



SHIVAJI UNIVERSITY KOLHAPUR
B. Sc. II Semester III Examination (NEP)
October/November 2023

Botany Paper V DSC-13 Plant Systematics and Anatomy
Subject code: 88181 91568

Day and date: Monday, 20/11/2023

Time: 10.00 to 12.00 pm

Marks: 40

Instructions: 1) All questions are compulsory.
2) Figures to right indicate full marks.

PCN:KMK 335

Q. 1. Complete the following sentences with correct alternative. [08]

1. ----- is known as father of plant taxonomy.
a. A.p.de Candolle b. Carl Linnaeus
c. J. D.Hooker d. C. Darwin
2. ----- are main function of Taxonomy.
a. Classification b. Identification
c. Naming d. All of above
3. Stem tubers are found in.....
a. Sweet potato b. potato
c. garlic d. onion
4. Bentham and Hooker classified phanerogams into.....
a. Two b. four
c. three d. nine
5. The term meristem is coined by..... in the year 1858
a. Maheshwari b. Nageli
c. Clowes d. Darwin

6. Addition of secondary tissue due to activity of----- tissue.

- a. cambium
- b. xylem
- c. collenchyma
- d. Phloem

7. Tetrarch type of vascular bundles are present in-----.

- a. Sunflower stem
- b. sunflower root
- c. maize stem
- d. wheat root

8. *Canna* is example of ----- flower

- a. actinomorphic
- b. zygomorphic
- c. asymmetric
- d. all of above

Q. 2. Answer the following questions (Any two) [16]

1. What is inflorescence? Describe Cymose type of inflorescence.
2. Describe primary growth in Maize stem.
3. Define tissue and add a note on simple tissue.

Q. 3. Write short notes (Any four) [16]

1. Herbarium technique
2. Lead botanical Garden, Shivaji University Kolhapur
3. Fleshy fruits
4. Root modifications
5. Xylem
6. T. S. of dicot leaf

SHIVAJI UNIVERSITY, KOLHAPUR
B. Sc. II, Semester III Examination (NEP)
October / November 2023
Botany Paper VI – DSC - C14
Genetics and Molecular Biology

Day and date: Wednesday, 21/11/2023

Time: 10.00 am to 12.00 pm

Marks: 40

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

S.C. : 91563

APCN: HMK336

Q. 1. Complete the following sentences with correct alternative.

[08]

1. Mendel is called father of
a. genetics b. taxonomy
c. palaeobotany d. microbiology
2. Mendel chose plant for his experiments.
a. rose b. bean
c. pea d. cucumber
3. Two sister chromatids are attached with
a. spindle fibers b. centromere
c. chromocenter d. chromatid
4. Polyploidy means occurrence of set of chromosomes.
a. haploid b. diploid
c. three or more d. monoploid
5. proposed the double helix structure of DNA.
a. Khorana and Khorana b. Watson and Crick
c. Griffith and Avery d. Jacob and Monad
6. Each strand of DNA has ends.
a. 3' to 4' b. 3' to 6'
c. 3' to 7' d. 3' to 5'
7. The central dogma is
a. DNA – mRNA – Protein b. DNA – mRNA – tRNA
c. DNA – tRNA – Protein d. mRNA – rRNA – tRNA

[P.T.O.]

8. DNA duplication is called of DNA.
- a. transformation
 - b. transduction
 - c. replication
 - d. transcription

Q. 2. Answer the following questions (Any two). [16]

1. Describe Mendel's laws of inheritance with suitable examples.
2. Explain in detail the structure of chromosomes.
3. Explain in detail DNA as genetic material with reference to Griffith's experiment.

Q. 3. Write short notes (Any four). [16]

1. Linkage
2. Crossing over
3. DNA
4. Central Dogma of Molecular Biology
5. Significance of nucleic acids
6. Polyploidy

.....

