. Derive the reduced equation of state for a gas.
b. State the laws of crystallography. **(5+5)**

UNIT III

- 13 a. Explain the following reactions of amides i) Hoffmanns degradation reaction
ii) Reaction with nitrous acid.
b. Benzaldehyde does not undergo Aldol condensation. Give reason.
c. Explain the nucleophilic addition reaction of acetaldehyde with alcohol and water. **(4+3+3)**
- 14 a. Explain the action of heat on alpha and beta hydroxy acids.
b. Explain the auto oxidation of ethers.
c. Give any two methods of preparation of acid anhydride. **(4+3+3)**
- 15 a. Explain the action of heat on i) malonic acid ii) adipic acid.
b. Explain the preparation of glutaric acid from Grignard reagent.
c. Explain the nucleophilic addition of sodium bisulphite to aldehyde and ketones. **(4+3+3)**

CHOICE BASED CREDIT SYSTEM
B.Sc. THIRD SEMESTER DEGREE EXAMINATION FEBRUARY 2022
PHYSICS
Physics Theory III

Duration:3 Hrs

Max Marks:80

PART - A

Answer any TWELVE from the following:

(12×1= 12 Marks)

1. Define acoustics.
2. Give the expression for the velocity of sound in air using Helmholtz resonator.
3. Mention any one method of producing ultrasonic waves.
4. Sound is produced simultaneously at one end of two strings of the same length, one of rubber and other of steel. In which string will the sound reach the other end earlier and why? Explain.
5. Define time period of a progressive wave with diagram.
6. Mention the shape of the wave front when a small piece of stone is dropped over a water surface.
7. Write the expression for the resultant amplitude when two waves interfere. Mention the terms used.
8. What is the path difference corresponding to a phase difference of 2π ?
9. Write the expression for the fringe width in case of interference at a wedge. Mention the terms used.
10. Write the formula for the radius of the mth bright ring obtained in Newton's rings arrangement.
11. Draw the intensity distribution curve for diffraction at a double slit.
12. Define resolving power.
13. On what factors does the number of orders of spectra obtained in a grating depend?
14. What is the phase difference between e-ray and o-ray in a half wave plate.
15. Define polarizing angle.

PART - B

UNIT I

Answer any TWO of the following:

(2×8= 16 Marks)

16. a) In real mechanical systems the damping coefficient is adjusted to the critical value. Explain with applications.
b) What are forced oscillations? Derive an expression for the displacement of forced vibration of a body. (2+6)
17. a) Draw a labelled diagram of Kundt's tube.
b) Define longitudinal waves. Derive an expression for velocity of longitudinal waves in a fluid.(2+6)
18. a) Discuss the effect of pressure and humidity on the speed of sound waves in gases.
b) With relevant equations explain in detail intensity of sound. (2+6)

UNIT II

Answer any TWO of the following:

(2×8= 16 Marks)

19. a) Why are coherent sources required to produce interference of light?
b) Briefly discuss the effect of introducing a thin plate in the path of one of the interfering beams in a biprism. Deduce the expression for finding the thickness of a mica sheet. (2+6)
20. a) Explain why the central fringe in a Lloyd's mirror is dark.
b) Explain with a ray diagram, the phenomenon of interference at a thin film due to reflected light and derive an expression for optical path difference. (2+6)
21. a) Deduce the relation between the wavelength and the displacement of the movable mirror in Michelson interferometer.
b) Discuss the formation of interference fringes when a thin wedge shaped film is seen by normally reflected light. Calculate the thickness of thin air film. (2+6)

UNIT III

Answer any TWO of the following:

(2×8= 16 Marks)

22. a) Describe how a zone plate is constructed.
b) Discuss the theory of a plane diffraction grating for oblique incidence. (2+6)
23. a) Mention any two differences between interference and diffraction phenomenon
b) In a single slit diffraction pattern, how is the angular width of central maximum changed, when (i) the slit width is increased (ii) the distance between the slit and the screen is increased (iii) light of smaller wavelength is used. Justify your answer. (2+6)
24. a) Explain how a Nicol prism can be used both as a polarizer and an analyzer.
b) Give Huygen's theory of double refraction in uniaxial crystals. (2+6)

PART - C

Answer any FOUR from the following:

(4×5= 20 Marks)

25. A 1.75 kg particle moves as function of time as $y = \sin(1.33 t + \frac{\pi}{5})$ where distance is measured in metres and time in seconds. (a) What is the equation of the velocity of this particle? (b) What is the spring constant? (c) What are the equations for the potential and kinetic energies of the particle? What is the total energy?
26. Calculate the amplitude, wavelength, frequency, wave velocity, particle velocity amplitude, acceleration amplitude and direction of propagation of the simple harmonic progressive wave given by $y = 8 e^{j(100 \pi t - 0.4 \pi x)}$
27. In a Young's double slit experiment red light of wavelength 620 nm is used and the two slits are 0.3 mm apart. If the interference fringes are observed on the screen are 1.3 mm apart, calculate (i) distance of the slit from the screen (ii) the fringe width if the distance between the slit and the screen is doubled.
28. Fringes of equal inclination are observed in a Michelson interferometer. As one of the mirrors is more back by 1mm, 3663 fringes move out from the centre of the pattern. Calculate the wavelength of the light used.
29. What is the radius of the first zone in a zone plate of focal length 20 cm for light of wavelength 5000 Å ?
30. A 200 mm long tube containing 48 cc of sugar solution produces an optical rotation of 11° when placed in a polarimeter. If the specific rotation of sugar solution is 66° , calculate the quantity of sugar contained in the tube in the form of solution.

19STA301

Reg No :

CHOICE BASED CREDIT SYSTEM
B.Sc. THIRD SEMESTER DEGREE EXAMINATION FEBRUARY 2022
STATISTICS
Statistics Theory III

Duration:3 Hours

Max Marks:80

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

1. Define Point Estimation.
2. Define Efficiency of an estimator.
3. Name the components of time series:
a) Demand for note books and b) Deaths due to corona Virus
4. " A study of time series data is very essential " Justify.
5. Suppose number of cutomers arriving for service is 5 per minute and the number of customers served is 2 per minute then what is traffic intensity?
6. Distinguish between steady state and transient state systems.

II. Answer any FIVE of the following : (5×6= 30 Marks)

7. Find the moment estimator of the parameter θ when a random sample of size n is drawn from an Exponential distribution with parameter θ .
8. Derive $100(1-\alpha)\%$ Confidence Interval for the ratio of two variances of two independent normal population with known means μ_1 and μ_2 .
9. Deduce Normal equations for fitting a curve of the type $y=ab^t$.
10. Briefly explain seasonal component of time series data with examples.
11. How do you estimate the trend from deseasonalised data?
12. Briefly explain the characteristics of a queuing system.

