Set- II

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# SHIVAJI UNIVERSITY, KOLHAPUR
## B Sc. I Semester I Examination (NEP)
## October/November 2023
## English for Communication
## Ability Enhancement Compulsory Course (AECC-1) A
**Subject code: 88173**

**Day and Date: Monday, 30/10/ 2023** **Marks: 40**
**Time:** 10.00 to 12.00 pm

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

**Q. 1 A) Complete the following sentence by choosing the correct alternatives:** **[4]**

1) Martin Luther King Jr. received the Nobel Peace Prize in .....
A) 1960 B) 1964 C) 1962 D) 1965

2) The pages of the book are ..... with age
A) white B) black C) blue D) brown

3) If birds could talk, ..... could walk with us.
A) rocks B) animals C) trees D) flowers

4) The modern world has been shaped by.....
A) industry B) technology C) modernity D) none

**Q. 1 B) Answer the following questions in one word/phrase/ sentence each.** **[4]**

1) What is the primary task of technology?

2) Who has written the poem *How Beautiful*?

3) What have made the book an open mystery?

4) Who were the followers of Kanti in hunting?

**Q. 2 A) Answer the following questions in three to four sentences each (Any Three)** **[6]**

1) How will the God behave with the child?

2) What happened at the moment of auspicious vision?

3) Bring out the imagery used in the poem *The Book*?

4) What is the dream of the speaker in I Have a Dream?

5) How does technology differ from nature?

**P.T.O**

**Q. 2 B) Write short notes on the following in about 7 to 8 sentences (Any Two)** [6]

1) Martin Luther King's warning to the Negroes.

2) End of the story *The Auspicious Vision*

3) God's love for the human beings.

4) The difference between 'mass production' and 'production by masses'.

**Q. 3 A)** Describe Smartphone using names of parts, color, size or other details. [4]

**Or**

Describe your close Mother.

**Q. 3 B) Write a detailed description of Village temple** [4]

**Or**

Describe your daily routine as a college student.

**Q. 4 A) i) Write synonyms for the following.** [2]

a) accept b) reject

**ii) Write antonyms for the following.** [2]

a) hate b) enemy

**iii) Prepare new word by adding prefix or suffix.** [2]

a) Nation b) love

**Q. 4 B)** Narrate birthday celebration your friend. Imagine the necessary details. [6]

**Or**

Narrate the memorable incident in your life.

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# SHIVAJI UNIVERSITY KOLHAPUR
## B. Sc. I, Semester I, Examination (NEP)
## October/November 2023
## Botany Paper I: DSC-A 13: Microbes, Algae and Biofertilizers
## Subject code: 88181

**Day and date:** Thursday, 02/11/2023
**Time:** 10.00 to 12.00 pm

**Marks: 40**

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

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

1. ---------- is known as the 'Father of Virology'.

A) M. Beijerinck B) Neil Watson
C) D. J. Iwanowsky D) Adolf Mayer

2. Full form of TMV is.....

A) Terminal Mosaic Virus B) Tobacco Mosaic Virus
C) Transmission Mosaic Virus D) Transformation Mosaic Virus

3. Bacteria are .....organism.

A) akaryotic B) eukaryotic
C) prokaryotic D) dikaryotic

4. The exchange of genetic material between two bacterial cells takes place through a ----------

A) flagellum B) plasmodesmata
C) conjugation tube D) transformation tube

5. Agar-Agar is obtained from.....a marine red alga.

A) *Gelidium* B) *Spirulina*
C) *Spirogyra* D) *Chlorella*

6. *Spirogyra* is .....algae

A) sea water B) fresh water
C) parasitic D) thermophytic

7. In *Nostoc*.....play important role for nitrogen fixations.

A) globule B) akinete
C) nucule D) heterocyst

8. *Trichoderma* is a ----------eco-friendly fertilizer.

