RIZVI COLLEGE OF A/S/C

FOUNDATION COURSE -Paper III (SEM III)

October-2023

Duration:2 1/2 Hrs   Total Marks :75

Note:1. All questions are compulsory.

2.Figures to the right indicate full marks.

Q.1(A).Explain the following concepts(Any Five) **15 Marks**

a. Scheduled Tribes   b. Minorities

c. Disaster Management   d. Floods

e. Blind Belief   f. Elderly people

g. Effective Listening   h. Self-Improvement

OR

(B) Write a comprehensive note on the Foundation Course(Semester III) project submitted by you.

Q.2. (A) "Women from all castes and classes suffer from discrimination,

exploitation and neglect" .Elaborate .Comment on any three laws

protecting rights of women.   **15 Marks**

OR

(B) .How the rights of Children are violated in India? Examine the legal rights of children.

Q.3.(A) Discuss the effects of disasters. What are the factors to be considered in protection of disasters.**15 Marks**

OR

(B) Write a detailed note on types of disasters.

Q.4.(A) Elucidate the characteristics of science. What is the difference between science and superstition.   **15 Marks**

OR

(B) Discuss the positive and negative impact of technology on human life.

Q.5. (A) Comment on the leadership skills and team building.   **15 Marks**
OR

(B) Bring out the differences between verbal and non-verbal communication.

———————————

Q2   Attempt any 4   20M

A   Explain the following terms with suitable examples.
a) Open and Close system.
b) Extensive and Intensive properties.

B   For the reaction at 25°C
$6C_{(s)} + 6H_{2(g)} \rightarrow C_6H_{12(l)}$
$\Delta H = -157.7$ kJ and $\Delta S = 206300$ kJ/K, calculate ΔG.

C   Derive Gibbs-Helmholtz equation.

D   What is cell constant? How it is related to conductance and conductivity? Calculate cell constant for a cell which has length $l=1.5$ cm and area $A= 3.34$ cm^2.

E   Explain the difference between metallic conductor and electrolytic conductors.

F   What are transport number? Explain moving boundary method to determine transport number. Calculate transport number for the anion (t -) for a solution of Hydrochloric acid with 0.01 N concentration at 298 K show transport number of cation (t₊) is 0.6651.

Q3   Attempt any 4   20M

A   What is radius ratio? How it helps to predict the structure of ionic compound?

B   Find the Heat of formation of NaI crystal with the help of following data:
Heat of sublimation of Sodium= 108.4 kJ/mol
Heat of ionisation of Sodium= 495.4 kJ/mol
Heat of dissociation of Iodine = 106.7 kJ/mol
Electron affinity of Iodine = -306.4 kJ/mol
Lattice energy of NaI = -287.9 kJ/mol

C   On the basis of VBT, explain the shapes of i) XeF_4 ii) BrF_5

D   Define hybridization. Explain sp^3d^3 hybridization with suitable example.

E   Explain the molecular orbital diagram of O_2^+

F   Explain the molecular orbital diagram of F_2

Q4   Attempt any 4   20M

A.   SNI reaction leads to racemisation. Explain with mechanism.

B   Write a note on Oxidation of alcohols.

C   Carry out the following conversions:
i) methyl magnesium bromide to t-butanol.
ii) dry ice to benzoic acid.
iii) methyl lithium to 2- butanol.

D   Draw structure of the following:
i) 2-methyl-pentan-2-ol   ii) Phenyl lithium   iii) 2-methyl epoxy ethane
iv) cyclohexane magnesium bromide   v) beta-naphtol.

E   i) What are epoxides. Convert ethene to an epoxide.
ii) What is a nucleophile. How does it differ from a electrophile.

F   Write reactions to show the following conversions:
i) Benzene sulphonic acid to phenol
ii) Chlorobenzene to phenol

RIZVI COLLEGE OF ARTS, SCIENCE AND COMMERCE
S.Y.B.Sc. CHOICE BASED (Regular 2023-24) SEMESTER-III CHEMISTRY: PAPER I

(Time: 2½ Hours)   Total Marks: 75

N.B.:   (1) All questions are compulsory.
(2) Figures to the right indicate full marks.
(3) Use of log table/ non-programmable calculator is allowed.

Q1 A   Multiple choice question (any 5 out of 7)   5M

1   For a spontaneous process, ΔG is always _____
a) positive   b) negative   c) zero

2   For ideal gas activity coefficient (γ) is always _____.
a) one   b) negative   c) zero

3   Equilibrium constant (k) is related to standard Gibbs free energy by _____.
a)) $\Delta G^0 = -RT\ln K$ b)$\Delta G^0 = RT\ln K$ c)$\Delta G^0 = -R\ln K/T$

4   A solution of Hydrochloric acid with 0.01 N concentration at 298 K show transport
number of cation (t_+) is 0.6171 then the transport number of anion (t_-) is _____.
a) one   b)0.3829   c) zero

5   The correct relationship between solubility product and solubility for $BaCl_2$ is _____.
a)$K_{sp} = 27S^4$ b)$K_{sp} = S^2$ c)$K_{sp} = 4S^3$

6   Oxidation always occurs at _____ in an electrochemical cell
a)Anode   b)Cathode   c)Both anode and cathode

7   An example of strong and weak electrolytes given below is _____ & _____
respectively.
a) NaCl &CH_3COOH b)CH_3COOH&NaCl   c) Oxalic acid &CH_3COOH

Q1 B   Match the columns (any 5 out of 7)   5M

1    $r^+/r^- = 0.225 - 0.414$ a)   +1
2    $r^+/r^- = 0.732 - 1.00$ b)   Tetrahedral void
3   BeH_2 c)   0
4   BCl_3 d)   sp hybridization
5   Formal charge on N in NH_4^+ e)   -1
6   Formal charge on O in N_2O f)   Cubic void
7   Formal charge on C in CO_3^{2-} g) sp^2 hybridization

Q1 C   True or False (any 5 out of 7)   5M

1   The nitronium ion is an example of a nucleophile
2   Benzyne contains one carbon-carbon triple bond.
3   Cyclohexane is an aromatic compound.
4   Nitration of phenol takes place at the o-position.
5   The methoxide ion is negatively charged.
6   Ethylene glycol is a trihydric alcohol.
7   An ion pair gets formed during the SNi reaction

RIZVI COLLEGE OF ARTS, SCIENCE AND COMMERCE
S.Y.B.Sc. CHOICE BASED (Regular 2023-24) SEMESTER-III CHEMISTRY: PAPER II

(Time: 2½ Hours)   Total Marks: 75

N.B.:   (1) All questions are compulsory.
        (2) Figures to the right indicate full marks.
        (3) Use of log table/ non-programmable calculator is allowed.