III. Answer any FOUR of the following : (4×10= 40 Marks)

13. If T_n and $T_{n'}$ are the two independent unbiased consistent estiamtors of θ . Find an unbiased estimator of
a) θ^2 b) $\theta(1-\theta)$. Are these estimators consistent?
14. Briefly explain method of moments for the estimation of the parameters with its principles and properties.
15. Briefly explain the characteristics of autocorrelation and autocovariance.
16. What is interarrival time? State and prove Markovian property of Interarrival time.
17. By stating the necessary assumptions obtain the probability distribution for Pure Birth and Death Process under queuing theory.

CHOICE BASED CREDIT SYSTEM
B.Sc. THIRD SEMESTER DEGREE EXAMINATION FEBRUARY 2022
MATHEMATICS
Mathematics Theory III

Duration:3 Hours

Max Marks:80

I. Answer any EIGHT of the following :**(8×3= 24 Marks)**

1. Prove that every convergent sequence is bounded.
2. State Sandwich theorem.
3. Test for the convergence of the series whose general term is $(1 + \frac{1}{\sqrt{n}})^{(-n^{\frac{3}{2}})}$.
4. Show that the series $\frac{1}{1^p} - \frac{1}{2^p} + \frac{1}{3^p} - \frac{1}{4^p} + \dots$ converges for $p > 0$.
5. Show that the series $\sum \frac{1}{n}$ does not converge.
6. Solve : $y(2xy + 1)dx - xdy = 0$.
7. Solve: $(2xy - 3x^2)dx + (x^2 + y)dy = 0$.
8. Find the velocity of escape at the surface of Venus whose radius is 3800 miles and acceleration of gravity at its surface is 0.85g where $g = .0061 \text{ miles/sec}^2$.
9. Find 'B' of the method of variation of parameters in solving $(D^2 + 1)y = \tan x$.
10. Solve: $(D^2 + 16)y = \sin 4x$.

II. Answer any EIGHT of the following :**(8×7= 56 Marks)**

11. Show that the sequence $\{S_n\}$ where $S_n = \frac{1}{n-1} + \frac{1}{n+2} + \dots + \frac{1}{n+n}$ is convergent.
12. Prove that every bounded sequence has a limit point.
13. Show that the series $\sum \frac{1}{n^p}$ converges, if $p > 1$, and diverges if $p \leq 1$.
14. Test the behaviour of the series $\frac{1^2 \cdot 2^2}{1!} + \frac{2^2 \cdot 3^2}{2!} + \frac{3^2 \cdot 4^2}{3!} + \frac{4^2 \cdot 5^2}{4!} + \dots$
15. Solve : $y(x + y)dx + (x + 2y - 1)dy = 0$.
16. Find the orthogonal trajectories of the curves $r = a \cos^2 \theta$.
17. Solve: $(D^3 - 12D + 16)y = (e^x + e^{-2x})^2$.
18. Solve: $(D^2 - 5D + 4)y = x^2 - 2x + 3$.
19. Solve by reducing to normal form: $xy_2 + 2y_1 + xy = 0$.
20. Solve: $x^2 y_2 - 3xy_1 - 5y = \sin(\ln x)$.

19COS301

Reg No :

CHOICE BASED CREDIT SYSTEM
B.Sc. THIRD SEMESTER DEGREE EXAMINATION FEBRUARY 2022
COMPUTER SCIENCE
Computer Science Theory III

Duration:3 Hours

Max Marks:80

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

1. Explain the relational operations of relational algebra?
2. Define NOT NULL constraint with an example.
3. Define linked list. Give an example.
4. What is key attribute? Give example.
5. Define the following binary tree terminologies: a) root b) leaf
6. Explain the different clauses used with the select statement.

II. Answer any FIVE of the following : (5×6= 30 Marks)

7. What is a weak-entity set? Explain with example.
8. Explain the following aggregate functions. 1) SUM() 2) COUNT() 3) AVG()
9. Define stack. Write an algorithm to delete an element from the stack.
10. Write a short note on UPDATE command.
11. What is a data structure? Explain linear and non-linear data structure with examples.
12. Explain the important characteristics of database approach.

III. Answer any FOUR of the following : (4×10= 40 Marks)

13. What are the advantages of using a DBMS? What is the purpose of database management system ?
14. List and explain the different types of attributes in ER model.
15. Explain different clauses used in the SQL query.
16. Briefly explain DDL and DML commands with an example.
17. Define queue. Write the algorithms for INSERT and DELETE operations on queue.

19MIC301

Reg No :

CHOICE BASED CREDIT SYSTEM
B.Sc. THIRD SEMESTER DEGREE EXAMINATION FEBRUARY 2022
MICROBIOLOGY
Microbiology Theory III

Duration:3 Hours

Max Marks:80

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

1. Define budding.
2. What are aerobes?
3. What are proteins? Give an example.
4. What are polysaccharides? Give an example.
5. What is a holoenzyme?
6. What is a substrate?

II. Answer any FIVE of the following : (5×6= 30 Marks)

7. Classify bacteria based on their energy source and electron source.
8. Define growth curve. Explain the different phases of growth curve.
9. Write a note on acids.
10. Explain the structure of ATP in brief.
11. Write a note on exo and endo enzymes.
12. Write a note on isomerases and ligases.

III. Answer any FOUR of the following : (4×10= 40 Marks)

13. Discuss in detail about measurement of growth by using haemocytometer.
14. Describe induction method. Add a note on selection of organisms based on their cell size.
15. Explain in detail on the types of fatty acids.
16. Discuss the principle of macromolecular separation by chromatography and electrophoresis.
17. Describe the general characteristics of enzymes with special reference to pH sensitivity and reversibility.

19PHY502

Reg No :

CHOICE BASED CREDIT SYSTEM
B.Sc. FIFTH SEMESTER DEGREE EXAMINATION FEBRUARY 2022
PHYSICS
Physics Theory VI

Duration:3 Hrs

Max Marks:80

PART - A

Answer any TWELVE from the following:

(12×1= 12 Marks)

1. State Dulong and Petit's law.
2. What is Einstein's temperature?
3. Define mean free path.
4. Define mobility of electrons.
5. Define Hall Effect.
6. Draw the energy band diagram for an insulator.
7. Give the symbol for LED.
8. What is depletion region?
9. What is breakdown voltage?
10. Define nanoscience.
11. Give an example for face centered cubic structured crystal.
12. Mention any two uses of X-rays.
13. What is burger's vector?
14. What is ferrimagnetism?
15. Give example for paramagnetic material.