A) fungal B) bacterial

C) viral D) algal

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

1. What is Virus? Describe general characters of Virus.
2. Describe various types of bacteria.
3. Describe the sexual reproduction in *Spirogyra*.

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

1. Economic importance of viruses
2. TMV
3. Positive economic importance of algae
4. Blue green algae as Biofertilizer
5. *Rhizobium*
6. Trichoderma as Biofertilizer

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# SHIVAJI UNIVERSITY KOLHAPUR

## B. Sc. I Semester I Examination (NEP)

## October/November 2023

## Botany Paper II DSC-14 A Cell biology and Analytical techniques

## Subject code: 88181

**Day and date: Friday, 03/11/2023**

**Time:** 10.00 to 12.00 pm **Marks: 40**

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

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

1. ---------- first time described the living cell.
   a. Lederberg b. Max knoll
   c. Robert Hook d. Anton van Leuwenhoek

2. --------- is known as powerhouse of cell.
   a. Mitochondria b.Chloroplast
   c. Golgi bodies d.Endoplasmic reticulum

3. The whatman No.1 paper used for paper chromatography contains------ of alpha cellulose.
   a. 78-80% b. 98-995
   c. 58-60% d. 88-90%

4. ---------- is known as reduction cell division.
   a. mitosis
   b. meiosis
   c. amitosis
   d. none of above

5. Dark reactions of photosynthesis takes place in
   a. stroma b. granum
   c. quantasome d. Photosystem

6. The spindle apparatus is formed during the _____ phase of mitosis.

a. telophase b. metaphase
c. prophase d. anaphase

7. The electron microscope uses ---------- source of light.

a. Light b. Electron beam
c. LED d. Molectron

8. Full form of TLC is ----------

a. Thin layer Chromatography b. Thick Layer Chromatography
c. Thin Level Chromatography d. Thick level Chromatography

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

1. Describe Phases of Mitosis. Add note on significance of mitosis.
2. Describe Structure of Eukaryotic cell with suitable diagram.
3. What is microscopy? Describe principle, working and application of compound microscopy.

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

1. Significance of meiosis
2. Endoplasmic reticulum
3. Prophase I
4. Applications of chromatography
5. Thin Layer Chromatography (TLC)
6. Structure of chloroplast.

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**SHIVAJI UNIVERSITY KOLHAPUR**
**B.Sc. I Semester I Examination (NEP)**
**October/November 2023**
**Physics Paper –I DSC-A1**
**Mechanics-I**

**Day & Date**: Saturday 04/11/2023

**Time**: 10.00 to 12.00 pm **Marks**: 40

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**Q.1. Choose the correct alternatives.** **8**

1) The process of determining the resultant of number of vectors is called …

a) vector resolution b) vector addition

c) vector multiplication d) vector division

2) If the vector product of two non-zero vectors is zero, the vectors must be …

a) either parallel or antiparallel b) perpendicular

c) inclined at an angle $45^0$with each other d) always antiparallel

3) Ordinary differential equation involves…

a) only dependent variables. b) only independent variables.

c) total derivatives. d) partial derivatives.

4) The equation $\frac{dy}{dx} = sinx$ is …differential equation

a) linear b) non-linear.

c) homogeneous. d) first order homogeneous linear

5) If the total… acting on a particle is zero, then the angular momentum of the particle is conserved.

a) force b) momentum

c) energy d) torque.

6) Rocket motion is based on Newton's…law of motion.

a) First b) Second,

c) Third

d) None of all

7) Moment of inertia in rotational motion is analogous to the … in translational motion.

a) momentum

b) mass

c) force

d) torque

8) Moment of inertia of a spherical shell about its diameter …

a) $\frac{2}{3}MR^2$

b) $\frac{3}{2}MR^2$

c) $\frac{5}{3}MR^2$

d) $\frac{1}{2}MR^2$

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

1. Define scalar product. Show that scalar product of rectangular vector,

   $\bar{A}.\bar{B} = A_xB_x + A_yB_y + A_zB_z$, for vectors

   $\bar{A} = \hat{\imath}A_x + \hat{\jmath}A_y + \hat{k}A_z$ and $\bar{B} = \hat{\imath}B_x + \hat{\jmath}B_y + \hat{k}B_z$

2. What is Cantilever? Derive expression for the depression for the free end of a cantilever due to a load.

3. Obtain the expression of the instantaneous current in the circuit containing inductance L and resistance R, when circuit is off.