SHIVAJI UNIVERSITY, KOLHAPUR
B.Sc. (Part – II) (Semester – III) Examination NEP)
October/ November, 2023
ZOOLOGY (Paper - V)
Animal Diversity-II

S.C : 91569

Day and Date: Friday 17/11/2023
Time 10.00 to 12.00 pm

Total Marks: 40

Q.P.C.N : KMH931

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

- Q.1 Select the correct answer from the following and rewrite complete sentence. 08 M**
- Skin acts as respiratory organ in.....
a) Amphibians b) Pisces c) Reptiles d) Aves
 - In chondrichthyes fishes endoskeleton is
a) Bony b) Cartilaginous c) Both a and b d) None of the above
 - are the pouched mammals.
a) Monotremata b) Placentalia c) Marsupidia d) Prototheria
 - Lungs with air sacs are seen in.....
a) Pigeon b) Whales c) Cobra d) Bat
 - Exoskeleton of consist of scales, scutes or bony plates.
a) Birds b) mammals c) Reptiles d) Amphibians
 - In cephalochordata midgut diverticulum acts as
a) Intestine b) Liver c) Kidney d) Gills
 - Venom of cobra is.....
a) Neurotoxic b) Haemotoxic c) Both neuro and haemotoxic d) Gastrotoxic
 - One of the following fish has electric organ
a) Catla b) Torpedo c) Scolidon d) Trygon
- Q.2 Attempt any two of following. 16M**
- Give the general characters of the class urochordata and classify it upto subclasses giving examples.
 - Give salient features of class amphibia and mention its subclasses.
 - Give an account on the Digestive System of a Rat
- Q.3 Attempt any four of the following. 16M**
- Classify Petromyzon by giving reasons.
 - Describe a holobranch of labeo.
 - First aid treatment of snake bite.
 - Salient features of mammals.
 - Give general characters of subphylum cephalochordata.

SHIVAJI UNIVERSITY, KOLHAPUR
B.Sc. (Part – II) (Semester – III) Examination (NEP-2020)
Examination October/November 2023
ZOOLOGY(Paper - VI)
Biochemistry
Sub. Code:73304

Day and Date: Saturday 18/11/2023
Time 10.00 to 12.00 pm

Total Marks: 40

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

QPCN : KMK333

Q.1 Select the correct answer from the following and rewrite complete sentence. 08 M

1. is water insoluble carbohydrate.
a) Cellulose b) Fructose c) Glucose d) Sucrose
2. A carbohydrate play important role in
a) Supply energy b) Supply protein c) supply lipid d) all of the above
3. Each molecule of NADH₂ yield number of ATP.
a) 1 b) 2 c) 3 d) 4
4. amino acid is called as scavenger of ammonia.
a) Threonine b) Serine c) α -ketoglutaric acid d) Glycine
5. Intestinal epithelial cell absorbs fat in the form of.....
a) Micelles b) Chylomicron c) Acyl CoA d) Acetyl CoA
6. French chemist was the first who discovered the enzyme.
a) B. Sumner b) Wilhelm Kuhne c) Eduard Buchner d) Anselme Payen
7. bind with an allosteric site in such way as to make active site of enzyme become operational.
a) Competitive activator b) Substrate c) Allosteric activators d) Competitive inhibitor
8. is present only in the liver cell.
a) Amylase b) Carbonyl-phosphate synthase c) Enterokinase d) Carboxypeptidase

Q.2 Attempt any two of following 16M

1. Define carbohydrates. Explain in briefly glycolysis.
2. Explain β oxidation.
3. Define enzyme and add note on its classification.

Q.3 Attempt any four of the following. M 16

1. Isoenzyme
2. Urea cycle.
3. Krebs cycle.
4. Gluconeogenesis.
5. Deamination

SHIVAJI UNIVERSITY KOLHAPUR
B.Sc. II Semester - III Examination (NEP)
October/November 2023

Physics Paper -V (DSC-CI THERMAL PHYSICS AND STATISTICAL MECHANICS-I)

Subject code -

Day & Date: Thursday, 11/11/2023

Time: 10.00 to 12.00 pm

Center: Matoshri Bayabai Shripatrao Kadam Kanya Mahavidyalaya, Kadegaon

S.G. 91565

Q.P.C.N: KMK332

Marks: 40

Q.1. Choose the correct alternatives.

