

Total No. of Questions : 3]

SEAT No. :

PE-1373

[Total No. of Pages : 1

[6501]-301

**S.Y. B.Sc. (Regular)/B.Sc.(Computer Science/Biotechnology/
Animation/B.C.A)**

ENGLISH

**AECC-IIA : English-Ability Enhancement Compulsory
(2019 Pattern) (CBCS) (Semester - III)**

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

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

Q1) Attempt any one of the following : [15]

- a) How does John Keats depict the supernatural elements in 'La Belle Dame Sans Merci'?
- b) Explain the theme of patriotism in Rabindranath Tagore's where the mind is without Fear.

Q2) Attempt any two of the following : [10]

- a) Draft a formal dialogue between a student and a professor where the student requests permission to submit an assignment late.
- b) Write a complaint letter to the manager of a company regarding a defective product you purchased.
- c) Your colleague is unhappy about a project deadline and complains to you. Draft a conversation showing how you respond and apologize effectively.

Q3) Attempt any two of the following : [10]

- a) Write a job application letter for the position of 'Content writer' at a publishing company.
- b) Draft a resume for applying to the position of 'Marketing Executive' in a firm.
- c) Write a note on tips and techniques for effective participation in Group Discussion.



[6501]-302

S.Y. B.Sc.(Regular/Cyber & Digital Science)

MARATHI (मराठी)

AECC-2 B : उपयोजित मराठी

(2019 Pattern) (CBCS) (Semester - III)

वेळ : 2 तास]

[एकूण गुण : 35

- सूचना : 1) सर्व प्रश्न सोडविणे आवश्यक आहेत.
2) उजवीकडील अंक प्रश्नांचे पूर्ण गुण दर्शवितात.

प्रश्न 1) अ) खालीलपैकी कोणत्याही पाच प्रश्नांची उत्तरे 20 शब्दांत लिहा.

[5]

- भाषा म्हणजे काय?
- कोणत्याही दोन समाजमाध्यमांची नावे सांगा.
- कोणत्याही दोन वृत्तपत्राची नावे सांगा.
- अर्जाचे कोणतेही दोन प्रकार सांगा.
- वृत्तपत्रासाठीच्या लेखाचे कोणतेही दोन प्रकार सांगा.
- आकाशवाणी हे कोणत्या स्वरूपाचे माध्यम आहे.
- कार्यालयीन भाषा म्हणजे काय?

ब) खालीलपैकी कोणत्याही दोन प्रश्नांची उत्तरे लिहा.

[10]

- आपल्या महाविद्यालयातील प्राचार्यांच्या नावे बोनाफाईड प्रमाणपत्र मिळणेबाबत विनंती अर्ज करा.
- आपले खाते असलेल्या बँकेत नवीन चेकबुक मिळण्यासाठी विनंती अर्ज करा.

प्रश्न 2) खालीलपैकी कोणत्याही दोन प्रश्नांची उत्तरे लिहा.

[15]

- 'शेतकरी मेळावा' या विषयावर वर्तमान पत्रासाठी लेख लिहा.
- 'व्यवसाय मार्गदर्शन' या विषयावर आकाशवाणीसाठी भाषण लिहा.
- समाजमाध्यमांमध्ये वापरल्या जाणाऱ्या भाषेचे स्वरूप स्पष्ट करा.

प्रश्न 3) खालीलपैकी कोणत्याही एका प्रश्नाचे उत्तर लिहा.

[5]

- अ) पर्यावरण संवर्धनात युवकांची भूमिका या विषयावर ब्लॉग लेखन करा.
- ब) फेसबुक या माध्यमाचे स्वरूप स्पष्ट करा.



[6501]-303

S.Y. B.Sc.

HINDI (हिंदी)

AECC-II-C : हिंदी काव्य तथा कहानी साहित्य

(2019 Pattern) (Credit System) (Semester - III) (23341)

पाठ्यपुस्तके – साहित्य संगम – संपादक, प्रो.डॉ. सदानंद भोसले

समय : 2 घंटे]

[पूर्णांक : 35

सूचनाएँ : 1) सभी प्रश्न अनिवार्य हैं ।

2) दाहिनी ओर लिखे अंक प्रश्नों के पूर्णांक हैं ।

प्रश्न 1) निम्नलिखित में से किन्ही दो प्रश्नों के उत्तर लिखिए ।

[15]

अ) 'अकाल और उसके बाद' कविता का भावार्थ लिखिए ।

ब) दुष्यंतकुमार ने 'कहाँ तो तय था' कविता में किस भावना को व्यक्त किया है?

क) 'इसको भी अपनाता चल' कविता द्वारा कौन सा संदेश मिलता है?

ड) स्त्री जीवन की वेदना 'पालतु कुत्ता' कविता में किस प्रकार अभिव्यक्त हुई है?

इ) 'घर' कविता में श्रीप्रकाश शुक्ल किस भावना को व्यक्त करते हैं?

प्रश्न 2) निम्नलिखित में से किन्ही दो प्रश्नों के उत्तर लिखिए ।

[15]

अ) आदर्श नायक लहनासिंह के माध्यम से देशप्रेम कैसे व्यक्त हुआ है?

ब) अन्धी भिखारिन का चरित्र – चित्रण कीजिए ।

क) 'ककड़ी की कीमत' कहानी का भावार्थ अपने शब्दों में लिखिए ।

ड) 'कप्तान' कहानी के माध्यम से देशप्रेम तथा कर्तव्य भावना की अभिव्यक्ति किस प्रकार हुयी है?

इ) 'बदबू' कहानी की समस्या का अंकन कीजिए ।

प्रश्न 3) निम्नलिखित में से किसी एक प्रश्न का उत्तर लिखिए :

[5]

अ) कप्तान कहानी की 'सुभद्रा' इस पात्र का चरित्र – चित्रण कीजिए ।

ब) प्रगतिवादी कवि नागार्जुन अकाल का वर्णन किस प्रकार करते हैं?