PART - B

UNIT I

Answer any TWO from the following:

(2×8= 16 Marks)

16. a) Show the differences between Einstein's and Debye's theories of specific heats of solids graphically.
b) Show that both FD and BE statistics reduce to MB statistics at low densities and high temperatures. (2+6)
17. a) What are the limitations of Einstein's theory of specific heats of solids?
b) Assuming Debye's expression for energy, discuss the results at very low and very high temperatures. (2+6)
18. a) Give the significance of Hall coefficient.
b) Explain how the Fermi function of free electrons in a metal varies with energy when (a) $T = 0$ K (b) $T > 0$ K. (2+6)

UNIT II

Answer any TWO from the following:

(2×8= 16 Marks)

19. a) Show how the energy gap of an intrinsic semiconductor can be calculated by using a graphical representation?
b) Explain the formation of a n type semiconductor and give its energy band diagram. (2+6)
20. a) Give any two applications of solar cell.
b) With the help of an energy band diagram explain the effect of reverse bias on a p-n diode. (2+6)
21. a) Write a note on nano wires.
b) With the help of a energy band diagram explain the formation of depletion region in an unbiased p-n diode. (2+6)

UNIT III

Answer any TWO from the following:

(2×8= 16 Marks)

22. a) Distinguish between continuous and characteristics X-rays.
b) Draw the diagram of Bragg's spectrometer and explain how it is used to determine the wavelength of X-rays.
23. a) Write a short note on compositional defects.
b) With a suitable diagram explain about screw dislocation .
24. a) Explain magnetic permeability.
b) Explain in detail about antiferromagnetism and ferromagnetism. Give examples for the same and mention the reasons for the materials to have these properties.

PART - C

Answer any FOUR from the following:

(4×5= 20 Marks)

25. Debye's temperature for sodium metal is 160 K. Calculate its molar specific heat at 15 K. Given $R = 8.314 \times 10^3 \text{ J/kmol /K}$.
26. There are 2.5×10^{28} free electrons for cubic meter of sodium. Calculate the Fermi energy and Fermi velocity.
27. The intrinsic carrier density of Germanium at 27°C is $2.4 \times 10^{17} \text{ m}^{-2}$. Calculate its intrinsic resistivity if the electron and hole mobilities are $0.35 \text{ m}^2\text{V}^{-1}\text{s}^{-1}$ and $0.18 \text{ m}^2\text{V}^{-1}\text{s}^{-1}$
28. The resistivity of pure silicon is $2.3 \times 10^3 \Omega\text{m}$ at 300 K. Calculate its resistivity at 200°C . Assume $E_g = 1.1 \text{ eV}$ and $K = 8.61 \times 10^{-5} \text{ eV/K}$.
29. Monochromatic X rays incident on a crystal of inter planar spacing 0.28 nm produces Bragg's reflection of a certain order at a glancing angle of 18° . On another crystal of spacing 0.34 nm, the reflection of the next order occurs at 30.6° , calculate the wavelength of the X rays.
30. An X-ray tube operates at the voltages (i) 100 kV (ii) 135 kV. Find the speed of the electrons striking the anode and shortest wavelength of the X-rays produced in each case.

CHOICE BASED CREDIT SYSTEM
B.Sc. FIFTH SEMESTER DEGREE EXAMINATION FEBRUARY 2022
PHYSICS
Physics Theory V

Duration:3 Hrs

Max Marks:80

PART - A

Answer any TWELVE from the following:

(12×1= 12 Marks)

1. What is gyromagnetic ratio?
2. Give the expression for L-S coupling. Mention the terms used.
3. What is magnetic resonance ?
4. What is the order of electronic energy of molecules?
5. State the factors on which the rotational energy of a diatomic molecule depends.
6. State Stefan's law of black body radiation.
7. What is the practical unit of work function?
8. Write Einstein's photoelectric equation and explain the symbols.
9. Can any type of wave travel faster than light? If so, mention it.
10. Which phenomenon was observed in Davisson-Germer experiment using an electron beam?
11. What do you understand by the wave function of a moving particle?
12. Why a particle trapped in a box cannot be at rest?
13. What is the expression for energy of a harmonic oscillator? Mention the terms used.
14. What is meant by non-degenerate state?
15. Write the expression for three dimensional time dependent Schrödinger wave equation and mention the terms used.

PART - B

UNIT I

Answer any TWO from the following:

(2×8= 16 Marks)

16. a) Give any two limitations of Bohr atom model.
b) Describe the Stern Gerlach experiment and mention the results. (2+6)
17. a) Explain the meaning of the spectral term $^2D_{5/2}$.
b) Explain Raman effect on the basis of quantum theory. What are the applications of Raman effect? (2+6)
18. a) Explain L-S coupling for a multi electron system.
b) Draw the energy level diagram for diatomic molecule. Show that in rotational spectra the energy levels are not equally spaced whereas the frequencies are equally spaced. (2+6)

UNIT II

Answer any TWO from the following:

(2×8= 16 Marks)

19. a) What were the assumptions of Rayleigh-Jeans in order to explain black body radiation spectrum?

- b) Discuss Planck's quantum hypothesis and deduce Planck's law of energy distribution for black body radiation. (2+6)
20. a) Find the change in wavelength of X-ray photon when it is scattered through an angle of 45° .
b) Give the differences between photoelectric effect and Compton effect and the differences between Raman effect and Compton effect. (2+6)
21. a) Define de-Broglie phase velocity and show that it exceeds velocity of light as well as the particle velocity.
b) State Heisenberg's uncertainty principle and obtain three sets of Heisenberg's uncertainty principles. (2+6)

UNIT III

Answer any TWO from the following:

(2×8= 16 Marks)

22. a) Distinguish between classical mechanics and quantum mechanics.
b) Explain in detail degeneracy for a three dimensional system. (2+6)
23. a) Show that the deBroglie wavelength of a particle in a one-dimensional box in the first excited state is equal to the length of the box.
b) Write down the Schrödinger wave equation for a free particle in a linear potential box and discuss probability graphs. (2+6)
24. a) Draw the (a). wave functions for $n = 1, 2,$ and 3 (b) The probability distributions for $n = 1, 2,$ and $3,$ for a particle confined to a one-dimensional box.
b) What is Expectation value, Eigen value and Eigen function? Explain their significance. (2+6)

PART - C

Answer any FOUR from the following:

(4×5= 20 Marks)

25. Calculate the wavelength separation between the two component lines which are observed in normal Zeeman effect. Given the magnetic field used is 0.4 T and $\lambda = 4000 \text{ \AA}$.
26. With an exciting radiation of wavelength 589.3 nm a substance showed Raman line at a wavelength 578.7 nm . Find the wavelength, frequency of Stoke's and anti Stoke's line.
27. Two bodies A and B have thermal emissivities of 0.01 and 0.81 , respectively. The outer surface area of the two bodies are the same. The two bodies emit total radiant power at the same rate. The wavelength corresponding to maximum spectral radiance in the radiation from B is shifted from the wavelength corresponding to maximum spectral radiance in the radiation from A by $1 \mu \text{ m}$. If the temperature of A is 5802 K , find the wavelength and temperature of body B.
28. The threshold wavelength for photo-electric emission in tungsten is 230 nm . What wavelength of incident light must be used in order to eject electrons with a maximum velocity of $5 \times 10^5 \text{ m s}^{-1}$?
29. An electron has a de-Broglie wavelength 3 nm and rest mass 511 keV . Determine its group velocity, phase velocity and kinetic energy.
30. The lowest energy possible for a certain particle entrapped in a box is 40 eV . What are the next three higher energies the particle can have?