Q1 A   Multiple choice question (any 5 out of 7)   5M

1   Chemical kinetics is a branch of Physical chemistry which deals with _____ chemical reaction
    a)Spontaneous   b)Non-spontaneous   c)Rate or speed

2   A partially miscible liquid, Nicotine and water system shows_____.
    a)Upper critical solution temperature
    b)Lower critical solution temperature
    c)Both upper and lower critical solution temperature

3   A binary solution has two components, one larger component and other smaller component which are called _____and _____respectively.
    a)Solvent and solute   b)Solute and solvent   c)Both are called as solvents

4   The polymer due to cross linked or network, do not softened on heating can are called
    _____.
    a)Polyester   b)Thermoplastic polymers   c)Thermosetting polymers

5   To calculate number average molecular weight or M_n molecular weight. The correct formula given is _____.
    a)$\sum N_i M_i^3 / \sum N_i M_i^2$ b)$\sum N_i M_i^2 / \sum N_i M_i$ c)$\sum N_i M_i / \sum N_i$

6   If the reaction is 25% completed in 3 minutes, then the rate constant for the reaction is _____.
    a)2 minutes^{-1} b)0.462 minutes^{-1} c)0.095 minutes^{-1}

7   Copolymer are made up of _____.
    a)One type of monomers
    b) Two or more different monomers
    c) Monomers are absent

Q1 B   Match the columns (any 5 out of 7)   5M

1	Carbon	a)	Metal
2	Gallium	b)	N_2O
3	Tin	c)	Non-metal
4	Laughing gas	d)	Oxidation state of nitrogen= +1
5	Nitric anhydride	e)	Oxidation state of nitrogen= +2
6	Nitrous oxide	f)	N_2O_5
7	Nitric oxide	g)	Metalloid

**Q1 C   True or False (any 5 out of 7)**   5M

1   Formalin is an aldehyde.
2   Ethylene is an saturated compound
3   Cannizaro reaction is an 1,2 elimination reaction.
4   Benzoic acid contains a reactive methylene group.
5   IUPAC of acetophenone is dimethyl ketone.
6   Allyl aldehyde is an aromatic compound
7   Lewis base is an electron acceptor

Q2   Attempt any 4   20M

A   Classify the following reaction into irreversible, reversible, parallel, opposing or
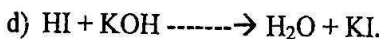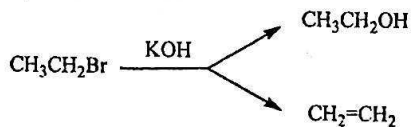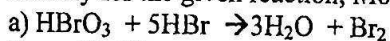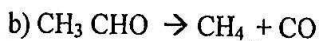consecutive reactions.
   a)

   b)

$$PCl_5 \rightleftharpoons PCl_3 + Cl_2$$

   c)

   d) $HI + KOH \text{-------} \rightarrow H_2O + KI$.
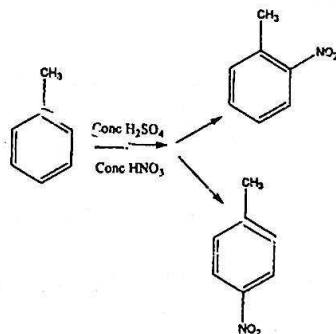
   e)

B   Identify for the given reaction, Molecularity and order of the reaction
   a) $HBrO_3 + 5HBr \rightarrow 3H_2O + Br_2$
   Rate= $K[HBrO_3][HBr]$

   b) $CH_3 CHO \rightarrow CH_4 + CO$
   Rate= $K[CH_3 CHO]^{1.5}$

C   What is Distillation? Explain any two difference between fractional and steam
distillation.

D   What are monomers? Explain the difference between thermoplastic and thermosetting polymers.

E   In a polymer sample, 30% molecules of weight 20,000, 40% molecules of weight 30,000 and rest have 60,000. Calculate weight average molecular weights.

F   Graph indicates
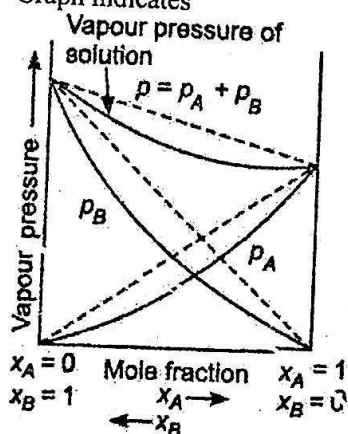
Vapour pressure diagram

a) Deviation of the solution from Raoult's law.
b) Force of attraction between liquid molecule A & B w.r.t. molecules in pure liquid A and pure liquid B.
c) ΔV of mixing
d) ΔH of mixing.
e) Suitable examples

Q3   Attempt any 4

20M

A   What are electron deficient compounds? Discuss.
B   Give preparation of tetraborane. Discuss the structure and bonding involved in tetraborane
C   Explain the structure of Silica and its uses.
D   Discuss zone refining process for purification of germanium and silicon.
E   Explain how ammonia is manufactured industrially.
F   Give preparation, properties and structure of i) NO_2 ii) N_2O_5

Q4   Attempt any 4

20M

A   Draw structure of the following:
     i) butan-2-one   ii) 3-chloro- pentan-2-one iii) benzaldehyde
     iv) Any unsaturated aliphatic aldehyde. v) cyclobutanone.
B   What are reactive methylene compounds? Draw the structure of any two reactive methylene compounds and name them.
C   i) How is methyl phenyl ketone prepared from benzene. Name the reaction.
     ii) What is the action of hydrazine on acetaldehyde
D   Give 2 applications and the mechanism of Claisen- Schmidt reaction.
E   Write a note on Cannizaro reaction.
F   i) What is the action of Grignard reagent on methanal?
     ii) How is a cyclic acetal formed.

RIZVI COLLEGE OF ARTS, SCIENCE AND COMMERCE

S.Y.B.Sc. CHOICE BASED (Regular 2023-24) SEMESTER-III CHEMISTRY: PAPER III

(Time: 2½ Hours)

Total Marks: 75

N.B.: (1) All questions are compulsory.
(2) Figures to the right indicate full marks.
(3) Use of log table/ non-programmable calculator is allowed.

Q1 A   Multiple choice question (any 5 out of 7)   5M

1   .... expresses the precision between laboratories to standardize the methodology.
   a)Accuracy   b) Precision   c)Reproducibility

2   ....analysis in which the size of the sample is between 1mg to 10mg.
   a)Macro   b)Semi   c)Micro

3   .... is the smaller size sample which possess all the characteristic of a sample.
   a)Sample   b)Universe   c)Sub sample

4   Selection of every fifth tablet from the batch for the analysis is a type of.........
   a)Random sampling   b)Systematic sampling   c) Gross sampling.

5   Addition of one drop excess to get end point in titration results in ....
   a)Instrumental error   b)Personal error   c)Methodical error

6   Accuracy is expressed by.........
   a)Range   b)Deviation   c)Absolute error

7   For a set of observation the most frequently observation is referred as a...........
   a)Mean   b)Range   c)Mode.

Q1 B   Match the columns (any 5 out of 7)   5M

1	Titrant	a)	Secondary standard
2	Sodium hydroxide	b)	Argentimetric titration
3	precipitation titration	c)	Solution in burette
4	Volatilisation method	d)	Transfer of electron
5	Theoretical end point	e)	Gravimetric method
6	Redox titration	f)	Laboratory glassware
7	Standard flask	g)	Equivalence point

Q1   True or False (any 5 out of 7)   5M

1   Absorbance of solution is -logT
2   For analysis of UV region cuvette should be made up of glass used.
3   Spectroscopy is the study of the interaction of matter with electromagnetic

energy.

4   The role of collimating lens to obtain parallel beam of light.
5   Visible region of electromagnetic spectrum is from 200nm to 400nm
6   deuterium lamp is used as source of radiation in UV region.
7   colourimeter use filter as monochromator.

Q2   Attempt any 4   20M

A   What are the advantages of instrumental method of analysis and classical method of analysis.
B   What are different methods to minimize determinate error in analysis.
C   Explain the term accuracy and precision. Also give objectives of analytical chemistry.
D   Explain different types of sampling methods .
E   How the methods of analysis are classified on the basis of information obtained.
F   For the set of data calculate:
     1. Mean 2. Median 3. Range 4. Average deviation from mean 5. Relative average deviation from mean.