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PE-1376

Total No. of Pages : 3

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S.Y.B.Sc. (Semester-III)

ARABIC FUNCTIONAL

CC-ID: Grammar and Translation

(2019 Pattern) (Credit System)(23371)

Total Marks :35]

[Time : 2 Hours

Instructions to the candidates :

- 1) *Attempt all questions.*
- 2) *Figures to the right side indicate full marks.*

Q.1 Define and illustrate the following Grammar (Any two) **[10]**

(a) الْمَوْصُوف وَالصِّفَةُ

(b) أَلَا سَفَاءُ الْإِثْمِ شَارَةٌ

(c) الْحُرُوفُ الشَّفْصِيَّةُ وَالْقَمَرِيَّةُ

Q.2 Translate in English Only (Any five) **[10]**

(a) أَلَوْلَدُ ذَكَرٍ

(b) هَذِهِ الْمَدْرَسَةُ جَيِّدَةٌ

(c) التِّلْمِيذُ ذَاهِبٌ إِلَى الْمَدْرَسَةِ

(d) فِي الْفَصْلِ تِلْمِيذٌ

(e) مَكْتَبُهُ بَعِيدٌ مِنْ بَيْتِهِ

(f) هُوَ ذَاهِبٌ إِلَى بَيْتِ صَدِيقِهِ

(g) الْمُدْرِسُ الْجَدِيدُ رَجُلٌ طَوِيلٌ

P.T.O.

Q.3 Translate in Arabice only(Any five).

[10]

- a) The boy is bright.
- b) The chair is comfortable.
- c) This school is beautiful.
- d) There is a table in the room.
- e) On the window there is a curtain.
- f) She is busy in her office.
- g) The color of his car is beautiful.

Q.4 Write the following terms in Arabic.(Any ten)

[5]

- a) Atom
- b) Melting
- c) Pesticide
- d) Nutrition
- e) Heat
- f) Boiling Point
- g) Compound
- h) Zone
- i) Astrology
- j) Soft

k) Substance

l) Atomic Weigh

m) Motion

n) Hygiene

o) Science



Total No. of Questions : 5]

SEAT No. :

PE-1377

[Total No. of Pages : 2

[6501]-306

S.Y. B.Sc. (Regular)

CHEMISTRY

CH - 301: Physical and Analytical Chemistry

(2019 Pattern) (CBCS) (Semester - III) (Paper - I) (23131)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) Question 1 is compulsory.
- 2) Solve any three questions from Q.2. to Q.5.
- 3) Question No 2 to 5 carry equal marks.
- 4) Use of logtables and calculator allowed.

Q1) Write any Five of the following: [5]

- a) Define adsorbate.
- b) Define the term accuracy.
- c) Which is the best Indicator for strong acid Vs strong base titration?
- d) What is rate of reaction?
- e) What is Standard Solution?
- f) Define energy of activation.

Q2) a) Write any two of the following. [6]

- i) What is error? Explain the types of error with suitable example.
- ii) What are suitable and best indicators? Explain with Suitable example.
- iii) Define $t_{1/2}$, t_0 and t_{∞} .

b) Derive mathematical expression for first order reaction. [4]

Q3) a) Write any two of the following. [6]

- i) Differentiate between physical and chemical adsorption.
- ii) What is mean by indicator, end point and equivalence point.
- iii) Explain the characteristics of second order reaction.

b) A velocity constant for the reaction $H_2 + I_2 \rightarrow 2HI$ is 3.58 at 781⁰k and 0.172 at 700⁰k. Calculate 'E_a'. [4]

P.T.O.

- Q4)** a) Write any two of the following: [6]
- i) What is mean by rate constant, order and molecularity of the reaction.
 - ii) Give classification of reactions in volumetric analysis.
 - iii) What is catalyst? Explain the surface phenomenon of catalysis with different steps involved in it.
- b) Find the pH at the equivalence point in a titration of 50 ml 0.1N KCN with 0.1N HCl. (Given: K_a for HCN = 7.2×10^{-10}) [4]

- Q5)** Write any four of the following : [10]
- a) Explain Factors affecting on adsorption.
 - b) Give the significance of significant figures and computations.
 - c) What is oxidation number? calculate the oxidation state of 'Mn' in KMnO_4
 - d) Give the characteristics of Primary Standard Substances.
 - e) Explain the titration curve of weak acid Vs. strong base.
 - f) Explain, Why callibration of apparatus is needful before the performance of experiment?



Total No. of Questions : 5]

SEAT No. :

[Total No. of Pages : 3

PE1378

[6501]-307

S.Y. B.Sc. (Regular)

CHEMISTRY

CH-302 : Inorganic and Organic Chemistry

(2019 Pattern) (CBCS) (Semester - III) (23132) (Paper - II)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *Q.1 is compulsory.*
- 2) *Solve any three questions from Q.2 to Q.5.*
- 3) *Questions 2 to 5 carry equal marks.*
- 4) *Figures to the right indicate full marks.*

Q1) Solve any five of the following: **[5]**

- a) What is bond order of Be_2 molecule.
- b) Calculate the stabilization energy of Li_2 molecule.
- c) Define the term ligand.
- d) Draw the structure of Anthracene.
- e) State the saytzeff rule.
- f) Draw the structure of p-chlorophenol.

Q2) a) Attempt any two of the following: **[6]**

- i) Sketch the π molecular orbitals from p-p combination of orbitals.
- ii) Draw the energy level diagram for B_2 molecules and calculate bond order.
- iii) What is friedel craft's acylation? How acylium ion is generated by using different method.

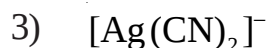
b) Attempt the following: **[4]**

- i) What are alkyl halide? How will you prepare alkyl halide from alcohol.
- ii) What do you mean by primary and secondary valency.

P.T.O.

Q3) a) Attempt any two of the following: [6]

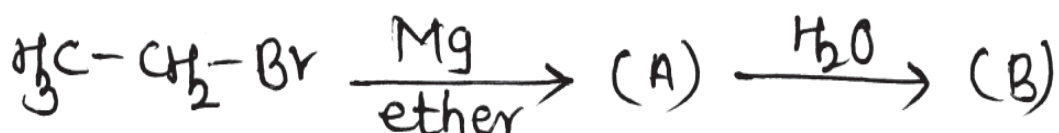
- i) Distinguish between VBT and MOT.
- ii) Give the IUPAC names of the following:



- iii) What are alcohols? Give the classification of alcohols.

b) Attempt the following: [4]

- i) Give the molecular orbital configuration of C_2 molecule and calculate bond order.
- ii) Identify the product 'A' and 'B' and rewrite reaction.