19COS501

Reg No :

CHOICE BASED CREDIT SYSTEM

B.Sc. FIFTH SEMESTER DEGREE EXAMINATION FEBRUARY 2022

COMPUTER SCIENCE

Computer Science Theory V

Duration: 3 Hours

Max Marks: 80

I. Answer any FIVE of the following :

(5×2= 10 Marks)

1. Write any two internet protocols.
2. What is a client-server architecture?
3. Give any two disadvantages of JDBC Type-3 Driver.
4. How do you create a PreparedStatement object? Give an example.
5. Why is the method setStatus() used?
6. What is Apache Tomcat?

II. Answer any FIVE of the following :

(5×6= 30 Marks)

7. Explain any three J2EE API's.
8. With a neat diagram, explain 3-tier architecture. Mention its advantages.
9. Explain any six methods used in navigating a ResultSet interface.
10. Explain any six methods of DriverManager Class.
11. Write a Java Servlet program to read "FirstName" and "LastName" from HTML page.
12. Explain any two loops used in JSP with an example each.

III. Answer any FOUR of the following :

(4×10= 40 Marks)

13. What is the need for enterprise programming? Explain any four advantages.
14. Explain the components and architecture of JDBC with a neat diagram.
15. How do you create a table using Statement interface? Illustrate with an example.
16. a) Define i) Java Servlet ii) CGI.
b) Explain the benefits of using Java Servlet over CGI.
17. How do you read the data from a client? Explain with the help of an example, how do you accept three user inputs from client.

CHOICE BASED CREDIT SYSTEM
B.Sc. FIFTH SEMESTER DEGREE EXAMINATION FEBRUARY 2022
COMPUTER SCIENCE
Computer Science Theory VI

Duration:3 Hours

Max Marks:80

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

1. Give any two features of Intel 8080.
2. When is the Parity Flag set to 1?
3. Write the syntax of IN and OUT instruction.
4. What is the use of LEA instruction?
5. Write the syntax of Shift Logical Left instruction with an example.
6. What is the significance of the Branch instructions?

II. Answer any FIVE of the following : (5×6= 30 Marks)

7. Convert the following decimal numbers into both packed and unpacked BCD forms: (i) 102 (ii) 44 (iii)1000
8. Draw the internal architecture of 8086 and explain the Execution Unit.
9. Explain the different program organization directives with suitable examples.
10. Explain the directives DB and DD.
11. Explain: (i) DAA (ii) DAS
12. Explain the interrupt actions.

III. Answer any FOUR of the following : (4×10= 40 Marks)

13. List and explain the Index Registers and Segment Registers.
14. What is an addressing mode? Explain the following addressing modes with an example : (i) Direct addressing mode (ii) Indirect addressing mode (iii) Register addressing mode
15. Write a note on (a) Macro (b) Procedure
16. (a) Write an Assembly Language Program to exchange a block of data.
(b) Write an Assembly Language Program to search an accepted character in an accepted string.
17. Explain the string transfer instructions with examples.

19MIC501

Reg No :

CHOICE BASED CREDIT SYSTEM
B.Sc. FIFTH SEMESTER DEGREE EXAMINATION FEBRUARY 2022
MICROBIOLOGY
Microbiology Theory V

Duration:3 Hours

Max Marks:80

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

1. Define Species immunity.
2. Define an Immunoglobulin molecule.
3. Mention the enterotoxins of Escherichia coli.
4. What is Aspergillosis?
5. What is chemotherapy?
6. Name the organisms used to produce Polymyxin and Streptomycin antibiotics.

II. Answer any FIVE of the following : (5×6= 30 Marks)

7. Write a short note on Cell mediated Immune response.
8. Write in brief on the types of Precipitation reactions.
9. Write a note on medically important parasites.
10. Enumerate the clinical features of Hepatitis B Virus.
11. Write a note on Amphotericin B.
12. Write a note on antiparasitic drugs.

III. Answer any FOUR of the following : (4×10= 40 Marks)

13. Describe the production of Monoclonal antibodies by the Hybridoma technique.
14. Describe the various methods of transmission of infections.
15. Explain the morphology, cultural, biochemical characters, pathogenesis and laboratory diagnosis of Clostridium tetani.
16. Explain the morphology, cultural, biochemical characters, pathogenesis and laboratory diagnosis of any two clinically important Gram positive Cocci.
17. Define an antimicrobial agent and explain the factors affecting antimicrobial control.

19MIC502

Reg No :

CHOICE BASED CREDIT SYSTEM
B.Sc. FIFTH SEMESTER DEGREE EXAMINATION FEBRUARY 2022
MICROBIOLOGY
Microbiology Theory VI

Duration:3 Hours

Max Marks:80

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

1. What is Cess pool?
2. Name any four fungi present in aquatic system.
3. List the factors affecting the Microflora of air.
4. What is sedimentation in Air Microbiology?
5. List the enzymes involved in the degradation of cellulose and starch.
6. What are autochthonous bacteria?

II. Answer any FIVE of the following : (5×6= 30 Marks)

7. Discuss filtration as a method of purification of drinking water.
8. Write a note on Defined substrate test and IMViC test done for coliforms.
9. Write a note on Measles.
10. Write a note on whooping cough.
11. Define a biofertilizer. Explain the isolation and cultivation of Rhizobia in industry for production of biofertilizer.
12. Define microbial insecticide. Explain the use of one microbial insecticide in controlling the pests.

III. Answer any FOUR of the following : (4×10= 40 Marks)

13. Explain the different types of natural water.
14. Explain the different types of water and effect of light rays and temperature on microbes in stored water.
15. Describe in detail on Coccidioidomycosis and Histoplasmosis.
16. Describe the Lemon sampler with a neat labelled diagram.
17. Define passive defense mechanism in plants and explain role of secondary metabolites in diseases development.

19BOT501

Reg No :

CHOICE BASED CREDIT SYSTEM
B.Sc. FIFTH SEMESTER DEGREE EXAMINATION FEBRUARY 2022
BOTANY
Botany Theory V

Duration:3 Hours

Max Marks:80

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

1. What is Hydroponics? Mention its applications.
2. What are transferases? Give an example.
3. Name the water soluble photosynthetic pigments.
4. Define turgour pressure and wall pressure.
5. Define Photolysis. Represent it with an equation.
6. Write the α - D Glucose ring structure.