Sample No.	1	2	3	4	5
Chromium content	4.88	4.92	4.86	4.85	4.71

Q3   Attempt any 4   20M

A   Define term : titrant end point equivalence point. Give the classification of volumetry and titrimetry
B   Explain the types of gravimetric method.
C   What are redox titrations .
D   Give brief note on tools used in titrimetry.
E   What are steps involved for calibration of pipette .
F   What are the conditions for a substance to act as a primary standard.
     Calculate the normality of a solution of a Nickel nitrate made by dissolving 2gm of pure nickel metal in nitric acid and diluting the solution to 500ml. The nickel is to be titrated with KCN.(molecular weight of KCN =58.70)

Q4   Attempt any 4   20M

A   State beer lambert's law.
     The transmettance of $2x 10^{-4}$ M solution of a substance was found to be 76.2% at a wavelength 280 nm. When placed in a cell of 1cm length. Calculate the: 1.Absorbance 2. molar absorptivity
B   With the help of diagram explain the principle and working of double beam colorimeter
C   Give a brief note on photomultiplier tube.
D   Explain basic component of any analytical instrument with block diagram.
E   What are the important components of single beam colorimeter.
F   Explain type of analytical instrument method based on optical and electrochemical properties.

RIZVI COLLEGE OF ARTS, SC. & COM.
S.Y.B.Sc. (PHYSICS) SEM –IIII (Revised Syllabus - REGULAR)
PAPER-I (Thermodynamics & Temperature Transducers – USPH301)

Time: 2 Flr 30 min.   Max. Mark: 75

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

Q.1 A) Attempt any TWO of the following..   (20)

1) Explain the working of an steam engine with the neat diagram and obtain an expression for its efficiency.
2) Derive the Clausius – Clapeyron's latent heat equation.
3) Explain the working of an Otto engine with the neat P – V diagram and obtain an expression for its efficiency.
4) Show that for a perfect gas $\left(\frac{\partial U}{\partial V}\right) = 0$.

Q.2 A) Attempt any TWO of the following.   (20)
1) Define entropy and state its unit. Show that the change in entropy of a perfect gas is
$$S_2 - S_1 = c_v \ln\frac{P_2}{P_1} + c_p \ln\frac{V_2}{V_1}$$
2) Derive the expression for the change of entropy when
   i) a solid or liquid is heated from T_1 to T_2
   ii) a liquid melts   iii) a liquid vaporizes
3) Show that the Kelvin's thermodynamics scale is completely identical with the perfect gas scale.
4) What is T-S diagram? What is the importance of T-S diagram? Find the expression for the efficiency of a reversible Carnot's engine with the help of T-S diagram.

Q.3 A) Attempt any TWO of the following.   (20)

1) Define temperature transducer. Explain working principle and any three applications.
2) Explain the Pyrometers i) Infrared ii) optical pyrometers.
3) Explain the working of a semiconductor diode as a temperature Sensor.
4) With the help of a neat diagram, explain industrial platinum resistance thermometer. Deduce its balancing condition. State it's any two advantages.

Q.4 A) Attempt any THREE of the following.   (15)

1) Derive equation of cooling by adiabatic expansion using Maxwell's equation.
2) Write down the difference between the reversible and irreversible process.
3) Explain the concept of 'Heat Death of Universe'.
4) Calculate the change in entropy when 10g of water at 60^0C is mixed with 30g of water at 20^0C.Specific heat of water may be assumed to be equal to 1.
5) Write a note on thermocouple.
6) At room temperature, resistance of lamp filament is 96 ohms. If the temperature coefficient at 20 °C is 0.0055 / ° C and resistance at T °C is 960 ohms. Find the temperature of the filament in hot condition.

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1

231026   SS 32320

Max. Mark: 75

Time: 2 Hr 30 min.

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

(20)

Q.1 Attempt any TWO of the following.

1. What do you mean by stabilization? Obtain an expression for the stabilization factor.

2. With the help of circuit diagram explain the working of voltage divider circuit?

   State advantages and disadvantages of the use of this circuit.

3. What is feedback of an amplifier? State different types of feedback circuits.

4. Explain the following term in relation to amplifier (i) Current gain, (ii) voltage gain ,

   (iii) power gain (iv) Input resistance (v) output resistance.

(20)

Q.2. Attempt any TWO of the following.

1. Explain the construction and working of a Phase-shift oscillator. Derive an expression for
   It's frequency.
2. What is an oscillator? How it is different from an amplifier. Explain the operation of a
   Colpitt's oscillator.
3. Give any TWO ideal characteristics of an OP-AMP. Explain OP-AMP in inverting mode.
   Obtain an expression for it's gain.
4. How will you use an OP-AMP as integrator in inverting mode. Draw suitable input and
   Output waveforms.

(20)

Q.3. Attempt any the following.

1. Explain the construction and working of edge triggered SR latch. Draw truth table.

2. Draw a MS JK flip flop system. Explain its operation.

3. What is Counter circuit? Explain asynchronous binary 3 bit counter.

4. Explain the working of serial in serial out shift register.

(15)

Q.4. Attempt any THREE of the following.

1) In a collector feedback biased silicon transistor circuit, $R_c = 1k$, $R_B = 120K$, $V_{cc} = 12V$,

   determine the operating point if $\beta = 100$.

2) An amplifier has input signal voltage 0.1 Vand draws a current 0.1 mA from the source. Amplifier
   delivers 5V to a load at 10 mA. Determine the voltage and power gain of an amplifier.

3. If a typical Wien-bridge oscillator, if $R_1 = R_2 = 220 K$ and $C_1 = C_2 = 250$ pF. Find the frequency
   of oscillations.

4. In an inverting OP-AMP as an adder, find the output voltage assuming initially output of an OP-AMP is null. If $R_1 = 4K$, $R_2 = 3K$, $R_3 = 8K$ and if $R_f = 10 K$ for the three input voltages $V_1 = 0.5$ V, $V_2 = -5.5$ V and $V_3 = 5V$.

5) Distinguish between Latch and Flip flop

6) Write in brief D-type FF.

231126   SST 32320

Time:3 Hrs   Max. Mark: 100
NOTE:
1. All questions are **compulsory**.
2. All questions carry equal marks.
3. Figures to the right indicate full marks.
4. Use of non-programmable scientific calculator is allowed.

....

Q.1 A) Attempt any TWO of the following.   (20)

1. Verify the, fundamental theorem for gradient using $\emptyset = x^2 + 4xy + 2yz^3$, the points are $A = (0,0,0), B = (0,0,0)$ and the paths are $(0,0,0) \rightarrow (1,0,0) \rightarrow (1,1,0) \rightarrow (1,1,1)$.
2. Explain spherical polar coordinate system. Obtain expression for position vector, unit vectors, infinitesimal displacement vector, area vector and volume element in terms of Cartesian coordinate system.
3. Test the divergence theorem for the function $\vec{F} = xy\hat{i} + 2yz\hat{j} + 3zx\hat{k}$. Take it to consideration the volume of cube with sides of length 2 units and situated at the origin in the first quadrant.