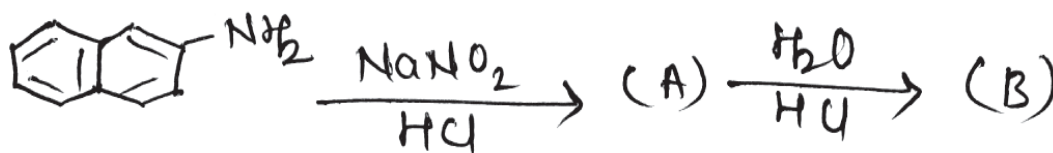


Q4) a) Attempt any two of the following: [6]

- i) Explain the bonding in HCl molecule according to MO theory. Comment on the polarity.
- ii) What is SN^2 reaction? Discuss the mechanism of SN^2 reaction with suitable example.
- iii) What are phenols? Enlist & explain physical properties of phenol.

b) Attempt the following: [4]

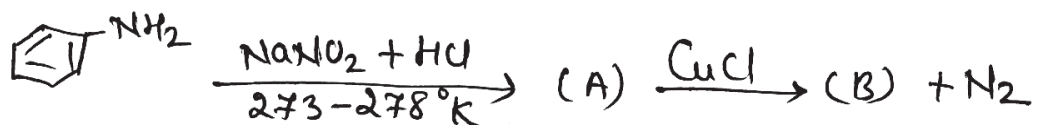
- i) Calculate stabilisation energy and bond order of N_2 molecule.
- ii) Identify the reaction product 'A' & 'B'



Q5) Attempt any four of the following:

[10]

- a) Sketch Mo's from s-s combination of atomic orbital.
- b) Distinguish between double salt and complex salt.
- c) Identify the reaction product 'A' and 'B'



- d) Write a note on William son's synthesis.
- e) Explain Kolbe synthesis.
- f) Give the uses of alcohols.



Total No. of Questions : 5]

SEAT No. :

PE-1379

[Total No. of Pages : 2

[6501]-308

S.Y. B.Sc. (Regular)

PHYSICS

**PHY-231 : Mathematical Methods in Physics - I
(CBCS) (2019 Pattern) (Semester - III) (Paper - I) (23121)**

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) Q. 1 is compulsory.
- 2) Attempt/Solve any three questions from Q.2 to Q.5.
- 3) Q.2 to Q.5 carry equal marks.
- 4) Figures to the right indicate full marks.
- 5) Use of calculator & log table is allowed.

Q1) Solve any Five of the following. **[5]**

- a) If $Z = 4 + 9i$, then write $I_m(z)$ and $R_e(z)$.
- b) If $Z = 1 + \sqrt{2}i$ determine $|Z|$
- c) Define partial differentiation.
- d) Find the total differential of the function $F = F(x, y) = 2x^3 + y^3x$.
- e) Define the Divergence of Vector field.
- f) State De-Moivre's theorem.

Q2) Answer the following :

- a) i) What is an Argand diagram and explain the addition of two complex numbers using Argand diagram. **[3]**
ii) What do you mean by a Solenoidal vector field? Give one example. **[3]**

OR

- a) What is a Scalar triple product and vector triple product. Show that the Scalar triple product represents the volume of a parallelepiped.
- b) Find $\vec{\nabla}\phi$ and $|\vec{\nabla}\phi|$ for the function $\phi = 2xz^4 - x^2y$ at $(1, 2, -2)$. **[4]**

P.T.O.

Q3) Answer the following question :

- a) i) Define the gradient of a scalar field, the divergence of a vector field and a solenoidal vector field. [3]

ii) Show that $(\vec{A} \times \vec{B}) \cdot (\vec{A} \times \vec{B}) = A^2 B^2 - (\vec{A} \cdot \vec{B})^2$ [3]

OR

a) Show that $\nabla^2 \left(\frac{1}{r} \right) = 0$

b) If $F = f(x, y) = x^3 y - e^{xy}$, show that $F_{xy} = F_{yx}$, Also find F_{xx} , F_{yy} . [4]

Q4) Answer the following question :

- a) i) If $\vec{a}, \vec{b}, \vec{c}$ be three vectors such that $\vec{a} + \vec{b} + \vec{c} = 0$, prove that

$$\vec{a} \times \vec{b} = \vec{b} \times \vec{c} = \vec{c} \times \vec{a} \quad [3]$$

- ii) State the order and degree of following differential equation. [3]

$$\frac{d^4 y}{dx^4} - \sqrt{y^2 - 5} = 0$$

OR

- a) Find approximate value of $[(3.82)^2 + (2.1)^3]^{1/3}$ using differential.

- b) Show that $\vec{F} = (y^2 + 2xz^2)\hat{i} + (2xy - z)\hat{j} + (2x^2z - y + 2z)\hat{k}$ is irrotational. [4]

Q5) Attempt any four of the following : [10]

- a) If $x + iy = \frac{1+2i}{1-4i}$, determine x and y .

- b) Show that $\cosh^2 z - \sinh^2 z = 1$

- c) Obtain the quadratic equation whose roots are $(1 + i)$ & $(1 - i)$

- d) Find the percentage error in the area of ellipse when an error of 1% is made in measuring its major and minor axes.

- e) Show that the point $x = 0$ is ordinary point of the Hermite differential equation $y'' - 2xy' + 2\lambda y = 0$ where λ is constant.

- f) Show that $\vec{F} = \cos y \hat{i} - x \sin y \hat{j} - \cos z \hat{k}$ is a conservative field.



Total No. of Questions : 5]

SEAT No. :

PE-1380

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S.Y. B.Sc.

ZOOLOGY

ZO-231 : Animal Diversity - III

(2019 Pattern) (CBCS) (Semester - III) (23151) (Paper - I)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) Question 1 is compulsory.
- 2) Solve any three questions from Q.2 to Q.5.
- 3) Question 2 to 5 carry equal marks.

Q1) Solve any five of the following : [5]

- a) Define Gnathostomata.
- b) Give example of Urochordata.
- c) Define Anura.
- d) What is Shagreen?
- e) What is Diphyccercal fin?
- f) What is Tetrapoda?

Q2) a) Describe structure and function of heart of scoliodon. [6]

OR

Give the salient features of chondrichthyes with any two examples.

b) Give the salient features of subphylum cephalochordata. [4]

Q3) a) Distinguish between chordates and Non-chordates. [6]

OR

Describe the female urinogenital system of scoliodon.

b) Describe digestive glands in scoliodon. [4]

Q4) a) Sketch and label dorsal view of brain of scoliodon. [6]

OR

Explain characteristic features of order Apoda with example.

b) Give the salient features of subphylum vertebrata. [4]

Q5) Write short notes on any four of the following : [10]

- a) Placoid scale.
- b) Liver of shark
- c) Give salient features of Hemichordata.
- d) Homocercal tail fin
- e) Holobranch
- f) Sexual diamorphism in scoliodon.