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

1. Explain angle of contact.
2. Define order and degree of the differential equation, state order and degree of the following differential equation.

   $$\frac{d^2y}{dx^2} + y\frac{dy}{dx} = x$$

3. Explain center of mass and give its physical significance

4. Calculate magnitude of work done in direction of displacement when a force an $\vec{F} = 3\bar{\imath} + \bar{\jmath} - 3\bar{k}$ applied on body produces a displacement$\vec{r} = \bar{\imath} - 2\bar{\jmath} - 4\bar{k}$.

5. Write note on torque

**SHIVAJI UNIVERSITY KOLHAPUR**
**B.Sc. I Semester I Examination (NEP)**
**October/November 2023**
**Physics Paper - II (DSC A2 MECHANICS-II)**
**Subject code - 88178**

**Day & Date: Monday, 6/11/2023**

**Time: 10.00 to 12.00 pm** **Marks: 40**

**Center: Matoshri Bayabai Shripatrao Kadam Kanya Mahavidyalaya, Kadegaon**

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**Q.1. Choose the correct alternatives.** **8**

I) The period of geostationary satellite is …

a) 18 hours b) 12 hours c) 6 hours d) 24 hours

II) Planets revolve an elliptically orbits round Sun was first shown by …

a) Newton b) Galileo Galilei

c) Kepler d) Copernicus

III) The displacement of particle performing SHM at time t is $y = a \cos \omega t$ . The displacement of the particle at time t = T/4 is ------ (Where T is period of SHM)

a) $a\,\omega$ b) $a\,\omega^2$ c) zero d) $-a\,\omega$

IV) Total energy of a body performing SHM is E. Then average energy of the body, over a period is …

a) $\frac{E}{2}$ b) $\frac{E}{4}$ c) $\frac{E^2}{2}$ d) $\frac{E}{8}$

V) A plane perpendicular to neutral surface is called -------

a) Plane of bending b) interaction of bending

c) neutral axis d) neutral plane

VI) The quantity $Ya\,K^2$ is called ------

a) flexural rigidity b) bending moment

c) geometrical moment of inertia d) depression in bending

VII) ---------- is cgs unit of surface tension.

a) $^{dyne}/_{cm}$ b) $^{dyne}/_{m}$ c) $^{dyne}/_{cm^2}$ d) $^{dyne}/_{m^2}$

8) If T is surface tension of a liquid then the excess pressure inside the liquid drop of radius r is

a) $\frac{T}{r}$ b) $\frac{2T}{r}$ c) $\frac{T}{2r}$ d) $\frac{4T}{r}$

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

I) obtain an expression for period (T) of revolution of a satellite revolving in circular orbit around the earth. Discuss what you mean by geostationary satellite.

II) Derive expressions for kinetic energy, potential energy and total energy of the particle performing SHM.

III) What is cantilever? Derive an expression for depression for the free end of a cantilever due to a load.

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

I) State and explain applications of artificial satellites.

II) Obtain an expression for work done in twisting the wire.

III) What is surface tension? Explain it on the basis of molecular forces.

IV) Explain angle of contact.

V) Explain what in brief torsional oscillations and use of it for determination of elastic constant.

VI) Explain conservations of various physical quantities for a body moving in central force field

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# B.Sc. Part–I Semester I (NEP 2020)
## Nov. 2023 Examination
## MICROBIOLOGY (Paper I)
## DSC - 25 A Introduction to Microbiology

**Day and Date: Saturday, 04/11/2023** **Subject Code - 88185**

**Time: - 10.00 to 12.00 pm** **Total Marks: 40**

**Instructions:**
1) All Questions are Compulsory.
2) Draw labelled diagrams wherever necessary.
3) The figures to the right indicate full marks.