II. Answer any FIVE of the following : (5×6= 30 Marks)

7. What is diffusion? Explain the factors affecting diffusion. Add a note on the uses of imbibition to plants.
8. Explain any six morphological adaptations to check excessive transpiration.
9. Write a note on i) Anaerobic respiration and its mechanism ii) RQ value of Malic acid, Tartaric acid and Oxalic acid.
10. Give the schematic representation of Krebs cycle.
11. Explain the role of Auxins in plant growth.
12. List the different sources of Nitrogen.

III. Answer any FOUR of the following : (4×10= 40 Marks)

13. What are enzyme inhibitors? Explain its types. Add a note on Exo and Endo enzymes.
14. Describe the mechanism of water absorption.
15. Explain the role of Macro and Micro elements in plant growth.
16. Explain glyoxylate cycle. Mention its significance.
17. Define i) Hypotonic solution ii) Cavitation iii) Hydrolases iv) Holoenzyme v) Allosteric inhibition

19BOT502

Reg No :

CHOICE BASED CREDIT SYSTEM
B.Sc. FIFTH SEMESTER DEGREE EXAMINATION FEBRUARY 2022
BOTANY
Botany Theory VI

Duration:3 Hours

Max Marks:80

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

1. What is a monocistronic gene?
2. What is the difference between a nucleotide and nucleoside?
3. Name the enzymes produced in Lactose metabolism.
4. What is the function of RNA polymerase III?
5. What is point mutation? Mention its types.
6. What are the three chief components of bioinformatics?

II. Answer any FIVE of the following : (5×6= 30 Marks)

7. Explain the possible modes by which DNA can replicate.
8. Explain the process of transcription in Prokaryotes.
9. Write the genetic effect of duplication.
10. Write the differences between monosomy and nullisomy.
11. Explain the role of mutation in plant breeding and evolution.
12. Explain the steps involved in DNA fingerprinting technique.

III. Answer any FOUR of the following : (4×10= 40 Marks)

13. Explain Hershey and Chase experiment to prove that DNA is the genetic material with a neat labeled diagram.
14. Define Translation. Explain the process of translation in Prokaryotes with a neat labeled diagrams.
15. Give an account of polyploidy.
16. Explain paracentric inversion and its cytology.
17. What is Southern blotting? Explain the detailed procedure involved.

19ZOO501

Reg No :

CHOICE BASED CREDIT SYSTEM
B.Sc. FIFTH SEMESTER DEGREE EXAMINATION FEBRUARY 2022
ZOOLOGY
Zoology Theory V

Duration:3 Hours

Max Marks:80

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

1. What is an Idiogram?
2. Write any two functions of intermediate filaments.
3. Draw a neat labeled diagram of Anaphase stage of Meiosis II.
4. What is homotypic division?
5. Define Genetic engineering.
6. What is B DNA? Write any two features.

II. Answer any FIVE of the following : (5×6= 30 Marks)

7. Write a note on any six subdivisions of Cell Biology.
8. Classify human chromosomes based on the position of centromeres.
9. Enumerate the significance of Mitosis.
10. Write short notes on nucleocytoplasmic interactions in Acetabularia.
11. Write a note on polysome concept of protein synthesis.
12. Give a brief account on initiation process of eukaryotic transcription.

III. Answer any FOUR of the following : (4×10= 40 Marks)

13. Give an account of the morphology of eukaryotic chromosomes, with special references to number, size and types of chromosomes.
14. Explain the structure and functions of golgi apparatus and plastids.
15. Explain the role of Vitamin E and Bioflavonoids as antioxidants in prevention of cancer.
16. Write the explanatory notes on tumour therapy.
17. Define genetic code. Enumerate the properties of genetic code.

19ZOO502

Reg No :

CHOICE BASED CREDIT SYSTEM

B.Sc. FIFTH SEMESTER DEGREE EXAMINATION FEBRUARY 2022

ZOOLOGY

Zoology Theory VI

Duration:3 Hours

Max Marks:80

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

1. Write a short note on surrogate mother.
2. Write the difference between a sperm and ovum.
3. Name the parts of the organizer.
4. Who is the father of Embryology? What are his contributions?
5. What is corpus luteum? Mention its function.
6. What is yolk sac placenta? Give an example.

II. Answer any FIVE of the following : (5×6= 30 Marks)

7. Give a schematic representation of menstrual cycle.
8. Explain the technique of preserving frozen sperm in a sperm bank.
9. Explain the neurula stage of frog with an illustration.
10. Give a brief account of acrosome reactions with suitable illustrations.
11. Give an account of the hormones produced by the anterior and posterior pituitary.
12. Explain the process of Blastulation in chick with an illustration.

III. Answer any FOUR of the following : (4×10= 40 Marks)

13. Explain parthenogenesis giving suitable examples. Add a note on its significance.
14. Explain the male and female reproductive system in human. Add a note on secondary sexual characters.
15. Explain the process of cleavage and blastulation in frog with suitable diagrams.
16. Describe different types of cleavage with suitable examples. Add a note on patterns of cleavage.
17. Give an account of gastrulation in chick. Illustrate your answer with suitable diagram.

19CHE501

Reg No :

CHOICE BASED CREDIT SYSTEM
B.Sc. FIFTH SEMESTER DEGREE EXAMINATION FEBRUARY 2022

CHEMISTRY
Chemistry Theory V

Duration:3 Hours

Max Marks:80

PART - A

I. Answer any Five of the following

(2×5= 10 Marks)

- 1 Write de Broglie equation and explain the terms.
- 2 Write the IUPAC name of i) $[\text{CoCl}_2(\text{en})_2]\text{SO}_4$ ii) $\text{K}_2[\text{PdCl}_4]$
- 3 Define the term dissociation constant of a weak electrolyte. Write the mathematical expression.
- 4 Calculate the cell constant of a conductivity cell which shows a conductance of 10mS when dipped in 0.1N KCl solution at 298K. Specific conductance of 0.1N KCl solution at 298K is 1.29 Sm^{-1} .
- 5 Write the structure of (i) lactose and (ii) sucrose
- 6 Write the Newmann projection formula for i) eclipsed 1,2 dichloroethane
ii) staggered ethane.