B) Attempt any one.   (05)

1. In spherical polar coordinate of a point are $(r, \theta, \emptyset) = 10, 30°, 60°$. Find the cartesian coordinates of the same plane.
2. Calculate $I = \int(x^2 dy - ydx)$ over the
   (a) straight line $y = x$ from $(0,0)$ to $(1,1)$
   (b) parabola $y = x^2$ from $(0,0)$ to $(1,1)$

Q.2. A) Attempt any TWO of vthe following.   (20)

1. With the help of a neat circuit diagram explain RC-PHASE SHIFT oscillator. Derive a suitable equation of frequency.

2. Explain the OP-AMP as inverting amplifier. Obtain an expression for it.s gain.

3. Explain OP-AMP as an integrator. Draw suitable waveforms.

B) Attempt any one.   (05)

1. A Wien bridge circuit has frequency 3 KHz. If $R_1 = R_2 = 330K\Omega$, find The C_1 and C_2.

2. The non-inverting OP-AMP works on + 12 V and -12V. What would be the output voltage for $V_I = 2V$ and $5V$?

CONT......

Q.3. A) Attempt any TWO of vthe following.

1. With the help of a neat diagram explain the voltage divider bias.

   Show that the stability factor $S_{(ICO)}$ is one.

2. Explain the block diagram of an amplifier. Explain a) voltage gain

   b) current gain and c) power gain.

3. What is feedback? Explain negative feedback and it's advantages.

(05)

B) Attempt any one.

1. An amplifier has a voltage gain to 100. If 10 % is the voltage gain with

   feedback, what should be the feedback to double the gain that existed.

2. If the voltage divider has $R_1 = R_2 =10$ K, R_C 1K and $R_E = 5$K. If the

   Supply is 20V, find I_E , V_{CE} and V_C .

(25)

Q.4. A) Attempt any FIVEof the following.

1. Prove the cylindrical coordinate system is orthogonal.

2. $x = r \sin \theta \cos \phi, y = r \sin \theta \sin \phi, z = r \cos \theta$ are the spherical coordinates, determine
   (i) $\frac{\partial r}{\partial \theta}$ & (ii) $\frac{\partial r}{\partial \phi}$

3. Find the work done in moving a particle from P(1,0,2) to Q(2,0,3) along straight line PQ
   in a force field given by $\vec{F} = x^2 \hat{\imath} + (x - y)\hat{\jmath} + (y + z)\hat{k}$.

4. What is an oscillator? Explain it.s block diagram.

5. Draw a symbol of an OP-AMP. Explain it. State any two characteristics.

6. Find the frequency of a COLLPIT'S oscillator. $C_1 = 0.02 \mu f$, $C_2 = 0.002 \mu f$.

   And $L = 10 mH$

7. Define stability. Explain thermal runaway of a transistor.

8. Explain UJT construction.

9. An amplifier has feedback 0f -10 dB. Find 1) Ratio of voltage gain with no

   Feedback to gain with feedback. 2) Loop gain.

RIZVI COLLEGE OF ARTS, SC. & COM.
S.Y.B.Sc. (PHYSICS) SEM –IIII (Revised Syllabus - REGULAR)
PAPER-III (Mathematical Method & Applied Physics – USPH303)

Time: 2 Hr 30 min.   Max. Mark: 75

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

Q.1 A) Attempt any TWO of the following.   (20)

1) Describe the method of solving the exact differential equations.

2) Obtain the general solution of the given differential equation

$$\frac{dy}{dx} + P(x)y = Q(x)$$

for $Q(x) = 0$ & $Q(x) \neq 0$.

3) Obtain the general solution of the 2nd order homogeneous differential equation

$$\frac{d^2 y}{dx^2} + p_0 \frac{dy}{dx} + q_0 y = 0$$

for (a) real and unequal roots

(b) real and equal roots

(c) roots are complex-conjugate pair.

4) Consider the following differential equation:

$$\ddot{y} + 2\delta \dot{y} + k^2 y = 0 \qquad (\text{for } k > 0)$$

Discuss the behavior of the solution for each of the following cases:

(a) $\delta = 0$, (b) $\delta < k$, (c) $\delta = k$ and (d) $\delta > k$

Q.2 A) Attempt any TWO of the following.   (20)

1) Obtain the solution of the second order non-homogeneous differential equation

$$\frac{d^2 y}{dx^2} + p_0 \frac{dy}{dx} + q_0 y = f(x)$$

using the method of successive integration.

2) Consider the one-dimensional heat equation

$$\frac{\partial^2 T}{\partial x^2} = \frac{1}{\sigma} \frac{\partial T}{\partial t}$$

a) If b^2 is the separation constant, solve the equation.

b) For $T(0.t) = T(L,t) = 0$ and $T(x,0) = T_0 \sin\frac{n\pi x}{L}$ (for $0 < x < L$), find $T(x,t)$

3) Solve one-dimensional wave equation

$$\frac{\partial^2 \phi}{\partial x^2} = \frac{1}{v^2} \frac{\partial^2 \phi}{\partial t^2}$$

For $\phi(0,t) = 0$ & $\phi(L,t) = 0$

4) Solve two dimensional Laplace's equation

$$\frac{\partial^2 \phi}{\partial x^2} + \frac{\partial^2 \phi}{\partial y^2} = 0$$

Q. 3 Attempt any two of the following. (20)

1. What is modulation ? What is the need for and advantages for the modulation?

2. What is electrical Noise? What are different types of Noise?

3. Obtained an expression for the spectrum of FM.

4. What do you mean by acoustics of building? Obtain an expression for the Sabine formula.
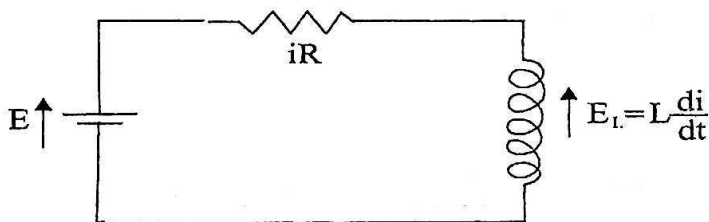
Q.4 A) Attempt any THREE of the following. (15)

1) Solve the following differential equation
$$y'' + 2y' + 4y = 0$$

2) Solve the following differential equation
$$\frac{dN(t)}{dt} = -\lambda N(t) \quad \text{where} \quad [N(t = 0) = N_0]$$

3) Derive an expression for the current in the circuit as shown below

4) By use of the separation of variables method, solve
$$u_x = 4u_y ; \quad u(0,y) = 8e^{-3y}$$

5. A R.F amplifier has an input resistance of $6K\Omega$ and works in the frequency range of 10 MHz to 16 MHz. Calculate the rms noise voltage at the input of this amplifier at standard temperature.

6. Calculate the modulation index of AM wave with $E_{max} = 7.5$ V and $E_{min} = 6.8$ V.

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23/025

SC32317

SYBSc. ZOOLOGY SEMESTER III PAPER I (COURSE V)

Total Marks : 100

Time : 3 Hrs

N.B :
1. All questions are compulsory
2. All questions carry equal marks
3. Draw neat and labelled diagram wherever necessary
05

Q.1 A) Fill in the blanks by choosing the correct options given below.

a. Gene as unit of transmission_____.
(cistron, recon, muton)
b. Polydactylism in human is____ trait.
(recessive, dominant, codominant)
c. The process of duplication of chromosomes without division of the cell is called _____
(heteropycnosis , karyokinesis , endomitosis)
d. The *Diplococcus pneumonie* SIII strain is _____
(virulent, non virulent, beneficial)
e. Nucleotides = _____.
(nucleosides+ phosphoric acid, nitrogen base + sugar, nucleosides- phosphoric acid)
05

Q.1B) Match the columns I and II and rewrite

Column I		Column II
a)	Locus	1) Intermediate lethal
b)	Creeper chicken	2) Purine
c)	Heamophilia	3) Sub- meta centric
d)	L shaped chromosome	4) Location of gene on particular chromosome
e)	Adenine	5) Royal disease

05

Q.1 C) State whether the given statement is true or false.

a. When recessive allele at one locus prevent expression of alleles at another locus , is called as recessive epistasis.
b. Phenylketonuria is an example of X-linked dominant inheritance.
c. X chromosomes contain large amount of heterochromatin and small amount of euchromatin.
d. Solenoid is 10nm in diameter
e. DNA is a self replicating molecule

05

Q.1 D) Define the following.

a. Cross between blood groups AxB
b. Pleiotropy
c. Balbiani rings
d. heterochromatin
e. mutation

Q.2 A) Express views of various scholars on linkage and types of linkages   **10**

<div align="center">OR</div>

A) Discuss dihybrid cross with suitable example

10

Q.2 B) Explain any two from the following.

   a.   Back cross and test cross

   b.   Recessive epistasis

   c.   Multiple allele

   d.   Classical concept of gene

10

Q.3 A) Explain inheritance of haemophilia with a suitable cross patterns.