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**Q. 1. Rewrite the sentences by choosing the correct option.** (08)

1. The existence of anaerobic bacteria was reported by .....
   A) Louis Pasteur B) Francesco Redi C) Louis Joblot D) Robert Koch
2. Endospores serve as a bacterial survival mechanism in .....
   A) Unfavourable environmental conditions B) Rapid growth phases
   C) Oxygen-rich environments D) Protein synthesis
3. In 1890, ..... introduced enrichment culture technique for the isolation of certain bacteria.
   A) Martinus W. Beijerink B) Alexander Fleming
   C) Dmitrii Ivanowski D) Joseph Lister
4. R.H Whittaker (1969) Proposed ..... classification of Organism.
   A) Four Kingdom B) Three Kingdom C) Five Kingdom D) Seven Kingdom
5. The genetic material in bacteria is typically found in the .....
   A) Ribosomes B) Mesosomes C) Inclusion bodies D) Nucleoid
6. ..... is the function of bacterial pili.
   A) Protection against antibiotics B) Conjugation and genetic exchange
   C) Energy production D) Protein synthesis
7. Starfish is an example of Kingdom .....
   A) Fungi B) Plantae C) Protista D) Animalia
8. ..... term describes the specific arrangement of bacterial cells into pairs.
   A) Cocci B) Diplococci C) Streptococci D) Bacilli

**Q. 2. Attempt any two of the following:** (16)

1. Draw well labeled diagram of a typical bacterial cell and discuss the difference between prokaryotic and eukaryotic cell.
2. Describe Spontaneous generation vs Biogenesis.
3. Describe in Brief Structure and function of bacterial Flagella.

**Q. 3. Attempt any four of the following:** (16)

1. General Characteristics of Bacteria
2. Alexander Fleming
3. Cell Membrane
4. Function of capsule
5. Economic Importance of Fungi
6. Contribution of Louis pasture

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# B.Sc. Part–I Semester I (NEP 2020)
## Nov. 2023 Examination
## MICROBIOLOGY (Paper II)
### DSC - 26 A Basic Techniques in Microbiology

**Day and Date: - Thursday, 06/11/2023** **Subject Code - 88185**

**Time: - 10.00 to 12.00 pm** **Total Marks: 40**

**Instructions:**
1) All Questions are Compulsory.
2) Draw labelled diagrams wherever necessary.
3) The figures to the right indicate full marks.

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**Q. 1. Rewrite the sentences by choosing the correct option.** **(08)**

1. The Lens present near to the observer's eye is called as .....
   A) Objective lens B) Ocular C) Condenser D) Immersion lens
2. ..... is used for the disinfection of water.
   A) Chlorine B) Phenol C) Alcohol D) Iodine
3. The chance's method is used for staining .....
   A) capsule B) cell wall C) bacterial D) flagella
4. U.V. radiation at ..... wavelength has the highest microbiocidal activity.
   A) 265nm B) 290nm C) 250nm D) 300nm
5. An example of a negative stain is .....
   A) India ink B) Nigrosin C) Safranine D) Both A and B
6. If the total magnification of a microscope is 2000X with the use of a 10X ocular lens ..... is the magnification of the objective lens.
   A) 10X B) 20X C) 200X D) 2000X
7. ..... is the process of destroying all forms of life.
   A) Disinfection B) Antiseptic C) Germicide D) Sterilization
8. Pasteurization is a process of .....
   A) sterilization B) Disinfection C) Filtration D) cold sterilization

**Q. 2. Attempt any two of the following:** **(16)**

1. Write in brief about Capsule (Maneval's method).
2. Define Sterilization? Explain principle of sterilization by dry and moist heat.
3. Write in brief about Gram's Staining.