8

I) Equation of state for one mole of an ideal gas is -----

a) $pV = RT$

b) $pV = nRT$

c) $\left(p + \frac{a}{V^2}\right)(V - b) = RT$

d) $\left(p + \frac{a}{V^2}\right) = RT$

II) Which of the following is the intensive variable?

a) entropy

b) volume

c) mass

d) temperature

III) Which of the law defines the temperature?

a) first law

b) second law

c) third law

d) zeroth law

IV) Mayer's relation for one mole of an ideal gas is ----- where C_p and C_v represent specific heat at constant pressure and specific heat at constant volume respectively.

a) $C_p - C_v = R$

b) $C_p + C_v = R$

c) $C_p = C_v$

d) none of these

V) Mean free path of a gas molecule is the ----- of free path.

a) sum

b) difference

c) average

d) double the sum

VI) Clausius formula for mean free path of a gas molecule is -----

a) $\frac{3}{4} \frac{1}{\pi d^2 n}$

b) $\frac{2}{4} \frac{1}{\pi d^2 n}$

c) $\frac{1}{\pi d^2 n}$

d) $\frac{n}{\pi d^2}$

VII) Coefficient of diffusion (D) of gas is-----

a) $D = \eta\rho$

b) $D = \frac{\eta}{\rho}$

c) $D = \frac{\rho}{\eta}$

d) $D = \frac{1}{\rho\eta}$

VIII) Coefficient of viscosity of gas is independent of -----

a) temperature

b) concentration

c) pressure

d) density

Q.2. Attempt any two of the following

16

- I. Explain isothermal process and obtain the expression for the work done in isothermal process.
- II. Explain viscosity of gases and obtain expression for coefficient of viscosity of a gas.
- III. Explain construction and working of Carnot's engine. Obtain its efficiency.

Q.3. Attempt any four of the following

16

- I. Write short note on Thermodynamic equilibrium.
 - II. Write short note on entropy.
 - III. Define specific heat at constant volume (C_p) and specific heat at constant pressure (C_p) and obtain relation between them.
 - IV. Define mean free path and obtain expression for mean free path using mutual collision cross section method.
 - V. State approximate formula for mean free path and explain Clausius and Maxwell corrections to approximate formula of mean free path.
 - VI. State types of thermometer.
-

SHIVAJI UNIVERSITY KOLHAPUR
B.Sc. II Semester - III Examination (NEP)
October/November 2023
Physics Paper - VI (DSC-C2 WAVES AND OPTICS - I)
Subject code - 91566

Day & Date: Thursday, 16/11/2023

Q.P.C.N : RMK329

Time: 10.00 to 12.00 pm

Maximum Marks: 40

Center: Matoshri Bayabai Shripatrao Kadam Kanya Mahavidyalaya, Kadegaon

Q.1. Choose the correct alternatives.

8

I) Frequency of beat of two SHM's with frequencies n_1 and n_2 is given by -----

- a) $(n_1 + n_2)$ b) $(n_1 - n_2)$ c) $\frac{1}{(n_1 + n_2)}$ d) $\frac{1}{(n_1 - n_2)}$

II) Slow frequency of normal mode of oscillation of two identical pedula is given by -----

- a) $\sqrt{\frac{g}{l} + \frac{2k}{m}}$ b) $\sqrt{\frac{g}{l}}$
c) $\sqrt{\frac{l}{g} + \frac{2k}{m}}$ d) $\sqrt{\frac{l}{g}}$

III) The velocity of transverse waves on the stretched having mass per unit length (m) and tension (T) string is -----

- a) $\sqrt{\frac{T}{m}}$ b) $\sqrt{\frac{m}{T}}$ c) $\sqrt{\frac{2T}{m}}$ d) $\frac{T}{m}$

IV) The frequency of ultrasonic wave is above -----

- a) 2000 Hz b) 20 Hz c) 20 KHz d) 50000 Hz

V) Unit of intensity level is -----

- a) *decibel* b) *decibel/cm²*
c) *decibel/cm* d) *decibel/m*

VI) The pleasant effect produced by notes produced one after another is called -----

- a) chord b) dischord
c) harmony d) melody

VII) _____ is cgs unit of viscosity.

a) *erg*

b) *dyne/cm*

c) *poise*

d) *dyne/m²*

8) The poiseuille's equation for viscosity of liquid flowing through capillary is _____

a) $\eta = \frac{\pi P a^4}{8 l V}$

b) $\eta = \frac{\pi P a^4}{4 l V}$

c) $\eta = \frac{P a^4}{8 l V}$

d) $\eta = \frac{\pi V a^4}{8 l P}$

Q.2. Attempt any two of the following

16

- I) Discuss in detail, analytically, the resultant vibrations of SHMs having same period and acting at right angles to one another. Discuss different cases.
- II) What is pressure microphone? Explain principle, construction and working of a moving coil microphone.
- III) Describe the determination of coefficient of viscosity of a liquid by Poiseuille's experiment.