Total No. of Questions : 5]

SEAT No. :

PE-1381

[Total No. of Pages : 2

[6501]-310

S.Y. B.Sc.

ZOOLOGY

ZO-232 : Applied Zoology - I

(2019 Pattern) (CBCS) (Semester - III) (23152) (Paper - II)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) Question 1 is compulsory.
- 2) Solve any three questions from Q.2 to Q.5.
- 3) Question 2 to 5 carry equal marks.

Q1) Solve any five of the following : [5]

- a) What is sericulture?
- b) What is the full form of IPM?
- c) What is the biological name of Muga Silkworm?
- d) Give any two diseases of silkworm.
- e) What is the biological name of Red cotton bug?
- f) Define fumigants.

Q2) a) Describe life cycle of Bombyx mori. [6]

OR

Explain cultural and chemical control measures of pest.

b) Explain Knapsack sprayer. [4]

Q3) a) Describe life cycle and nature of Damage of Rice weevil. [6]

OR

Describe harvesting methods of mulberry.

b) Explain Biotechnological and Biomedical applications of silk. [4]

P.T.O.

Q4) a) Describe the post-harvest processing of cocoons. [6]

OR

Describe the mark of identification nature of damage and control measures of Jowar stem borer.

b) Describe fertilizer schedule of irrigated mulberry cultivation. [4]

Q5) Write short notes on any four of the following : [10]

- a) Eri silkworm
- b) Describe in brief rearing house of silkworm.
- c) Uzi fly as a pest of silkworm.
- d) Veterinary pest.
- e) Nature of damage caused by rat.
- f) Pheromonal control.



Total No. of Questions : 5]

SEAT No. :

PE-1382

[Total No. of Pages : 2

[6501]-311

S.Y. B.Sc.

BOTANY

BO - 232 : Plant Physiology

(2019 Pattern) (CBCS) (Semester - III) (Paper - II) (23142)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) Question 1 is compulsory.
- 2) Attempt any three questions from Q.2. to Q.5.
- 3) Question No 2 to 5 carry equal marks.
- 4) Figures to the right indicate full marks.
- 5) Draw neat labelled diagrams wherever necessary.

Q1) Attempt any Five of the following: [5]

- a) Explain any one application of plant physiology.
- b) What is capillary water?
- c) Give types of Transpiration.
- d) Define symbiotic nitrogen fixation.
- e) What is Ascent of Sap?
- f) Define seed dormancy.

Q2) a) Explain non - symbiotic N_2 Fixation with the help of suitable example.[6]

b) Explain any three methods to break seed dormancy. [4]

Q3) a) What is transpiration? Describe various factors affecting rate of transpiration. [6]

b) Describe factors affecting ascent of Sap. [4]

Q4) a) What is photoperiodism? Describe classification of plants on the basis of Photoperiod. [6]

b) Explain factors affecting water absorption. [4]

P.T.O.

Q5) Write short notes on any Four of the following :

[10]

- a) Nitrification
- b) Exudation
- c) Vernalization
- d) Role of nitrogen in Plant
- e) Importance of plant physiology
- f) Physical seed dormancy.



Total No. of Questions : 5]

SEAT No. :

PE-1383

[Total No. of Pages : 4

[6501]-312

S.Y. B.A./B.Com./B.Sc.

AECC-I : ENVIRONMENTAL AWARENESS
(2019 Pattern) (Semester - III) (23361)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *Question 1 is compulsory.*
- 2) *Solve any Three questions from Question No 2 to Question No 5.*
- 3) *Question No 2 to Question No 5 carry equal marks.*

Q1) Attempt any FIVE of the following.

- a) What do you mean by Environment? [1]
- b) What is sustainability? [1]
- c) Define Resources? [1]
- d) Define Endangered species? [1]
- e) What is solid waste? [1]
- f) What do you mean by segregation? [1]

Q2) Answer the following.

- a) What is multidisciplinary nature of Environmental studies? [6]
- b) Discuss the characteristics of Forest ecosystem? [4]

Q3) Answer the following.

- a) Explain causes and effects of land degradation. [6]
- b) Explain the conflicts over water at international and inter-state levels. [4]

P.T.O.

Q4) Answer the following.

- a) Define ecological succession and explain its types? [6]
- b) Why India is considered a mega-biodiversity Nation? [4]

Q5) Write a short note on Any Four of the following.

- a) Ecosystem and Biodiversity services. [2½]
- b) Levels of Biological diversity. [2½]
- c) Threats to biodiversity. [2½]
- d) Deforestation. [2½]
- e) Over use of groundwater [2½]
- f) Desertification [2½]



Total No. of Questions : 5]

PE-1383

[6501]-312

S.Y. B.A./B.Com./B.Sc.

AECC-I : ENVIRONMENTAL AWARENESS

(पर्यावरणीय अभ्यास)

(2019 Pattern) (Semester - III) (23361)

(मराठी रूपांतर)

वेळ : 2 तास]

[एकूण गुण : 35

- सूचना : 1) प्रश्न क्र. 1 सोडविणे अनिवार्य आहेत.
2) प्रश्न क्र. 2 ते प्रश्न क्र. 5 मधील कोणतेही दोन प्रश्न सोडवा.
3) प्रश्न क्र. 2 ते प्रश्न क्र. 5 समान गुण आहेत.

प्रश्न 1) पुढीलपैकी कोणतेही पाच प्रश्न सोडवा.

- अ) पर्यावरण म्हणजे काय? [1]
ब) शाश्वतता म्हणजे काय? [1]
क) संसाधनांची व्याख्या लिहा. [1]
ड) संकटग्रस्त प्रजाती म्हणजे काय? [1]
इ) घन कचरा म्हणजे काय? [1]
फ) पृथक्करण म्हणजे काय? [1]

प्रश्न 2) पुढील प्रश्नांची उत्तरे द्या.

- अ) पर्यावरणीय अध्मयगाची बहुशाखीय स्वरूपता काय आहे. [6]
ब) वन परिसंस्थेच्या वैशिष्ट्यांवर चर्चा करा. [4]

प्रश्न 3) पुढील प्रश्नांची उत्तरे द्या.