**Q.3. Attempt any four of the following:** **(16)**

1. Simple staining.
2. Alcohol as disinfectant.
3. Applications of Compound Microscope.
4. Difference between light and electron microscope.
5. Explain sterilization by Filtration.
6. Iodine as disinfectant.

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# SHIVAJI UNIVERSITY, KOLHAPUR

## B.Sc. (Part – I) (Semester – I) Examination (NEP)

## Octomber/ November2023

## ZOOLOGY(Paper - I)

## Animal Diversity – I

## Sub. Code: 88182

**Day and Date: Tuesday, 07/11/2023** **Total Marks: 40**

**Time: 10.00 to 12.00 pm**

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**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 the complete sentence. 08 M**

1. Sea star belongs to the class.....

   A) Crinoidea B) Echinoidea C) Asteroidea D) Cystidea

2. Platyhelminthes are also known as.....

   A) Flatworms B) Pore bearing C) Roundworms D) With jointed appendages

3. The primary host of T. Solium is.....

   A) man B) pig C) Cat D) Bat

4. Scolex of Tapeworm has.....

   A) Mouth &hooks B) Mouth & Suckers C) only suckers D) Suckers & hooks

5. Jellyfish is the common name of .....

   A) Aurelia B) Physalia C) Obelia D) Hydra

6. The adult *Ascaris* is found in ..... of man

   A) Lung B) Stomach C) Intestine D) Liver

7. Ascaris is.....

   A)Hermaphrodite B) Monoecious C) Unisexual D) Bisexual

8. Locomotion in Amoeba is achieved by.....

   A)Flagellum B) cilia C) Pseudopodia D) All of the above

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

1. Give general characters and classification of phylum Annelida up to classes.
2. Describe the Parasitic adaptations of *T. solium*.
3. Describe the canal system in Sycon and state its significance.

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

1. Give general characteristics of Echinodermata.
2. Metamerism in annelida
3. Types of Vision in Arthropoda
4. General characters of phylum Nemathelminthes.
5. Significance of Torsion.
6. Scolex of Tapeworm.

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# SHIVAJI UNIVERSITY, KOLHAPUR

**DATTAJIRAO KADAM ARTS, SCIENCE AND COMMERCE COLLEGE, ICHALKARANJI**

## B.Sc. (Part – I) (Semester – I) (New) (CBCS) (NEP)

## Octomber/ November2023,

## ZOOLOGY (Paper - II)

## Cell Biology and Evolutionary Biology

## Sub. Code: 88182

**Day and Date: Wednesday, 08/11/2023** **Total Marks: 40**

**Time: 10.00 to 12.00 pm**

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

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

1. Ultrastructural studies reveal that nuclear membrane is made up of ..... the membrane.
   A) One B) Two C) Three D) Four
2. ..... are the basic structural and functional units or building blocks of all living organisms.
   A) Bones B) Tissues C) Cells D) Organs
3. The number of chromosomes in man is .....
   A) 48 B) 47 C) 46 D) 60
4. ..... plays a role in the formation of acrosome during spermeogenesis.
   A) Golgi complex B) Nucleus C) Endoplasmic reticulum D) Mitochondria
5. The fluid mosaic model of plasma membrane was proposed by ------
   A) S.J. Singer and G.L. Nicolson B) Robert Hook C) Cook D) Darwin
6. Darwin's finches are found on.....
   A) Andaman iseland B) Nicobar island C) Darwin D) Mendel
7. ..... is the study of fossils.
   A) Anthropology B) Entomology C) Galapgos islands D) Sri Lankan Islands
8. When ribosomes are present in large number on the wall of endoplasmic reticulum, then it is called.....
   A) Smooth Endoplasmic reticulum B) Rough Ribosomes
   C) Rough Endoplasmic reticulum D) All of above

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

1. Describe Ultra structure, chemical composition and function of Mitochondria.
2. Give an account of ultrastructure of nucleus. Add note on its function.
3. Describe Theory of natural selection