<div align="center">OR</div>

A) Describe chromosome and classify them on the basis of position of centromere.

10

Q.3 B) Explain any two from the following.

   a.   Lyon's Hypothesis

   b.   Difference between X and Y chromosomes.

   c.   Sex determination in *Bonelia*

   d.   Endomitosis

10

Q.4A) Explain DNA packaging in Eukaryotes with suitable diagram

<div align="center">OR</div>

A) Explain Western-Crick model of DNA and give the biological significance of double helical model of DNA.

10

B) Explain any two from the following.

   a.   Structure of mRNA

   b.   Bi-directional nature of DNA replication

   c.   RNA polymerase

   d.   Z-DNA

2(

Q.5 Write short notes on any four.

   a.   Chromosome theory of linkage

   b.   Monohybrid cross

   c.   Giant chromosomes.

   d.   Sex limited genes

   e.   Aminoacylation of t-RNA

   f.   Genetic code

231026

SS32321

SYBSc. ZOOLOGY SEMESTER III PAPER II (COURSE VI)

Time : 3 Hrs

Total Marks : 100

N.B :
1. All questions are compulsory
2. All questions carry equal marks
3. Draw neat and labelled diagram wherever necessary

05

Q.1 A) Fill in the blanks by choosing the correct options given below.

a. _____ has only one opening at anterior end, the mouth.
(Cockroach, Amoeba, Hydra)

b. End product of carbohydrate digestion are _____.
(Polysaccharides, Monosaccharides, Disaccharides)

c. Spiders respires by _____
(skin, book lungs, gills)

d. Circulation in cockroach is _____
(open circulation, single circulation, closed circulation)

e. The splitting of the parent organisms into two or more daughter cells is _____
(Fission, budding, fragmentation)

05

Q.1B) Match the columns I and II and rewrite

Column I		Column II	
a)	Planaria	1)	Mammals
b)	Ureotelic	2)	Flame cells
c)	Pulmonary alveoli	3)	Circulating fluid in sponges
d)	Water	4)	Afferent
e)	Sensory neuron	5)	Single layer membrane

05

Q.1 C) State whether the given statement is true or false.

a. In stomach hydrochloric acid converts pepsinogen to pepsin and kills microbes.
b. The major calyces converge into a funnel like cavity called pelvis.
c. Erythrocytes are absent in most invertebrates
d. Response to chemicals is called chemotropism.
e. Large fins are called finlets.

05

Q.1 D) Define the following.

a. Autotrophs
b. Osmoregulators
c. Perfusion
d. Plasmasol.
e. Gametogenesis

Q.2 A) Describe in detail nutritional apparatus in *Amoeba*.   10

<div align="center">OR</div>

A) Describe the physiology of urine formation in man.

Q.2 B) Explain any two from the following.   10

    a.   Types of nutrition.

    b.   Physiology of digestion in stomach.

    c.   Malpighian tubules in cockroach.

    d.   Internal structure of kidney.

Q.3 A) Explain physiology of respiration in man.   10

<div align="center">OR</div>

A) Explain with neat labeled diagram heart of crocodile.

Q.3 B) Explain any two from the following.   10

    a.   Characteristics of respiratory surface

    b.   Air sacs in pigeon

    c.   Single and double circulation

    d.   Working of shark heart

Q.4A) Explain the mechanism of synaptic transmission.   10

<div align="center">OR</div>

Q.4 B) Describe asexual reproduction (Any three types).

    B) Explain any two from the following.   10

    a.   Irritability in *Paramoecium*

    b.   Action potential

    c.   Structure of cilia in *Paramoecium*

    d.   Structure of human sperm

Q.5 Write short notes on any four.   20

    a.   Digestive system of Pigeon.

    b.   Ammonotelic animals.

    c.   Open circulation

    d.   Cutaneous respiration

    e.   Structure of striated muscle fibre.

    f.   Ovoviviparity

231027   S C 32324

SYBSc. ZOOLOGY SEMESTER III PAPER III (COURSE VII A)

Time : 3 Hrs   Total Marks : 100

N.B :   1. All questions are compulsory
              2. All questions carry equal marks
              3. Draw neat and labelled diagram wherever necessary

Q.1 A) Fill in the blanks by choosing the correct options given below.   05

a. In honey bees _____ indicates that food is near the hive.
(Mimicry, Waggle dance, Round dance)
b. Biggest baby shark gulp its other siblings is _____.
(Kinship, Altruism, Infanticide)
c. Wuchereria bancrofti causes _____.
(Filariasis, Taeniasis, Liver rot)
d. Father of apiculture is _____
(Darwin ,L.L. Langstroth, Carl Linnaeus)
e. Worms used in vermicomposting is _____.
(Roundworm, Redworm , Pinworm)

Q.1B) Match the columns I and II and rewrite   05

Column I		Column II	
a)	Salivation to food	1)	Prevent attack
b)	Warning colouration	2)	Unconditioned response
c)	Rabies	3)	With in the earth
d)	Endogeic	4)	Honey bee
e)	Apidae	5)	Lyssavirus

Q.1 C) State whether the given statement is true or false.   05

a.   In territorial behaviour animal protects its territory from intruder.
b.   By altruistic act animals tends to help others in a group at a risk to themselves.
c.   Prophylaxis is the treatment before disease is caused.
d.   Bird flu is the chronic respiratory tract infection caused by influenza virus.
e.   Cow milk contains more amount of fats as compared to buffalo milk

Q.1 D) Define the following.   05

a.   Anadromous migration.
b.   Imprinting.
c.   Hyperparasite
d.   Anecic
e.   Skim milk powder

Q.2 A) Describe innate behavior with suitable examples.   10

<div align="center">OR</div>

A) Describe displacement activities and give its causes and functional significance.

Q.2 B) Explain any two from the following.   10

   a.   Habituation.

   b.   Filial imprinting.

   c.   Breeding migration in fish.

   d.   Social behavior in Hanuman langur.

Q.3 A) Give an account of life history and pathogenicity of *Entamoeba histolytica*.   10

<div align="center">OR</div>

A) Describe morphology, control measures and treatment of Head louse.

Q.3 B) Explain any two from the following.   10

   a.   Anthrax
   b.   Structural adaptation in endoparasite
   c.   Types of host
   d.   Life cycle of *Taenia solium* in pig

Q.4A) Explain the modern method of apiculture.   10

<div align="center">OR</div>

A) Describe the composition of milk.