Q.3. Attempt any four of the following

16

- I) What are applications of ultrasonic?
 - II) Discuss acoustic aspects of an auditorium.
 - III) Show that the profile of the advancing liquid in a horizontal capillary tube is a parabola.
 - IV) How viscosity of a liquid varies with temperature?
 - VI) Find an expression for total energy of a coupled oscillatory system.
-

SHIVAJI UNIVERSITY KPLHAPUR
B.Sc. II, Semester III Examination (NEP)

Oct/Nov 2023

MICROBIOLOGY

Paper-V (DSC- C25): Microbial Physiology & Metabolism

Subject Code: 91572

Day and Date: Saturday, 11/11/2023

Marks: 40

Time: 10.00 – 12.00 pm

Instructions: 1) All Questions are Compulsory.

2) Figures to the right indicate full marks.

S.C : 91572
R.P.C.N : KMK328

Q.1. Select the correct alternatives from the following.

08 Marks

1. Microbial growth curve shows a curve.
a) Bell-shaped b) Hypertonic c) Parabolic d) Sigmoidal
2. pathway is not involved in catabolism of glucose
a) EMP b) ED c) HMP d) Photophosphorylation
3. The growth phase where the number of cells increases exponentially is called
a) Log b) Lag c) Stationary d) Death
4. Glycolysis occurs in
a) Cytosol b) Mitochondria c) Lysosome d) Nucleus
5. growth is characterized by a double growth cycle consisting of two exponential phases separated by a distinct lag phase.
a) Synchronous b) Continuous c) Diauxic d) None of these
6. The cytochrome is a protein that contains Prosthetic group.
a) Sulfur b) Carbon c) Heme d) Gold
7. Thermophiles have an optimum growth temperature °C
a) 0 °C b) 15 °C c) 37 °C d) 55 °C
8. is the terminal electron acceptor in ETC.
a) UQ b) FMN c) NAD d) O²

Q.2 Attempt any two of following

16 Marks

- 1) Define growth. Describe different phases of growth.
- 2) Describe catabolism of glucose by EMP pathway.
- 3) Explain in detail homolactic and heterolactic fermentation.

Q.3) Write a short note (any four)

16 Marks

- 1) Diauxic growth
- 2) Significance of HMP pathway
- 3) Measurement of cell mass
- 4) Significance of pentose-phosphate pathway
- 5) Lactic acid fermentation
- 6) Aerobic Respiration

SHIVAJI UNIVERSITY KPLHAPUR
B.Sc. II, Semester III Examination (NEP)
Oct/Nov 2023
MICROBIOLOGY
Paper - VI C9-DSC-6: Applied Microbiology
Subject Code: 91572

Day and Date: Thursday, 16/11/2023

Marks: 40

Time: 10.00 – 12.00 pm

Instructions: 1) All Questions are Compulsory.

2) Figures to the right indicate full marks.

R.P.C.N: KMK030

Q 1. Select the correct alternatives from the following.

08 Marks

1. Secondary metabolites are produced during the phase of the growth curve.
a) Stationary b) Lag c) Logarithmic d) Death
2. The size of droplet nuclei is
a) More than 0.1 mm b) Less than 0.1 mm c) More than 1 mm d) Less than 1 mm
3. are used for aeration in the fermenter.
a) Baffles b) Sparger c) Impeller d) None
4. EMB agar medium is used for the Test.
a) Confirmed test b) Presumptive c) Completed d) MPN
5. The Batch culture is a/an culture system.
a) Open b) Closed c) Isolated d) Semi-closed
6. Bead Bubbler device is used for microbiological examination of
a) Water b) Air c) Milk d) Soil
7. are present in the fermenter to avoid vortex formation.
a) Baffles b) Sparger c) Impeller d) None
8. Fecal and non-fecal coliforms are differentiated by the Test.
a) MPN b) Completed c) IMViC d) Presumptive

Q.2. Attempt any two of the following.