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

1. Functions of endoplasmic reticulum
2. Urey and Miller's experiment
3. Polytene chromosome
4. Cast and Mould fossil
5. Cell Size

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**SHIVAJI UNIVERSITY KOLHAPUR**

**B.Sc. Part I ( Semester I )Examination (NEP)**

**October; November 2023**

**CHEMISTRY – DSC A-3**

**INORGANIC CHEMISTRY ( Paper I )**

**Subject Code-71605**

**Day and Date –Tuesday ,31/10/2023**

Time-10.00 am to 12.00 pm Total Marks-40

## Instructions-

1.All Questions are Compulsory

2.Figures to the Right indicate Full Marks

3.Neat Diagram Should be drawn whenever necessary

.....

**Q.1. A) Select most correct alternative and rewrite the sentence 8 Marks**

I) The Shape of S orbital is.....

a) spherical b) dumbbell shaped c) triangular d) square planner

2) The attractive force which keeps atoms together in a matter is known as.....bond

a) electrovalent b) chemical c) covalent d) hydrogen

3) Geometry of $BF_3$ is.....

a) linear b) trigonal planner c) tetrahedral d) diagonal

4) Cations are.....than theirparent atoms

a) smaller b) larger c) bigger d) both a and c

5) Lewis acid is.....acceptor

a) proton b) electron pair c) oxygen d) nitrogen

6) .....is an ionic compound

a) $CCl_4$ b)NaCl c) HF d) $Cl_2$

7) In $IF_7$ Iodine is.....

a) tetravalent b) heptavalent c) pentavalent d) hexavalent

8) The bond formed by complete transfer of electron from one atom to another is called.....

a) Ionic bond b) covalent c)co ordinate d) Metallic

**Q.2.write short answers from the following( Any four ) 16 Marks**

i) Givefactors affecting the formation of ionic bond

ii) Explain $SP^3$dhybridisation

iii) Explain in brief classification of Lewis acid and base

iv) Give limitations of VBT

v) Write short note on Ionization energy

vi) Write electronic configuration ofO , C, F and B

**Q.3. Answer the following questions in brief (Any Two ) 16 Marks**

i) Explain the born Haber cycle for sodium chloride. Give its application.

ii)what is hybridization? Explain $BeCl_2$ molecule and $SiCl_4$ molecule.

iii) Write the general electronic configuration of Group 15A elements

# SHIVAJI UNIVERSITY, KOLHAPUR

## B.Sc. Part I, Semester I Examination (NEP)

## October/November 2023

## Chemistry Paper II DSC A-4

## Organic Chemistry

## Subject Code: 88180

**Day and Date: Wednesday 01/11/2023** **Marks:40**

**Time: 10:00 am to 12:00 pm**

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**Instructions: 1) All questions are compulsory.**

**2) Figures to the right indicate full marks.**

**Q1) Choose the correct alternative and rewrite the sentence again.** **8 Marks**

a) Hybridization of free radical is _____ .

a) $sp^3$ b) $sp^2$ c) $sp^3$ or $sp^2$ d) $sp^3d$

b) The resonating structure that contribute 80% in resonance hybrid of benzene is _____ .

a) Dewar b) Kekule c) Lidenburg d) both a & b

c) What is the relationship between 1-butene and cis-2-butene ?

a) Unrelated compounds b) Enantiomers

c) Constitutional isomers d) Diastereomers

d) _____ is not five-membered heterocyclic compound.

a) thiophene b) pyridine c) pyrrole d) furan

e) Identify an electrophile.

a) $SO_2$ b) $SO_3$ c) $NF_3$ d) $H_3O^+$

f) Any cyclic, planar and fully conjugated system containing $4n\pi$ electrons is _____

a) aromatic b) non-aromatic c) anti-aromatic d) pseudo-aromatic

g) Stereoisomers which are non-superimposible mirror image of each other are called _____ .

a) Enantiomers b) Diastereomers

c) Meso compounds d) Conformational isomerism

h) The ring compound which containing N, S and O atom is called _____

a) aromatic compound b) cyclic compound

c) heterocyclic compound d) acyclic compound

**Q2) Attempt any TWO of the following. ( Out of three )** **16 Marks**

a) What is bond fission ? Describe the types of cleavage of bonds ?

b) What is optical isomerism ? Discuss optical isomerism in Tartaric acid .

c) Explain modern theory of aromaticity.