Q.4 B) Explain any two from the following.   10

   a.   Flora beneficial in apiculture

   b.   Different species of worms useful in vermiculture

   c.   Classification of milk

   d.   Flow diagram for preparation of yogurt

Q.5 Write short notes on any four.   20

   a.   Territorial behavior.

   b.   Kin recognition.

   c.   Role of honey bees in pollination

   d.   Mechanical method of harvesting of worms

   e.   Mechanical vectors

   f.   Toxoplasmosis

231028   SS32326

S.Y. B.Sc. SEMESTER – III EXAMINATION: OCTOBER 2023

MATHEMATICS PAPER –I: CALCULUS – III

Time: $2\frac{1}{2}$ Hours   **Maximum Marks: 75**

NOTE: (1) All questions are compulsory.

(2) Figures to the right indicate full marks.

Qn. (1) Attempt any FOUR questions from the following. ($4 \times 5 = 20\ Marks$)

(a) Show that if the series $\sum_{n=1}^{\infty} a_n$ converges then $a_n \to 0$.

(b) Show that the geometric series $\sum_{k=1}^{\infty} ar^{k-1}$ converges if and only if $|r| < 1$.

(c) Show that if $\sum_{n=1}^{\infty} |a_n|$ converges then $\sum_{n=1}^{\infty} a_n$ converges.

(d) If $a_n \geq 0$ and $na_n \geq 1$ for all $n \in N$, show that $\sum_{n=1}^{\infty} a_n$ diverges.

(e) Discuss the convergence of the alternating series $\sum_{n=1}^{\infty} \frac{(3n)(-1)^n}{2n-1}$.

Qn. (2) Attempt any FOUR questions from the following. ($4 \times 5 = 20\ Marks$)

(a) If f is integrable on $[a, b]$, show that $|f|$ is also integrable on $[a, b]$ and $\left| \int_a^b f \right| \leq \int_a^b |f|$.

(b) Show that a constant function $f(x) = C$ is integrable on $[a, b]$.

(c) Show that $f: [0,1] \to \mathbb{R}$ defined by $f(x) = 5x$ is integrable and $\int_a^b f(x)dx = \frac{5}{2}$.

(d) Show that if f and g are integrable on $I = [a, b]$ and $f(x) \leq g(x)$

$$for\ all\ x \in I\ then\ \int_a^b f \leq \int_a^b g$$

(e) If $a < c < b$ and if f is integrable on both $[a, c]$ and $[c, b]$ then show that f is integrable on $[a, b]$ and

$$\int_a^b f = \int_a^c f + \int_c^b f$$

Qn. (3) Attempt any FOUR questions from the following. ($4 \times 5 = 20\ Marks$)

(a) Show that if f is Riemann integrable on $[a, b]$ and $F'(x) = f(x)$ then

$\int_a^b f(x)dx = F(b) - F(a)$.

1

(b) Find the area of the region bounded by the parabola

$$y = x^2 + 2 \text{ and } y = 2x + 5, x = 0 \text{ to } x = 6$$

(c) Find the arc length of the curves $\quad x = a\cos^3\theta;$

$$y = a\sin^3\theta, 0 \leq \theta \leq \pi$$

(d) *Show that* $\beta(m,n) = 2\int_0^{\pi/2}(\sin^{2m-1}\theta)(\cos^{2n-1}\theta)d\theta.$

(e) Prove that $\Gamma\left(\frac{1}{2}\right) = \sqrt{\pi}$.

Qn. (4) Attempt any THREE questions from the following. (3 × 5 = 15 Marks)

(a) Discuss the convergence of $\sum(\frac{n}{8n+1})^n$ by using Root Test.

(b) Discuss the convergence of $\sum[\frac{n!}{n^n}]$ by using Ratio Test.

(c) *Let* $f(x) = 2x + 1, I = [0,2], P = \{0,0.5,1,1.5,2\}.$
   Find the value of $L(P,f)$ *and* $U(P,f).$

(d) Let $f:[a,b] \rightarrow R$ defined by $f(x) = \begin{cases} 0, x \text{ is irrational} \\ 1, x \text{ is rational} \end{cases}$

   Show that the function is not Riemann integrable on R.

(e) Show that $\int_0^\infty x^{3/2}e^{-x^5} dx = \frac{\sqrt{\pi}}{5}.$

(f) *Find the value of the improper integrals* (i) $\int_{-\infty}^\infty \frac{dx}{1+x^2}$ *and*

$$(ii) \int_0^1 \frac{dx}{\sqrt{1-x^2}}.$$

****

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2

231030

SS32331

MARKS: 75

TIME DURATION: 2 Hr. 30 Min

N.B: 1) All questions are compulsory.
2) Figures to the right indicate full Marks.

Q.1 Attempt any Four   **(20)**

(i) Find the solution set for the following system of equations. Also interpret the system and its solution geometrically.

$$2x + 3y - z = 0;$$
$$x - 2y + z = 0;$$
$$4x + 3y - z = 0.$$

(ii) Solve the following equations by Gauss elimination method and write the solution set.

$$2x_1 + x_2 - x_3 + 3x_4 = 11$$

$$x_1 - 2x_2 + x_3 + x_4 = 8$$

$$4x_1 + 7x_2 + 2x_3 - x_4 = 0$$

$$3x_1 + 5x_2 + 4x_3 + 4x_4 = 17$$

(iii) Define Elementary matrices and their inverse.

(iv) Prove that, the sum of any two solutions and Scalar multiple of a solution is also the solution of the homogeneous system of linear equations.

(v) Prove that, a non-homogeneous system of m linear equations in n unknowns has infinite solutions if m < n.

Q.2 Attempt any Four.   **(20)**

(i) Verify whether the set $\mathcal{M}_2(\mathbb{R})$ satisfies the properties of Vector Spaces related to "+" where the operation "+" denotes usual addition of matrices.

(ii) Verify whether the subset $W \equiv \{ax^2 + bx + c \ where \ c = 0\}$ is a subspace of $P_2[x]$.

(iii) Verify whether the set {(1, 0, 0), (1, 1, 0), (1, 1, 1)} is linearly dependent.

(iv) Let V is a real vector space $x \in V$ & $\alpha \in \mathbb{R}$, Prove that,

   a) if $\alpha.x = 0$ then either $\alpha = 0$ or $x = 0$
   b) $(-1).x = -x$

(v) Let W_1 and W_2 be two subspaces of a real vector space V. Prove that,

   dim. $(W_1 + W_2)$ = dim. W_1 + dim. W_2 – dim. $(W_1 \cap W_2)$

Q.3 Attempt any Four.   **(20)**

(i) Solve the following determinant by Laplace expansion method using second column

$$\begin{bmatrix} 3 & 2 & 5 & 2 \\ 4 & -1 & 2 & -3 \\ 1 & 3 & 1 & 5 \\ -1 & 4 & 3 & 6 \end{bmatrix}$$

(ii) Find the inverse of the matrix A by adjoint method

$$A = \begin{bmatrix} 1 & 2 & -1 \\ -3 & 1 & 4 \\ 2 & -3 & 5 \end{bmatrix}$$

(iii) Verify whether the following system of equations is consistent. If it is consistent, find it's solution set.

$$3x_1 + 8x_2 - 3x_3 - 14x_4 = 1$$
$$2x_1 + 3x_2 - x_3 - 2x_4 = 2$$
$$x_1 - 2x_2 + x_3 + 10x_4 = 3$$
$$x_1 + 5x_2 - 2x_3 - 12x_4 = -1$$

(iv) Decompose the matrix A by LU decomposition method.

$$A = \begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$$

(v) Prove that

det. $(v_1, v_2, \text{--------}, \alpha v_i, \text{---- -------} v_n) = \alpha$ det. $(v_1, v_2, \text{------}, v_i, \text{--- ------} v_n)$

Q.4 Attempt any Three. (15)

(i) Reduce the following matrix into a row echelon form.

$$\begin{bmatrix} 2 & -4 & 3 & 1 & 0 \\ 1 & -2 & 1 & -4 & 2 \\ 0 & 1 & -1 & 3 & 1 \\ 4 & -7 & 4 & -4 & 5 \end{bmatrix}$$

(ii) Find the inverse of a matrix by Gauss elimination method.

$$= \begin{bmatrix} 3 & 2 & 2 \\ -1 & 3 & 3 \\ -4 & -10 & 1 \end{bmatrix}$$

(iii) Verify whether the set $\{(1, 1), (1, -1)\}$ is a basis of R^2.