PART - B

II. Answer any Seven of the following choosing at least one from each unit: (10×7= 70 Marks)

UNIT I

- 7 a) What is photoelectric effect? What are the experimental facts regarding photoelectric effect?
b) Explain Heisenberg's uncertainty principle.
c) What are chelates? Explain with two examples. (4+3+3)
- 8 a) Discuss geometrical isomerism in compounds with co-ordination number 6.
b) Write Schrodinger's wave equation for particle in one dimensional box and hydrogen atom.
c) Explain the physical significance of wave function. (4+3+3)
- 9 a) Explain co-ordination isomerism and polymerization isomerism with an example.
b) Explain the significance of quantum numbers.
c) Explain the shapes of all the d- orbitals. (4+3+3)

UNIT II

- 10 a) Explain the variation of specific conductance and equivalent conductance with dilution.
b) Explain the Debye- Huckle theory of conductance of strong electrolyte and its validity.
c) The equivalent conductance at infinite dilution of HCl and NaCl and sodium acetate are 426.1×10^{-4} , 126.45×10^{-4} and $91 \times 10^{-4} \text{ Sm}^2\text{eq}^{-1}$ respectively. If the equivalent conductance of a solution of acetic acid is $48.15 \times 10^{-4} \text{ Sm}^2\text{eq}^{-1}$. What is the degree of dissociation of acetic acid? **(4+3+3)**
- 11 a) Explain the Hittorf's method of determining the transport number of an ion using non attackable electrodes.
b) Define ionic mobility. Deduce the relationship between ionic mobility and transport number.
c) Mention the number of phases, number of components and number of degrees of freedom in the following equilibria: a) pure gas b) aqueous sodium chloride solution. **(4+3+3)**
- 12 a) Explain Pattinson's process of desilverisation of lead.
b) Explain the conductometric titration between weak acid and strong base.
c) State Kohlrausch's law and explain any one of its applications.

UNIT III

- 13 a) Explain the conversion of (i) glucose to fructose (ii) glucose to arabinose.
b) Explain optical activity in lactic acid.
c) Distinguish between enantiomers and diastereomers. **(4+3+3)**
- 14 a) Enumerate the Cahn- Ingold-Prelog rules with examples.
b) What are glycosides? How are they prepared?
c) Write the reactions of glucose with
i) Fehling's solution ii) bromine water. **(4+3+3)**
- 15 a) Explain the method of resolution of racemic mixtures by chemical method and biochemical method.
b) Discuss the mechanism of mutarotation.
c) How is the ring size of glucose determined by periodic acid method? **(4+3+3)**

CHOICE BASED CREDIT SYSTEM
B.Sc. FIFTH SEMESTER DEGREE EXAMINATION FEBRUARY 2022

CHEMISTRY
Chemistry Theory VI

Duration:3 Hours

Max Marks:80

PART - A

I. Answer any Five of the following:

(2×5= 10 Marks)

- 1 Gadolinium and Lutetium show only +3 state. Give reason.
- 2 Explain the following. AgI_2^- complex is stable but AgF_2^- is not.
- 3 What is Rayleigh scattering?
- 4 Define a) Stokes lines b) anti Stokes lines
- 5 What are Grignard reagents?

PART - B

II. Answer any Seven of the following choosing at least one from each unit: (10×7= 70 Marks)

UNIT I

- 7 a) Differentiate between conductors, semiconductors and insulators on basis of band theory of metallic bond.
b) Give any three similarities between actinides and lanthanides.
c) With suitable examples explain the characteristics of hard and soft acids. (4+3+3)
- 8 a) What is lanthanide contraction? Explain its cause.
b) Give three consequences of lanthanide contraction.
c) State the limitations of HSAB theory. (4+3+3)
- 9 a) Explain how lattice energy of sodium chloride crystal is calculated using Born-Haber cycle.
b) Explain the general trends in electronic configuration of actinides.
c) Calculate the lattice enthalpy for lithium fluoride, given the following information:
Enthalpy of sublimation for solid lithium = 161 kJ/mol, First ionization energy for lithium = 520 kJ/mol, F-F bond dissociation energy = 154 kJ/mol, Enthalpy of formation for F(g) = 77 kJ/mol, Electron affinity for fluorine = -328 kJ/mol, Enthalpy of formation for solid lithium fluoride = -617 kJ/mol. (4+3+3)

UNIT II

- 10 a) The force constant of CO is 1840 Nm^{-1} . Calculate the vibrational frequency in cm^{-1} and zero point energy in cm^{-1} .
b) Draw the energy level diagram of a molecule for vibrational transition with simple harmonic oscillator.
c) Explain the characteristics of electromagnetic radiation. (4+3+3)

- 11 a) Explain anharmonic behaviour of diatomic molecules. Draw the energy level diagram of a molecule for vibrational transition with anharmonic oscillator.
b) Explain the principle of NMR spectroscopy
c) What is the reference used in NMR spectroscopy? List its advantages. (4+3+3)
- 12 a) Show that the frequency separation of successive lines in pure rotational spectra of rigid diatomic molecule is $2B$.
b) Write and explain the selection rule for rotational and vibrational transition.
c) Explain the types of molecular vibrations. (4+3+3)

UNIT III

- 13 a) Give the synthesis of methyl orange and Congo red.
b) Explain the mechanism of Claisen condensation.
c) How is butanoic acid prepared from DEM. (4+3+3)
- 14 a) Explain Friedel- Crafts reaction and Wagner Meerwein rearrangement with suitable examples.
b) Give the synthesis of alizarin.
c) Give the synthesis of succinic acid from AAE. (4+3+3)
- 15 a) What is Grignard reagent? Explain the formation of primary, secondary and tertiary alcohols from it.
b) Give the synthesis of crotonic acid from DEM.
c) Write the synthesis of indigo. (4+3+3)

CHOICE BASED CREDIT SYSTEM
B.Sc. FIFTH SEMESTER DEGREE EXAMINATION FEBRUARY 2022
MATHEMATICS
Mathematics Theory V

Duration:3 Hours

Max Marks:80

I. Answer any EIGHT of the following :**(8×3= 24 Marks)**

1. Define a ring with zero divisor and give an example .
2. Define a field and show that ring of integers is not a field .
3. Give an example of a commutative ring which is not an integral domain .
4. For the vectorspace $V = R^n$, show that the unit vectors form a basis.
5. Define (i) Orthonormal basis
(ii) Orthonormal set
(iii) Orthogonal vectors
6. Prove that any two bases of vectorspace V have the same number of elements .
7. Verify whether $W = \{x = (x_1, x_2, \dots, x_n)/2x_2 + 3x_3 + \dots + nx_n\}$ is a subspace of R^n .
8. Find $L^{-1}\left\{\frac{s^2}{(s+2)^3}\right\}$.
9. Find $L\{\sin^2 kt\}$.
10. Find $L\{t^{1/2}\}$.