**Q3) Answer any FOUR of the following ( Out of Six)** **16 Marks**

a) Difference between Electrophiles and Nucleophiles

b) Chirality

c) Classification of heterocyclic compounds

d) Inductive effect

e) i) Aromatic compound

ii) Non-aromatic compound

f) Enantiomers

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# SHIVAJI UNIVERSITY, KOLHAPUR

## B.Sc. (Part – I) (Semester – I) Examination (NEP)

## October/ November2023

## Mathematics (Paper - I)

## Calculus

## Sub. Code:

**Day and Date: Tuesday, 07/11/2023** **Total Marks: 40**

**Time: 10.00 to 12.00 pm**

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**Instructions:1) All questions are compulsory.**

**2) Figures to the right indicate full marks**

**Q.1. Choose the correct alternatives.** **8**

1) If $f(x) = |x|$then $f(x)$ is -------- at x = 0

a) continuous b) discontinuous c) derivable d) None

2) The $f(x)$ and $g(x)$ be the functions such that $f(a) = 0$ and $g(a) = 0$ then $\lim_{x\to a} \frac{f(x)}{g(x)} = \cdots$

a) $\lim_{x\to a} \frac{f'(x)}{g'(x)}$ b) $\lim_{x\to a} \frac{g'(x)}{f'(x)}$ c) $\frac{f(a)}{g(a)}$ d) none of these

3) $\lim_{x\to 0} \frac{\sin x}{x} = \cdots$

a) 1 b) 0 c) 2 d) -1

4) The geometrical meaning of rolls theorem is that the tangent at point $c \in (a, b)$ is .....

a) parallel to y axis b) parallel to x axis

c) Intersecting to x and y axis d) none of these

5) A function $f(x)$ is said to be continuous at $x = a$, if .....

a) $\lim_{x\to a} f(x)$ exists b) f(a) exists

c) $\lim_{x\to a} f(x) = f(a)$ d) $\lim_{x\to a} f(x) \neq f(a)$

6) $\lim_{x\to 0} \frac{\log(1+x)}{x} =$ .....

a) 0 b) 1 c) $e^x$ d) $\log a$

7) Continuity is ..... condition for the existence of derivative.

a) necessary but not sufficient b) sufficient but not necessary

c) necessary as well as sufficient d) neither sufficient nor necessary

8) Expansion of $\frac{1}{1-x}$ in ascending power of x is -------

a) $-1-x-x^2-x^3-\cdots$ b) $1+\frac{x^2}{2!}+\frac{x^4}{4!}+\cdots$

c) $-1+x-x^2+x^3-\cdots$ d) $1+x+x^2+x^3+\cdots$

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

1) State and prove Lagrange's mean value theorem and its geometrical interpretation

2) Verify Rolle's theorem in the case of function

i) $f(x)=x^3-4x\ on\ [-2,2]$ ii) $f(x)=|x|\ in\ x\in[-1,1]$

3) If $y=e^{a\sin^{-1}x}$, prove that $(1-x^2)y_{n+2}-(2n+1)xy_{n+1}+(n^2-a^2)y_n=0$

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

1) prove that composite function of two continuous functions is continuous

2) Verify Cauchy mean value theorem for the function defined below

$f(x)=\frac{1}{x}$, $g(x)=\frac{1}{x^2}$ on $[1,4]$

3) Find the $n^{th}$ derivative of $x^3\cos x$

4) Find the $\lim_{x\to a^-} f(x)$, $\lim_{x\to a^+} f(x)$ and $\lim_{x\to a} f(x)$ where, $f(x)=x^2, a=2$

5) Find the series expansion of $e^{ax}$

.....