16 Marks

1. Give detailed account of tests for coliforms.
2. Describe in detail the various methods of pasteurization of milk.
3. Write an essay on batch and continuous fermentation.

Q.3. Write a short note (Any four).

16 Marks

- 1) Bead Bubbler Device
- 2) Batch fermentation
- 3) Pasteurization of milk
- 4) Dual or Multiple fermentation
- 5) Fecal pollution of water
- 6) Continuous fermentation

- c) Give the postulates or assumptions of kinetic theory of gasses.
- d) Define entropy. Give its mathematical equation. What are its units?
- e) What are the characteristics of a third-order reaction?
- f) Describe the conductometric titration between a strong acid and a strong base.



SHIVAJI UNIVERSITY KOLHAPUR

Faculty: Science and Technology - Course: B.Sc. Examination NEP

B.Sc. Part II (Semester- III)

Examination October/ November 2023

ANALYTICAL CHEMISTRY (Paper VI)

Day and Date Friday, 10/11/2023

Time: 10.00-12.00 pm

40 Mark

R.P.E. No - RMK 826

S.C. : 91567

Instructions:

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

Que 1. Select the most correct alternative from the following

8

1. A reagent which brings about precipitation is called as.....

- | | |
|----------------|----------------------|
| a) precipitant | b) precipitate |
| c) coagulant | d) emulsifying agent |

2. The chromatographic technique used to separate charged species is

- | | |
|--------------------------------|------------------------------|
| a) ion exchange chromatography | b) adsorption chromatography |
| c) partition chromatography | d) exclusion chromatography |

3. Universal theory (Electrochemical theory) of corrosion was introduced by.....

- | | |
|------------|------------|
| a) Whitney | b) Evan |
| c) Keir | d) Faraday |

4. The internationally recommended unit for conductance is.....

- | | |
|----------|------------|
| a) poise | b) Dyne |
| c) Ohm | d) Siemens |

5. Hardness of water is conventionally expressed in terms of equivalent amount of

- a) H_2CO_3
- b) $MgCO_3$
- c) $CaCO_3$
- d) Na_2CO_3

6. During the process of precipitation, impurities become incorporated into precipitate, hence it is called.....

- a) co-precipitation
- b) post-precipitation
- c) contamination
- d) exclusion

7. Nucleation is the step of precipitation

- a) initial
- b) second
- c) third
- d) final

8. An eluent releases the most strongly held bands on a column at.....

- a) beginning
- b) end
- c) in between
- d) any way

Que 2 Attempt any TWO of the following (Out of Three)

16

1. Describe the principle of column chromatography and Methodology.
2. Explain the terms (a) Copyright and (b) Trademark
3. What are the advantages of organic precipitant in Inorganic gravimetric analysis? What is the role of DMG as organic precipitant?

Que 3. Answer any Four of the following (Out of six)

16

1. Write short note on Nucleation
2. Describe electrochemical theory of corrosion
3. Explain the packing of column in adsorption chromatography
4. Define and explain the terms a) P^{H^+} b) Chemical Oxygen Demand
5. Write note on synthetic petrol
6. Give the optimum conditions for good precipitation

6) For The differential equation $\frac{d^2y}{dx^2} + P\frac{dy}{dx} + Qy = R$ the known solution to C.F. will be $y = e^{ax}$, if -

a) $a + Pa^2 + Q = 0$

b) $a^2 + Pa + Q = 0$

c) $a - Pa^2 + Q = 0$

d) $a^2 - Pa + Q = 0$

7) The general solution of the differential equation $yzdx + xzdy + xydz = 0$ is -----

a) $xyz = c$ b) $xz = c$ c) $xy = c$ d) $yz = c$

8) The differential equation of the form $\frac{dx}{P} = \frac{dy}{Q} = \frac{dz}{R}$ where P, Q, R are functions of x, y, z are called -----

a) Total differential equation b) Simultaneous differential equation

c) Lagranges linear equation d) Homogeneous linear equations.