II. Answer any EIGHT of the following :**(8×7= 56 Marks)**

11. Let R be a finite integral domain, then prove that R is a field .
12. Show that in a Boolean ring $2a = 0$ for all $a \in R$ and deduce that a Boolean ring is commutative .
13. Prove that the set of all 2×2 matrices forms a ring with unity and not commutative.
14. Define dimension of a vectorspace V . Let V be a vectorspace of dimension n . Then prove that any set of n linearly independent elements of V is a basis of V .
15. Let $\{v_1, v_2, \dots, v_n\}$ be a maximal linearly independent set in V , then prove that it forms a basis of V .
16. Prove that the sum of two subspaces of a vectorspace is also a subspace .
17. Define Laplace transform of a function $F(t)$. Find $L\{H(t)\}$ where

$$H(t) = \begin{cases} t, & 0 < t < 4, \\ 5, & t > 4 \end{cases}$$
 .
18. Find the Laplace Transform of the function

$$\Psi(t, c) = \begin{cases} 1, & 0 < t < c \\ 0, & c < t < 2c \end{cases}, \Psi(t + 2c, c) = \Psi(t, c)$$
 .
19. Find $L\{y(t)\}$ where $y(t) = \begin{cases} t^2, & 0 < t < 2 \\ 6, & t > 2 \end{cases}$ using α -function.
20. Solve: $y''(t) + 4y(t) = 2t - 8$ with $y(0) = 1, y'(0) = 0$, using Laplace Transforms.

CHOICE BASED CREDIT SYSTEM
B.Sc. FIFTH SEMESTER DEGREE EXAMINATION FEBRUARY 2022
MATHEMATICS
Paper VI: Discrete Mathematics

Duration: 3 Hours

Max Marks: 80

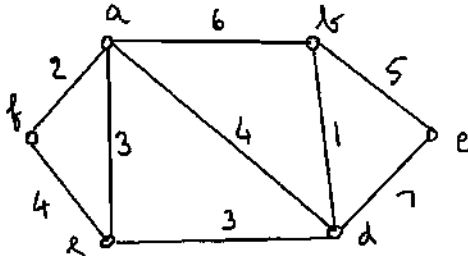
I. Answer any EIGHT of the following :

(8×3= 24 Marks)

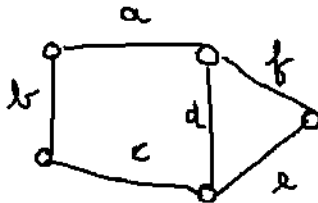
1. Define planar graph. Give an example of a non planar graph.
2. Find chromatic number of the wheel graph W_6 .
3. Write an incidence matrix containing the matrix given below and draw the undirected graph represented by it.

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

4. Use Prim's algorithm to find a minimal spanning tree of the graph given below.



5. Draw a binary tree for the prefix code {1,01,0010,000}.
6. Draw any three spanning trees of the graph given below.



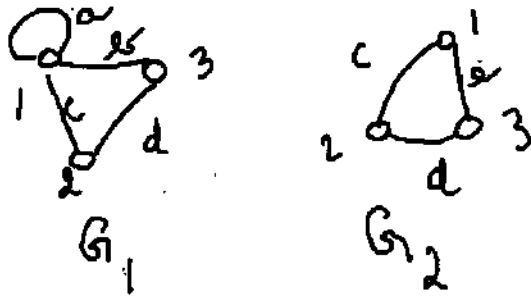
7. Find the particular solution of the difference equation, $a_r + 2a_{r-1} = 5$.
8. If $A(z) = 3z + \frac{2}{1-2z}$, find a_r .
9. Find the particular solution of the recurrence relation $a_r - 2a_{r-1} = 3 \cdot 2^r$.
10. Find the generating function for the numeric function $a_r = 2^r - 3^r; r \geq 0$.

II. Answer any EIGHT of the following :

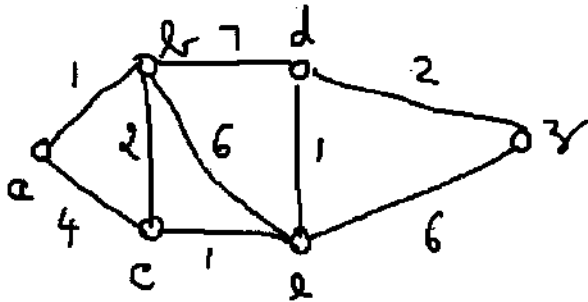
(8×7= 56 Marks)

11. For the graphs given below find (i) union, (ii) intersection and (iii) ring sum. Also in the graph G_2 , find (iv) a decomposition and the graphs obtained by (v) deletion of vertex 1, (vi) deletion of edge d,

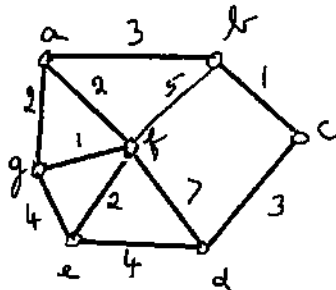
(vii) fusion of vertices 1 and 3.



12. Prove that a directed complete graph has always possesses a hamiltonian path.
13. Using Euler's formula, prove that a complete graph of five vertices is non-planar
14. Find the shortest distance between a and z in the weighted graph given below.



15. Prove that a connected graph with $e = v - 1$ is a tree.
16. State Kruskal's algorithm. Use this algorithm to find minimal spanning tree of the graph given below.



17. Define the following.
spanning tree, cutset.
Prove the following.
(i) A circuit and the complement of any spanning tree must have at least one edge in common.
(ii) A cutset and any spanning tree must have at least one edge in common.
18. Find the particular solution of the recurrence relation $a_r + 5a_{r-1} + 6a_{r-2} = 3 \cdot r^2$.

19. If $A(z) = \frac{z}{1-z^2}$ then find the numeric function corresponding to the numeric function $A(z)$

20. Let a be the numeric function defined by

$$a_r = \begin{cases} 2 & 0 \leq r \leq 3 \\ 2^{-r} + 5 & r \geq 4 \end{cases}$$

Find the forward difference Δa , the backward difference ∇a , and $s^{-2}a$.