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# SHIVAJI UNIVERSITY, KOLHAPUR

**DATTAJIRAO KADAM ARTS, SCIENCE AND COMMERCE COLLEGE, ICHALKARANJI**

## B.Sc. (Part – I) (Semester – I) (New) (CBCS) (NEP)

## October/ November2023,

## Mathematics (Paper - II)

## Differential Equations

## Sub. Code:

**Day and Date: Wednesday, 08/11/2023** **Total Marks: 40**

**Time: 10.00 to 12.00 pm**

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

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**Q.1. Choose the correct alternatives.** **8**

**1)** The Solution of differential equation $p = log(px - y)$ is.....

a) $y = cx + e^c$ b) $y = cx - e^c$

c) $x = cy + e^c$ d) $x = cy - e^c$

2) The integrating factor of the linear differential equation

$\frac{dy}{dx}$ + Py = Q is.....

a) $e^{\int f(y)dy}$ b) $e^{\int f(x)dx}$ c) $e^x$ d) $e^y$

3) Which of the following form of the equation is of the type homogeneous differential equations.

a) $f(D) = 0$ b) $f(D)\,y = 0$

c) $f(D) = X$ d) $f(D)\,y = X$

4) The solution of the differential equation $\frac{ydx - xdy}{y^2} = 0$ is....

a) $\frac{y}{x} = c$ b) $\frac{y+x}{y} = c$ c) $\frac{x}{y} = c$ d) $x + y = c$

5) $\frac{1}{D-a}X$ =.....

a) $e^{ax}\int Xe^{-ax}dx$ b) $e^{-ax}\int Xe^{ax}dx$

c) $e^{ax}\int Xdx$ d) $e^{-ax}\int Xe^{-ax}dx$

6) The Necessary and Sufficient condition for $Mdx + Ndy = 0$ to be exact is .....

a) $\frac{\partial M}{\partial x} = \frac{\partial N}{\partial y}$ b) $\frac{\partial M}{\partial y} = \frac{\partial N}{\partial y}$

c) $\frac{\partial N}{\partial x} = \frac{\partial M}{\partial x}$ d ) $\frac{\partial M}{\partial y} = \frac{\partial N}{\partial x}$

7) The meaning of $\frac{1}{D+a}X$ =.....

a)$e^{ax}\int Xe^{-ax}dx$ b) $e^{-ax}\int Xe^{ax}dx$

c) $e^{ax}\int Xdx$ d) $\int Xdx$

8)The degree of the differential equation.....

$$(1+x^2)\frac{dy}{dx}+2xy=cosx$$

a) 1 b) 2 c) 3 d) 4

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

1) Prove the necessary and sufficient condition for the differential equation $Mdx+Ndy=0$ to be exact is $\frac{\partial M}{\partial y}=\frac{\partial N}{\partial x}$

2) Verify Cauchy mean value theorem for the function defined below

$f(x)=\frac{1}{x}, \quad g(x)=\frac{1}{x^2}$ on $[1,4]$

3) If $y=Y$ be the complete solution of the equation $f(D)y=0$ and $y=u$ be theparticular solution of the equation $f(D)y=X$ where $X$ is the solution of $x$, then prove that, complete solution of the equation $f(D)y=X$ is $y=Y+u$.

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

1) $Solve\ (4x+3y+1)dx+(3x+2y+1)dy=0$

2) $Solve\ (1+x^2)\frac{dy}{dx}+y=e^{tan^{-1}x}$

3) $Solve\ p=log(px-y)$

4) $Solve\ [D^3+2D^2+D]y=0$

5) $Solve\ (D^2-5D+6)y=e^{4x}$

.....