- अ) भु-संपत्तीच्या ज्हासाची कारणे आणि परिणाम स्पष्ट करा. [6]
ब) आंतरराष्ट्रीय आणि आंतरराज्यीय स्तरावर पाण्यावर होणाऱ्या संघर्षाचे स्पष्टीकरण द्या. [4]

प्रश्न 4) पुढील प्रश्नांची उत्तरे द्या.

अ) पर्यावरणीय उत्तराधीकार (ecological succession) म्हणजे काय? आणि त्याचे प्रकार स्पष्ट करा. [6]

ब) भारताला मेगा – जैवविविधता राष्ट्र का मानले जाते? [4]

प्रश्न 5) पुढीलपैकी कोणत्याही चारवर संक्षिप्त टीप लिहा.

अ) परिसंस्था आणि जैवविविधता सेवा. [2½]

ब) जैवविविधतेची पातळी [2½]

क) जैवविविधतेला धोका [2½]

ड) जंगलतोड [2½]

इ) भुगर्भजलाचा अतिरेक वापर [2½]

फ) वाळवंटीकरण [2½]



Total No. of Questions : 5]

SEAT No. :

PE-1384

[Total No. of Pages : 2

[6501]-313
S.Y. B.Sc.
GEOLOGY
GL - 211 : Structural Geology
(2019 Pattern) (Semester - III) (23161)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *Question 1 is compulsory.*
- 2) *Solve any three questions from Q.2. to Q.5.*
- 3) *Question No 2 to 5 carry equal marks.*

Q1) Answer the following in 2-3 lines (Any 5): **[5]**

- a) Define Strike
- b) What are Mylonites?
- c) What is Dip amount?
- d) Define structural Geology.
- e) Define Strain.
- f) Draw Normal fault.

Q2) a) Define rock deformation. Explain mechanism of plastic deformation. **[6]**

b) Explain factor controlling behaviour of material **[4]**

- i) Temperature
- ii) Pressure

Q3) a) Define Fault. Give genetic classification of faults. **[6]**

b) Define Joints. Give geometric classification of joints. **[4]**

P.T.O.

- Q4)** a) Determination of top of bed by primary sedimentary structure. [6]
b) Define compass. Explain Fore and Back bearing. [4]
- Q5)** Write a note on (Any four) : [10]
- a) Brunton compass
 - b) Types of shear zone
 - c) Nomenclature of fold
 - d) Rake and plunge
 - e) Draw stress - strain diagram
 - f) Throw and Heave.



Total No. of Questions : 5]

SEAT No. :

PE-1385

[Total No. of Pages : 2

[6501]-314

S.Y. B.Sc.

BOTANY

**BO - 231 : Taxonomy of Angiosperms and Plant Ecology
(2019 Pattern) (CBCS) (Semester - III) (Paper - I) (23141)**

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *Question 1 is compulsory.*
- 2) *Attempt any three questions from Q.2. to Q.5.*
- 3) *Question No 2 to 5 carry equal marks.*
- 4) *Figures to the right indicate full marks.*
- 5) *Draw neat labelled diagrams wherever necessary.*

Q1) Attempt any five of the following: **[5]**

- a) Define Taxonomy.
- b) What is author citation?
- c) State the principle of priority.
- d) Define Synecology.
- e) What is the type of fruit in family Asclepiadaceae?
- f) Define biodiversity.

Q2) a) Give broad outline of Engler and Prantl's system of classification. **[6]**

b) Explain economic importance of family Annonaceae. **[4]**

Q3) a) Write distinguishing characters, Floral formula and economic importance of Family Brassicaceal. **[6]**

b) How generic names are coined? **[4]**

Q4) a) What are halophytes? Give their adaptive external and internal features. **[6]**

b) Write a note on major ecosystem types of the world. **[4]**

P.T.O.

Q5) Write short notes on Any four of the following :

[10]

- a) Grassland ecosystem.
- b) Concept of Beta diversity.
- c) Transect method of regetation sampling.
- d) Concept of Systematics.
- e) Flower of family Asclepiadaceae.
- f) Gamopetalae.



Total No. of Questions : 4]

SEAT No. :

PE-1386

[Total No. of Pages : 2

[6501]-315

S.Y. B.Sc.

STATISTICS

**ST-231 : Discrete Probability Distributions and Time Series
(2019 Pattern) (Semester - III) (Paper - I) (23171)**

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Figures to the right indicate full marks.*
- 3) *Use of calculator and statistical tables is allowed.*
- 4) *Symbols and abbreviations have their usual meanings.*

Q1) Attempt each of the following :

- a) Choose the correct alternative in each of the following : **[1 each]**
- i) If $X \rightarrow NB$ ($k = 6, p = 0.5$) then mean (X) is
 - A) 6
 - B) 3
 - C) 0.5
 - D) 12
 - ii) Rank of variance covariance matrix of $\underline{X} = (X_1, X_2, \dots, X_m)$ is
 - A) $m - 1$
 - B) m
 - C) $m + 1$
 - D) $m + 2$
 - iii) In time series analysis the method of moving averages, is used to estimate
 - A) Seasonal variations
 - B) Trend
 - C) Cyclical variations
 - D) Irregular variations
- b) State whether each of the following is true or false : **[1 each]**
- i) The mean of truncated Poisson (λ) is always same as poisson (λ) random variable.
 - ii) Seasonal variations are short term variations.

P.T.O.

Q2) Attempt any two of the following : **[5 each]**

- a) Derive the mean and variance of a Poisson r.v. truncated to the left at $X = 0$.
- b) Seven independent observations are to be made on a r.v. with p.d.f.

$$f(x) = \frac{1}{4}; 1 \leq x \leq 5$$

What is the probability that 3 observations will be less than 2, 3 will be greater than 2 but less than 4 and remaining observation is greater than 4?

- c) Describe the term 'Business Cycle'. What are the four phases of business cycle, discuss each in brief?

Q3) Attempt any two of the following : **[5 each]**

- a) Suppose 30% students in a college taking admission for B.Sc. Animation.
 - i) What is the probability that the tenth admitted student in that college will be third one who admitted for B.Sc. animation.
 - ii) In the above case find the average number of admissions required to complete the strength of B.Sc. animation course which is 30.
- b) Fit a trend line to the following time series by the least squares method.