Q.2. Attempt any two of the following

16

- 1) Define homogeneous linear differential equations of order n. Explain the method of solving it.
- 2) Explain necessary condition for integrability of total differential equation
- 3) Solve $x^3 \frac{d^2y}{dx^2} + 2x^3 \frac{dy}{dx} + 2y = 10(x + \frac{1}{x})$

Q.3. Attempt any four of the following

16

- 1) Solve $(4x + 3y + 1)dx + (3x + 2y + 1)dy = 0$
 - 2) Solve $\frac{dx}{x^2 - yz} = \frac{dy}{y^2 - xz} = \frac{dz}{z^2 - xy}$
 - 3) Solve $(y + z)dx + dy + dz = 0$
 - 4) Solve $(x + 1)^2 \frac{d^2y}{dx^2} + (1 + x) \frac{dy}{dx} + y = 4 \cos \log(1 + x)$
 - 5) Solve $(D^2 - 5D + 6)y = e^{4x}$
-

Seat No.	
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Total No. of Pages: 2

SHIVAJI UNIVERSITY, KOLHAPUR
B.Sc. (Part – II) (Semester – III) Examination NEP)
October/ November, 2023
Mathematics (Paper - VI)
Numerical Methods

G.C. 91565

Day and Date: Saturday 18/11/2023
Time 10.00 to 12.00 pm

Total Marks: 40

RPGN : KMK 834

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Q.1. Choose the correct alternatives.

8

- 1) The 6th difference of a polynomial of degree 5 is -----
a) a quadratic polynomial b) a linear polynomial
c) a constant d) 0
- 2) Lagranges interpolation can be used for -----
a) only equal spaced data b) only unequally spaced data
c) Both equal and unequally spaced data d) none of these
- 3) If δ denotes the central difference operator, then $\delta y_r =$ -----
a) $y_r - y_{r-1}$ b) $y_{r+1} - y_r$ c) $y_{r+1/2} - y_{r-1/2}$ d) $y_{r+1/2} + y_{r-1/2}$
- 4) The value of $\int_0^1 \frac{dx}{1+x}$ by Simpsons rule is -----
a) 0.96315 b) 0.63915 c) 0.69315 d) 0.69351
- 5) Numerically techniques more commonly involve -----
a) Elimination method b) Iterative method
c) Reduction method d) Direct method
- 6) Trapezoidal rule gives exact value of the integral when the integral is a -----
a) Linear function b) Quadratic function
c) Cubic function d) Polynomial of any degree
- 7) Taylor series method will be very useful to give some -----
a) Initial value b) Final value c) Quadrature d) Quadrant
- 8) Various types of Runge – Kutta methods are classified according to their -----
a) degree b) order c) rank d) both a) and b)

Q.2. Attempt any two of the following**16**

- 1) Find the real root of the equation $f(x) = x^3 - x - 1 = 0$ which lies between 1 and 2 with accuracy
- 2) From the following table estimate the number of students who obtained marks between 40 and 45

Marks	30-40	40 - 50	50 - 60	60 - 70	70 - 80
No. of students	31	42	51	35	31

- 3) Evaluate $\int_0^6 \frac{dx}{1+x^2}$ by using
i) Trapezoidal rule ii) Simpsons $\frac{1^{st}}$ rule
iii) Simpsons $\frac{3^{rd}}$ rule

Q.3. Attempt any four of the following**16**

- 1) Prove that $\Delta = E - 1$ and $\nabla = 1 - E^{-1}$
- 2) Find the root of the equation $x^3 - 2x - 5 = 0$ using Newton Raphson method, where $x_0 = 2$
- 3) Find the quadratic polynomial that takes the values,

x	0	1	3
y	1	3	55

Using Lagranges formula.

- 4) Apply Gauss elimination method to solve the equations
 $2x + y + z = 10$, $3x + 2y + 3z = 18$, $x + 4y + 9z = 16$
 - 5) Solve $y' = 3x + y^2, y(0) = 1$ by Taylors series method. Hence find the value of y at $x = 0.1$
-