CHOICE BASED CREDIT SYSTEM

B.Sc. FIFTH SEMESTER DEGREE EXAMINATION FEBRUARY 2022

MATHEMATICS

Paper VI: Linear Programming

Duration: 3 Hours

Max Marks: 80

I. Answer any EIGHT of the following :

(8×3= 24 Marks)

- Write the canonical form of minimization LPP .
- State the canonical minimization LPP represented by

x	20	25	300
y	40	20	500
-1	1000	800	0
	= t ₁	= t ₂	= g

- Write the table of the noncanonical LPP: Maximize $f(x, y) = x + 3y$ subject to $x + 2y \leq 10, 3x + y \leq 15$.
- Pivot on $a_{12} = 3$ in the following canonical maximization table :

	x_1	x_2	-1	
	2	3	6	= -t ₁
	1	3	2	= -t ₂
	0	2	1	= f

- State the Duality Theorem .
- Define mixed strategy and pure strategy for the column player in the matrix game.
- Define a source , sink and intermediate vertex in capacited directed network $N = [V, E]$.
- Obtain two cycles in the following transportation table :

C_{11}	C_{12}	C_{13}
C_{21}	C_{22}	C_{23}
C_{31}	C_{32}	C_{33}

- Apply the first step of the Hungarian Algorithm to the following assignment problem:

0.5	2	1
1.2	1/6	7
5/9	0	3.14

10. State the balanced assignment problem .

II. Answer any EIGHT of the following :

(8×7= 56 Marks)

11. Apply simplex algorithm to the following maximum table :

	x_1	x_2	-1	
	-1	-2	-3	$= -t_1$
	1	1	3	$= -t_2$
	1	1	2	$= -t_3$
	-2	3	0	$= f$

12. Apply simplex algorithm to the following maximum table :

	x_1	x_2	-1	
	1	-1	3	$= -t_1$
	-2	1	2	$= -t_2$
	2	-1	0	$= f$

13. Solve the noncanonical LPP: Maximize $f(x, y, z) = x + 2y + z$, subject to $x + y \leq 1, x + y + z = 6, x, z \geq 0$.

14. An oil company owns 2 refineries, refinery A and refinery B. Refinery A is capable of producing 20 barrels of gasoline and 25 barrels of fuel oil per day. Refinery B is capable of producing 40 barrels of gasoline and 20 barrels of fuel oil per day. The company requires atleast 1000 barrels of gasoline and atleast 800 barrels of fuel oil. If it costs \$300 per day to operate refinery A and \$500 per day to operate refinery B, How many days should each refinery be operated by the company so as to minimise costs? Solve Graphically.

15. Solve the dual noncanonical LPP:

	x_1	x_2	-1	
y_1	2	-1	-1	$= 0$
y_2	-1	1	-1	$= -t_1$
-1	2	1	0	$= f$
	$= 0$	$= s_2$	$= g$	

16. Solve the dual canonical LPP :

	x_1	x_2	-1	
y_1	20	25	300	$= -t_1$
y_2	40	20	500	$= -t_2$
-1	1000	800	0	$= f$
	$= s_1$	$= s_2$	$= g$	

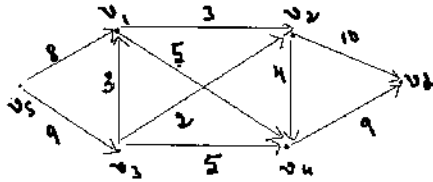
17. Solve the dual canonical LPP :

	x_1	x_2	-1	
y_1	-2	1	-2	$= t_1$
y_2	1	-1	-1	$= t_2$
-1	1	1	0	$= f$
	$= s_1$	$= s_2$	$= g$	

18. Solve the balanced transportation problem :

5	12	8	50	26
11	4	10	8	20
14	50	1	9	30
15	20	26	15	

19. Solve the maximal flow network problem given below :



20. State the Hungarian algorithm to solve an assignment problem.

19STA501

Reg No :

CHOICE BASED CREDIT SYSTEM
B.Sc. FIFTH SEMESTER DEGREE EXAMINATION FEBRUARY 2022
STATISTICS
Statistics Theory V

Duration:3 Hours

Max Marks:80

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

1. Explain Finite Population correction factor and Sampling fraction.
2. What do you mean by Sampling Error?
3. What is an unbiased estimator of Population Total under SRSWR?
4. Give the formula for estimating the sample size using Proportional Allocation.
5. What is an expression for getting Variance of sample mean under Systematic Sampling?
6. State the necessity of going for Circular Systematic Sampling.

II. Answer any FIVE of the following : (5×6= 30 Marks)

7. Discuss about different types of Reliability and the importance of testing the reliability of the questionnaire.
8. Briefly explain objectives of NSSO.
9. Obtain an expression for $V(\hat{Y})$ under Stratified Random Sampling WOR.
10. Under certain assumptions show that $V(\bar{y})_{SRSWOR} \geq V(\bar{y}_{ST})_{PROP}$.
11. State the necessity of Quota Sampling with its merits and demerits.
12. What are the merits and demerits of cluster sampling? Obtain an expression for $V(\hat{Y})$ under Cluster Sampling.

III. Answer any FOUR of the following : (4×10= 40 Marks)

13. a) Write a note on Sampling frame and sampling Units with an example. (5)
b) Explain the situation of Nonresponse. How do you tackle such a situation? (5)
14. Obtain an estimate of Standard Error for the estimation of population total under SRSWOR.
15. a) Under SRSWR for attributes obtain an expression for population mean, sample mean, S^2 and s^2 in terms of population proportion. (6)
b) Under SRSWR for attributes show that sample proportion is an unbiased estimator of the population proportion. (4)
16. a) Deduce an expression for $V(\bar{y})_{ST}$ for a population with linear trend. (6)
b) How do you relate Systematic Sampling to Stratified Random Sampling? (4)
17. a) Explain Systematic Sampling procedure with two examples. What are its advantages? (5)
b) Write a note on different types of Systematic Sampling Techniques. (5)

CHOICE BASED CREDIT SYSTEM
B.Sc. FIFTH SEMESTER DEGREE EXAMINATION FEBRUARY 2022
STATISTICS
Statistics Theory VI

Duration:3 Hours

Max Marks:80

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

1. Define post optimal analysis. What is its objective?
2. How do we select the entering variable in Dual Simplex method?
3. Define present value in replacement problem.
4. How do you resolve degeneracy in TP?
5. Define inventory control.
6. What is FSN analysis?

II. Answer any FIVE of the following : (5×6= 30 Marks)

7. For the following LPP find i) all the basic feasible solutions
(ii) degenerate and non- degenerate BFS
Maximize $Z = 12x_1 + 8x_2 + 14x_3 + 10x_4$
s.t
 $5x_1 + 4x_2 + 2x_3 + x_4 = 100$
 $2x_1 + 3x_2 + 8x_3 + x_4 = 75$
8. Explain the graphical method of solving an LPP.
9. State and prove the theorem for existence of feasible solution of TP.
10. Explain the concept of travelling salesman problem.
11. Briefly explain purchase inventory models with prize breaks. Discuss the situation when there are two prize breaks.
12. How do you resolve the degeneracy in Simplex method?

III. Answer any FOUR of the following : (4×10= 40 Marks)

13. Explain newspaper boy problem.
14. What are artificial variables? Briefly explain the methods which uses these variables.
15. a) Explain NWCR of finding an initial feasible solution of a transportation problem.(4)
b) Why TP is called a special case of LPP. (6)
16. Define AP. Explain the general formulation of AP by justifying why is it called a special case of TP.
17. Obtain the EOQ model with constant rate of demand and scheduling time variable.