Year (t)	2015	2016	2017	2018	2019
Profit (Y) (in lakh rupees)	10	13	17	19	24

Obtain the trend value of profit for 2020.

- c) If $(X_1, X_2, X_3) \rightarrow MD(n, p_1, p_2, p_3)$ find the conditional distribution of X_1 given $X_2 = X_3$. Also state mean and variance of X_1 given X_2 .

Q4) Attempt any one of the following :

- a)
 - i) Define 'time series', also discuss the importance and utility of time series analysis in various fields. **[5]**
 - ii) If $X_T \rightarrow B(5, 0.5)$ find the probability distribution of X_T which is truncated below at $X = 0$. Find its mean and compare it with mean of $B(5, 0.5)$ **[5]**
- b)
 - i) Derive the expression for M.G.F. and C.G.F. of NB (K,P). **[5]**
 - ii) State and prove additive property of multinomial distribution. **[5]**



Total No. of Questions : 5]

SEAT No. :

PE-1387

[Total No. of Pages : 2

[6501]-316
S Y. B.Sc. (Regular)
PSYCHOLOGY
Psychology of Adjustment
(Paper-I) (2019 Pattern) (Credit system) (Semester - III) (23201)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates :

- 1) *Q. 1 is compulsory.*
- 2) *Solve any three questions from Q. 2 to Q. 5.*
- 3) *Questions 2 to 5 carry equal marks.*

Q1) Solve any five of the following : **[5]**

- a) Define happiness
- b) What is assertiveness?
- c) State the types of Communication.
- d) Name the types of Adjustment.
- e) Define Self Control.
- f) Name the types of occupational hazards.

Q2) a) Describe the various component of communication process. **[6]**

OR

Explain the effective parenting styles.

- b) Justify that case study method is as appropriate approaches to study behaviour. **[4]**

P.T.O.

Q3) a) Discuss the sound study habit method. **[6]**

OR

Examine the Holland's career choice model.

b) Categorise the types of punishment and its effect. **[4]**

Q4) a) Explain the self control executing and evaluating program. **[6]**

OR

Describe the areas of marital adjustment.

b) Analyze the constructive conflict resolution techniques. **[4]**

Q5) Write short notes on any four of the following : **[10]**

a) Nature of adjustment.

b) Empiricism approach

c) Process of communication

d) Permissive parenting

e) Effect of unemployment

f) Happiness.



Total No. of Questions : 4]

SEAT No. :

PE-1388

[Total No. of Pages : 2

[6501]-317

S.Y. B.Sc. (Regular)

MATHEMATICS

MT-231 : Calculus of Several Variables

(2019 Pattern) (CBCS) (Semester - III) (23111) (Paper - I)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates :

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

Q1) Attempt any Five of the following :

[5]

- a) Sketch the domain of $f(x, y) = \sqrt{2x - y}$.
- b) Evaluate $\lim_{(x, y) \rightarrow (1, -1)} e^{-xy} \cos(x + y)$.
- c) Let $f(x, y) = x^y$. Find $f_x^{(x, y)}$.
- d) State Clairaut's theorem.
- e) Let $f(x, y) = \log \left(\frac{x^4 + y^4}{x + y} \right)$. check whether $f(x, y)$ is homogenous.
- f) Define local maximum.
- g) Evaluate $\int_0^1 \int_0^3 (x + 3y) \, dx dy$.

Q2) a) Attempt any ONE of the following :

[5]

- i) If the function f is differential at a point (a, b) then prove that f is continuous at (a, b) and the partial derivatives $f_x(a, b)$ and $f_y(a, b)$ both exists.
- ii) Define domain, range and level curves of the function of two variables. Hence find level curves of the function $f(x, y) = 4x^2 + y^2 + 1$ for $k = 5$.

b) Attempt any ONE of the following :

[5]

- i) Use ϵ - δ definition of limit to show that $\lim_{(x, y) \rightarrow (1, 2)} (2x + 3y) = 8$.
- ii) Define Wave equation. Show that the function $u = \sin(x - at) + \ln(x + at)$ is solution of wave equation.

P.T.O.

Q3) a) Attempt any ONE of the following : **[5]**

i) If $f(x, y)$ is homogenous function of degree n , then show that

$$x \frac{\partial f}{\partial x} + y \frac{\partial f}{\partial y} = n f(x, y).$$

ii) Suppose that $z = f(x, y)$ is a differentiable function of x and y , where $x = g(t)$ and $y = h(t)$ are differentiable functions of t then prove that

$$z \text{ is differentiable functions of } t \text{ and } \frac{dz}{dt} = \frac{\partial z}{\partial x} \frac{dx}{dt} + \frac{\partial z}{\partial y} \frac{dy}{dt}.$$

b) Attempt any ONE of the following : **[5]**

i) Find the extreme values of the function $f(x, y) = x^4 + y^4 - 4xy + 1$.

ii) Use Lagrange multiplier to find the maximum and minimum values of the function $f(x, y) = x^2 + y^2$ subject to the constraint $xy = 1$.

Q4) a) Attempt any ONE of the following : **[5]**

i) Derive the formula for changing cartesian coordinates to polar coordinates. Hence find $\iint_D dx \, dy$ where D is circle with radius 2.

ii) Define Jacobian of the transformation $x = g(u, v, w)$, $y = h(u, v, w)$ and $z = k(u, v, w)$. Hence find the Jacobian of the transformation $x = v + w^2$, $y = w + u^2$ and $z = u + v^2$.

b) Attempt any ONE of the following : **[5]**

i) Evaluate $\iint_D xy \, dA$ where D is enclosed by the curves $y = x^2$ and $y = 2x$.

ii) Evaluate $\int_0^1 \int_x^{2x} \int_0^y (x + y + z) \, dz \, dy \, dx$.



Total No. of Questions : 5]

SEAT No. :

[Total No. of Pages : 2

PE1389

[6501]-318

S.Y.B.Sc. (Regular)

ENVIRONMENTAL SCIENCE

EVS-231 : Ecology and Ecosystem

(2019 Pattern) (Credit System) (Semester-III) (Paper-I) (23241)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *Question No.1 is compulsory.*
- 2) *Solve any three questions from Q.No. 2 to 5.*
- 3) *Question No. 2 to 5 carry equal marks.*
- 4) *Figures to the right indicate full marks.*

Q1) Answer any five of the following.