(iv) Prove that, If V is a real vector space and S is any subset of V then linear span of S is a subspace of V.

(v) Solve the following equations by Cramer's rule.

$$x + 2y - z = 3; 3x + 2y + z = 13; 2x - y + z = 7$$

(vi) Solve the following system of equations by LU decomposition method.

$$x + y + z = 1; 4x + 3y - z = 6; 3x + 5y + 3z = 4$$

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SC32335

<u>S.Y. B.Sc. SEMESTER – III EXAMINATION: OCTOBER 2023</u>

<u>MATHEMATICS PAPER –III: ORDINARY DIFFERENTIAL EQUATIONS</u>

Time: $2\frac{1}{2}$ Hours   Maximum Marks: 75

NOTE: (1) All questions are compulsory.

    (2) Figures to the right indicate full marks.

Qn. (1) Attempt any FOUR questions from the following. $(4 \times 5 = 20 \ Marks)$

(a) Show that e^x and e^{-x} are linearly independent solutions of $y'' - y = 0$. Hence, write general solution.

(b) Find the general solution of the differential equation $4y'' + 12y' + 9y = 0$.

(c) Find the general solution of $y'' - 4y' - 12y = 3e^{5x}$ by using the method of undetermined coefficients.

(d) Solve the differential equation by using Method of Variation of Parameters $y'' + y = \sec x$

(e) Show that $y = c_1 x + c_2 x^2$ is the general solution of $x^2 y'' - 2xy' + 2y = 0$ on any interval not containing zero.

Qn. (2) Attempt any FOUR questions from the following. $(4 \times 5 = 20 \ Marks)$

(a) Show that $\begin{cases} x = e^{4t} \\ y = e^{4t} \end{cases}$ and $\begin{cases} x = e^{-2t} \\ y = -e^{-2t} \end{cases}$ are the linearly independent solutions of the

homogeneous system $\begin{cases} \dfrac{dx}{dt} = x + 3y \\ \dfrac{dy}{dt} = 3x + y \end{cases}$

(b) Find the general solution for the linear system of homogeneous equations

$$\begin{cases} \dfrac{dx}{dt} = -3x + 4y \\ \dfrac{dy}{dt} = -2x + 3y \end{cases}$$

(c) Find the general solution for the linear system of homogeneous equations

$$\begin{cases} \dfrac{dx}{dt} = 5x + 4y \\ \dfrac{dy}{dt} = -x + y \end{cases}$$

(d) Solve the linear system of non-homogeneous equations $\begin{cases} \dfrac{dx}{dt} = 3x - 4y + 2t - 5 \\ \dfrac{dy}{dt} = x - y + 3t + 1 \end{cases}$

1

(e) Solve the linear system of homogeneous equations $\begin{cases} \frac{dx}{dt} = 2x \\ \frac{dy}{dt} = 3y \end{cases}$

Qn. (3) Attempt any FOUR questions from the following. $(4 \times 5 = 20\ Marks)$

(a) Given $\frac{dy}{dx} = y' = x - y^2$ and $y(0) = 1$, using Taylor's series method

compute $y(0.1)$ correct to four decimal places.

(b) Using Picard's Method find the first approximation for $y' = x + y^2$; $y(0) = 1$

(c) Given $\frac{dy}{dx} = 1 + y^2$; $y(0) = 0$; $h = 0.1$, find $y(0.2)$ using Euler's method.

(d) Given that $y' = x^2 + y$; $y(0) = 1$; $h = 0.05$. Using Modified Euler's method find

$y(0.1)$.

(e) Given $\frac{dy}{dx} = y - x$; $y(0) = 2$. Find the value of $y(0.1)$ and $y(0.2)$ using

Runge $-$ Kutta. method second order formula with $h = 0.1$.

Qn. (4) Attempt any THREE questions from the following. $(3 \times 5 = 15\ Marks)$

(a) Find the general solution of the differential equation $y'' + y' - 6y = 0$.

(b) Find the Particular Integral of $(D^2 + 4D + 4)y = e^{3x}$.

(c) Verify that $\begin{cases} x = 4e^t \\ y = 2e^t \end{cases}$ and $\begin{cases} x = e^{-t} \\ y = -e^{-t} \end{cases}$ are the linearly independent or linearly dependent

solutions of the homogeneous system

$$\begin{cases} \frac{dx}{dt} = 6x - 2y \\ \frac{dy}{dt} = 5x + 3y \end{cases}$$

(d) Find the general solution for the linear system of homogeneous equations

$\begin{cases} \frac{dx}{dt} = 7x + 6y \\ \frac{dy}{dt} = 2x + 3y \end{cases}$

(e) Given $\frac{dy}{dx} = x + y^3$; $y(0) = 1$; $h = 0.2$. Find $y(0.2)$ by using

Runge $-$ Kutta Method fourth order formula correct four places of decimals.

(f) Given $\frac{dy}{dx} = x + y$; $y(0) = 2$; $h = 0.1$ Find $y(0.1)$ by using

Runge $-$ Kutta Method second order formula. correct four places of decimals.

2

S.Y.B.Sc. (Botany): Sem-III; Paper-I

[Time: Three Hours]   **[Marks: 100]**

N.B:

. All questions are compulsory.

. Figures to the right indicate full marks.

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

Q. 1 A) Choose the correct option from the following and rewrite the sentence   10

1. In Phaeophyta, the reserved food material is _____.
   a) Laminarin   b) Fucosan   c) Carotene   d) Starch

2. The sporophyte of *Funaria* is differentiated into foot, _____ and capsule.
   a) seta   b) theca   c) cap   d) operculum

3. In *Sargasssum*, _____ help the plant floating.
   a) Air bladder   b) Hold fast   c) Axis   d) Phylloclade

4. Binomial nomenclature was first time adopted by_____
   a) Carl Linnaeus   b) Gaspard Bauhin   c) A P Decandoll   d) Takhtajan

5. *Pisum sativum* (Sweet Pea) belongs to family_____
   a) Fabaceae   b) Asteraceae   c) Amaranthaceae   d) Palmae

6. Vexillium type of aestivation found in _____
   a) Caesalpinoidae   b) Compositae   c) Papilionaceae   d) Amaranthaceae

7. Electrophoresis technique is first designed by _____.
   a) Tswett   b) Tiselius   c) Knoll   d) Robert koch

8. Agarose is composed of long unbranched chains of uncharged_____.
   a) Protein   b) Vitamins   c) Carbohydrates   d) lipids

9. Mobile phase can be_____.
   a) Gas or liquid   b) Solid or liquid   c) Only solid   d) Mixture of solid liquid and gas

10. A technique which separates charged particles using electric field is_____.
   a) Hydrolysis   b) Electrophoresis   c) Protein synthesis   d) Chromatography

Q.1 B) Answer in one or two sentences   10

1. What is the function of air bladder in *Sargassum*?
2. Define bryophyte.
3. Name of three subfamilies of Leguminosae.
4. Give Botanical name of sunflower.
5. Write the function of electron gun.

Q.2 Answer any two from the following   20

a) Enumerate the characteristic features of Phaeophyta.
b) Describe sexual reproduction of *Sargassum*.
c) Give general account of Musci.
d) With the help of neat labelled diagram, explain the vertical section of *Anthocerose*.

Q.3 Answer any two from the following   20

a) Write an account on Chemotaxonomy for the study of taxonomy.
b) Describe family Caesalpinaceae with classification, neat and labeled diagram and add a note on its economic importance.
c) Which characters of anatomy are considered for the classification of plants? Describe.
d) Describe family Fabaceae with classification, neat and labeled diagram and add a note on its economic importance.

Q.4 Answer any two from the following   20

a) What is electrophoresis? Explain principle and technique of horizontal gel electrophoresis.
b) Describe the principle, construction, working and applications of SEM.
c) Describe the principle, construction, working and applications of TEM.
d) Describe different types of paper chromatography with the help of a labelled diagram.

Q.5 Write short notes on: (any four)   20

a) Male conceptacle of *Sargassum*
b) Vegetative reproduction in *Anthoceros*
c) Systematic position of family Palmae
d) Palynology in relation to taxonomy
e) Techniques of Vertical gel electrophoresis.
f) Techniques of horizontal gel electrophoresis.
g) Principal of chromatography

X-------X-------X

Semester – III　　　Botany: Paper II　　　3 Hours　　　　**Marks: 100**

i. **N.B.: All questions are compulsory**
ii. **Figures to the right indicate full marks**
iii. **Draw neat and labeled diagrams whenever necessary**

Q.1.A. Choose the correct option from the following and rewrite the sentence　　　10

1. Who suggested De novo origin of **Mitochondria**?.
a) Harvey b) Robertson   c) Both of them   d) None of them

2. The enzyme which converts hydrogen peroxide into water:
a) Urate oxidase b) Catalase c) ATPase complex d) All of them

3. The cell cycle was first described by:
a) Nageli b) Duve & Pele c) Howard & Pele d) Robert & Pele

4. Which protein is involved in synthesis of microtubules in spindle fibres ?
a) Globulin b) Alanine c) Serine d) Tubulin

5. Another name for Chromosomal mutation is:
a) Variations b) Changes c) Mutations   d) All of them.

6. Mechanism of sex- determination in butterflies:
a) ZW-ZZ b) ZO-ZZ c) XX-XY d) XY-XX.

7. Barr eyes is the feature of which of the following organism?
a) Drosophila b) Maize   c) Honey bees   d) Human being

8. The term **molecular biology** was coined by:
a) Watson- Crick b) Warren- weaver c) Meselson-Stahl d) All of them

9. The enzyme Gyrase is a type of which of the following enzyme?
a) Ligase   b) Kornberg enzyme c) Ribozyme d) None of them

10. Proof reading mechanism in DNA is carried out by:.
a) 3'-5' exonuclease b) 5'-3' exonuclease c) 3'-5' endonuclease d) 5'-3' endonuclease

Q.1.B. Answer the following in one sentence.　　　　　　　　　　10

1. Prophase
2. Pericentric inversion
3. Dioecious organisms
4. Okazaki fragments.
5. Replication bubble.

Q.2. Answer any two of the following.   **20**

1. Describe the structure of DNA with the help of suitable diagram
2. Give a detailed account on karyokinesis of Mitosis.
3. Explain the structure & functions of Mitochondria.
4. With the help of suitable diagram describe Interphase of Cell cycle.

Q.3. Answer any two of the following.   **20**

1. What do you understand by Chromosomal aberrations ? Elaborate deletion and its types
2. What is meant by Sex-linked traits? Explain with the help of suitable examples.
3. Give a detailed account of UV mode of sex determination in *Marchantia* and *Ectocarpus*.
4. Explain the hypothesis of X-chromosome inactivation.

Q.4. Answer any two of the following.   **20**

1. With the help of suitable diagram explain the synthesis of telomeric DNA.
2. Explain Bidirectional replication of circular DNA with the help of suitable diagram.
3. What is protein synthesis? Describe different steps involved in it.
4. Give a detailed account on transcriptional unit in Prokaryotes.

Q.5. Write short notes on any four.   **20**
1. Signicance of cell division.
2. Cytokinesis
3. Barr body.
4. Robertsonian translocation.
5. Theta model in E.coli.
6. Structure of RNA Polymerase in bacteria.

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Please check whether you have got the right question paper.

N.B:
  i.   **All questions are compulsory**
  ii. **Figures to the right indicate full marks**
  iii. **Draw neat and labeled diagrams whenever necessary**

Q 1. A). Choose the correct option from the following and rewrite the sentence   10 M

1. The word Pharmacopoeia means _____
   a) Drugs   b) Marketing   c) Committee   d) Unity
2. Alkaloids are _____ type of substances.
   a) Acid   b)Neutral   c) chemical   d) Basic nitrogenous

3. IP stands for_____
   a) Indian Pharmacopoeia   b) Institute of Pharmacopoeia
   c) International Pharmacopeia   d) Ireland Pharmacopoeia

4. Glycosides are condensation products of _____.

a) Sugar+ aglycone b) Sugar+ protein c) Protein + aglyconed   d) Fats + aglycone

5. _____forests are mostly evergreen natural forest of conifers.

a. Temperate   b. Alpine   c. Dry tropical   d. Riverrain

6. Jute belogs to family_____

a. Oryza sativum   b. Corchorus capsularis   c. Cocos nucifera   d. Pisum sativum

7. Saffron is produced from _____

a. roots of Indigofera   b. petals of Rosa

c. stamens of Hibiscus   d. Style and stigma of Crocus

8. _____is the most widely planted species of cotton in the world.

a. Gossypium hirusutum   b. Cocos nucifera   c. Mangifera indica   d. Centella asiatica

9. Aromatherapy uses _____ as the therapeutic agent.

a) Seeds   b) Leaves   c) Bark   d) Essential oil

10. _____ used Myrrh and cedar wood oil to preserve mummies.

a) Russians   b) Americans   c) Egyptians   d) Indians

Q.1. B). Answer in one or two sentences 10 M

a. Name two example of Alkloides
b. Give two uses of Tannins.
c. Name two types of fibres.
d. Name two types of Social forestry.
e. Name two uses of spirulina..

Q.2. Answer the following questions in brief (any two) 20 M

a. Define the term metabolites and Explain in detailed types of Secondary metabolites.
b. Describe Indian Pharmacopoeia and its significance.
c. Explain in detail Sustainable and Adulteration of *Polyalthia longifolia*.
d. Define term Volatile oils. Explain in detailed Sources, properties, uses of Volatile oils.

Q.3. Answer the following questions in brief (any two) 20 M

a. Explain in detail classification of forests in India.
b. Define Social forestry and its Application's
c. Explain in detailed cotton and jute with respect to its sources, properties and uses.
d. Describe Agroforestry and its types.

Q.4. Answer the following questions in brief (any two) 20 M

a. Describe in detail Aromatherapy.
b. Explain in detail branches of Aromatherapy with example.
c. Describe in detail about *Jatropha curcus*.
d. Define term Enzymes and its types

Q.5. Write short notes on: (any four) 20 M

a. Uses of Resins
b. Functions of Secondary metabolites
c. Types of forests in India.
d. Alpine forests.
e. Biofuel.
f. Cellulose.

_____X_____