[5×1=5]

- a) Write any two examples of terrestrial ecosystem.
- b) What is detritus food chain?
- c) Write names of any two macronutrients.
- d) What is mortality?
- e) What are the characteristics of community ecology?
- f) What is lithosere?

Q2) Answer the following.

- a) Describe levels of organisation in ecology. **[6]**
- b) Explain role of food web for ecosystem stability. **[4]**

Q3) Answer the following.

- a) Explain Nitrogen cycle with diagram. **[6]**
- b) Describe types of population growth curves. **[4]**

P.T.O.

Q4) Answer the following.

- a) Illustrate different stages in the process of succession. [6]
- b) Write about dispersion pattern in population ecology. [4]

Q5) Write short notes on any four of the following. [10]

- a) Secondary succession
- b) Biomass
- c) Fecundity
- d) Ecological niche
- e) Sedimentary biogeochemical cycle
- f) Ecotone and Edge effect



Total No. of Questions : 4]

SEAT No. :

PE-1390

[Total No. of Pages : 2

[6501]-319

S.Y. B.Sc.

MATHEMATICS

**MT-232 (A) : Numerical Methods and its Applications
(2019 Pattern) (CBCS) (Semester - III) (23112A) (Paper - II)**

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates :

- 1) *All questions are compulsory.*
- 2) *Figures to the right indicate full marks.*
- 3) *Use of calculator is allowed.*

Q1) Attempt any Five of the following : [5]

- a) Round off 3.141592654 and 0.141592654 to five significant figures.
- b) Find the root x_1 of $x^3 - 12 = 0$ by Newton - Raphson method with $x_0 = 2.5$.
- c) Evaluate $\Delta(x^3)$, take $h = 1$.
- d) Simplify $E^2(x^2)$, take $h = 1$, where E is shift operator.
- e) Evaluate $\int_0^1 x^2 dx$ by Trapezoidal rule, take $h = 0.5$.
- f) Write the formula for $\frac{dy}{dx}$ at $x = x_n$ in terms of ∇ .
- g) Write modified Euler's formula for $y_1^{(n+1)}$.

Q2) a) Attempt any ONE of the following : [5]

- i) Explain Newton - Raphson method.
- ii) Explain Picard's method of successive approximation.

b) Attempt any ONE of the following : [5]

- i) Evaluate $\int_0^1 x^2 dx$ by using Simpson's one third rule, take $h = 0.1$.
- ii) Find $\log 2.7$ using Lagrange's interpolation formula, given that

x	2	2.5	3
$\log x$	0.69315	0.91629	1.09861

P.T.O.

Q3) a) Attempt any ONE of the following : **[5]**

- i) Derive general quadrature formula for numerical integration.
- ii) Explain Bisection method to find approximate root of $f(x) = 0$.

b) Attempt any ONE of the following : **[5]**

- i) Obtain the interpolating quadratic polynomial in x , using Newton's forward difference interpolation formula for the given data.

x	0	2	4	6
y	-3	5	21	45

- ii) Find $y(0.1)$ Using Runge - kutta second order method, given that

$$\frac{dy}{dx} = 3x + \frac{y}{2} \text{ with } y(0) = 1, h = 0.1.$$

Q4) a) Attempt any ONE of the following : **[5]**

- i) Derive Newton's backward difference interpolation formula.

- ii) Explain Euler's method to solve $\frac{dy}{dx} = f(x, y)$ with $y(x_0) = y_0$.

b) Attempt any ONE of the following : **[5]**

- i) Find a real root of the equation $x^3 - 3x + 1 = 0$ between 0 and 1 by Regula - Falsi method (Two iteration).

- ii) Estimate the missing term in the following data.

x	0	1	2	3	4
y	1	3	9	?	81



Total No. of Questions : 4]

SEAT No. :

PE-1391

[Total No. of Pages : 3

[6501]-320

S.Y. B.Sc (Regular)

MATHEMATICS

MT-232 (B) : Graph Theory

(2019 Pattern) (CBCS) (Semester - III) (23112(B)) (Paper - II)

Time : 2 Hours]

[Max. Marks : 35

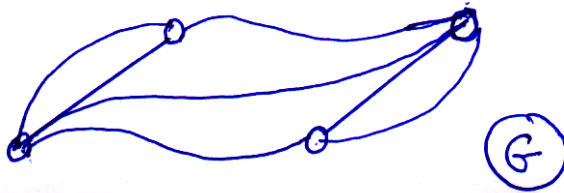
Instructions to the candidates :

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

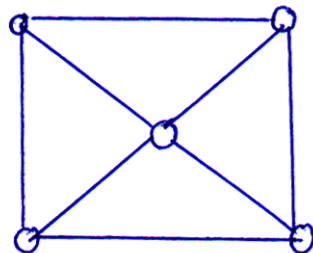
Q1) Attempt any Five of the following :

[5]

- a) Define : Loop
- b) Define : Null graph
- c) Draw a 3-regular graph on 4 vertices.
- d) Is it possible to draw a binary tree with 10 vertices?
- e) Find $\lambda(G)$ of the following graph.



- f) Draw any one Euler graph.
- g) Find any one spanning tree of following graph.



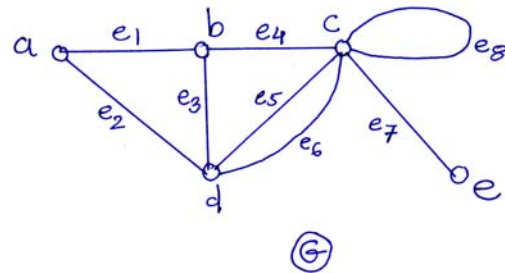
P.T.O.

Q2) a) Attempt any ONE of the following : **[5]**

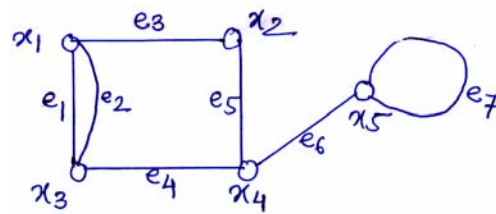
- i) Explain Konigsberg bridge problem.
- ii) If all vertices of a connected graph G are of even degree then prove that G is Euler graph.

b) Attempt any ONE of the following : **[5]**

- i) From the following graph G . Find $\langle S \rangle$, $\langle F \rangle$ where, $S = \{a, b, d\}$, $F = \{e_4, e_5, e_8\}$



- ii) Find the adjacency and incidence matrix of the following graph.

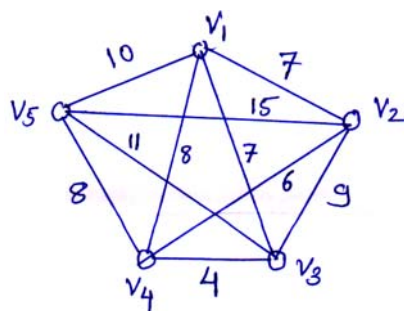


Q3) a) Attempt any ONE of the following : **[5]**

- i) Prove that it is not possible to have a graph with nine people at a party such that each knows exactly five of the others in the graph.
- ii) Prove that a connected graph G is a tree if and only if adding an edge between any two vertices in G creates exactly one circuit.

b) Attempt any ONE of the following : **[5]**

- i) Let G be a connected graph with 12 vertices and 20 edges. Find the number of fundamental cutsets and fundamental circuit of G w.r.t. spanning tree T .
- ii) Using Kruskal's algorithm, Find the shortest spanning tree of the following graph.



- Q4) a)** Attempt any ONE of the following : **[5]**
- i) What is the nullity of a complete graph with n vertices?
 - ii) Prove that the vertex connectivity of any graph G can never exceed the edge connectivity of G .
- b)** Attempt any ONE of the following : **[5]**
- i) Find the maximum and minimum height of a binary tree with 11 vertices.
 - ii) Give an examples of the graph with proper meaning of
 $K(G) = \lambda(G) = \delta(G) = 2$



Total No. of Questions :5]

SEAT No. :

[Total No. of Pages : 2

PE1392

[6501]-321

S.Y.B.Sc. (Regular)

ENVIRONMENTAL SCIENCE

**EVS-232 : Natural Resources conservation and Management
(2019 Credit Pattern) (Semester-III) (Paper-II) (23242)**

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *Question 1 is compulsory.*
- 2) *Solve any Three questions from Question No 2 to Question No 5.*
- 3) *Question No 2 to Question No 5 carry equal marks.*

Q1) Attempt any Five of the following.

[5]

- a) What are Natural Resources?
- b) What do you mean by land degradation?
- c) Define sustainable development?
- d) What do you mean by Traditional Agriculture?
- e) What is RWH?
- f) Give Full Form of HYV?

Q2) Answer the following.

- a) Differentiate between biotic and abiotic resources with examples? **[6]**
- b) Discuss the ecological and economic Importance of Forest. **[4]**

Q3) Answer the following.

- a) Explain in brief JFM and EDP In India. **[6]**
- b) Why are mineral resources essential for economic development? **[4]**

P.T.O.

Q4) Answer the following

- a) What are the effects of modern Agricultural technologies on the environment and human health? [6]
- b) Discuss reasons behind the global water crisis. [4]

Q5) Write a short note on Any Four of the following [10]

- a) Soil erosion
- b) Shifting cultivation
- c) Watershed management
- d) Over utilization of Ground water
- e) Increasing world food demand
- f) Genetically modified crops.



Total No. of Questions : 5]

SEAT No. :

PE-1393

[Total No. of Pages : 2

[6501]-322

S Y. B.Sc. (Regular)

GEOLOGY

**GL 212: Principles of Stratigraphy and Sedimentation
(23162A) (2019 Pattern) (Credit system) (Semester - III)**

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates :

- 1) *Q. 1 is compulsory.*
- 2) *Solve any three questions from Q. 2 to Q. 5.*
- 3) *Questions 2 to 5 carry equal marks.*
- 4) *Neat diagrams must be drawn wherever necessary.*

Q1) Answer the following (any five) :

[5]

- a) Enlist chronostratigraphic units.
- b) What is Biostratigraphy?
- c) What is clastic texture?
- d) Define porosity?
- e) What is lamination?
- f) Define sedimentary environment.

Q2) Answer the following :

- a) Explain progressive changes in sediments during transport with respect to size and shape. **[6]**

OR

- b) Define stratigraphy name stratigraphic procedures on outcrop for stratigraphic data collection. **[4]**

P.T.O.

Q3) Answer the following :

- a) Define sedimentary environment . Mention different types Explain any two of them [6]

OR

- b) Define sedimentary textures. Explain clastic and non-clastic textures. [4]

Q4) Answer the following :

- a) Enlist primary sedimentary structures. Explain any two of them. [6]

OR

- b) What are residual sedimentary rocks write a note on laterite. [4]

Q5) Write a note on (any four) : [10]

- a) Tracks and Trails
- b) Importance of stratigraphy
- c) Sandstone
- d) Weathering
- e) Sedimentary structures
- f) Chronostratigraphic units.



Total No. of Questions : 5]

SEAT No. :

PE-1394

[Total No. of Pages : 2

[6501]-323
S.Y. B.Sc. (Regular)
GEOLOGY
GL - 212 : Palaeontology
(2019 Pattern) (2021 Syllabus) (Semester - III)(23162 B)
(Credit System)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *Question No. 1 is compulsory.*
- 2) *Solve any Three questions from Question.2. to Question.5.*
- 3) *Question No 2 to 5 carry equal marks.*

Q1) Answer the following question in 2-3 line (any 5): **[5]**

- a) What is index fossil.
- b) What are astracods.
- c) Define Palaeontology.
- d) What are Ichnofossils.
- e) Enlist branches of Palaeontology.
- f) What is Eon in Geological Time Scale.

Q2) Answer the following:

- a) Give classification of phylum Brachiopoda, give morphological characters and draw neat diagram. **[6]**
- b) What is micropalaeontology? Describe any two branches. **[4]**

Q3) Answer the following:

- a) Give classification, morphological characters and geographical distribution of Glossopteris. **[6]**
- b) Give evidences of macroevolution **[4]**

P.T.O.

Q4) Answer the following:

- a) Explain field and laboratory techniques for collection of megafossils. **[6]**
- b) Describe any two modes of preservation of fossils. **[4]**

Q5) Write notes on Any five of the following : **[10]**

- a) Palynology
- b) Foraminifers
- c) Nilsonia
- d) Microevolution
- e) Stromatolites
- f) Morphological characters of vertebrate fossils.



Total No. of Questions : 4]

SEAT No. :

PE-1395

[Total No. of Pages : 2

[6501]-324

S.Y. B.Sc. (Regular)

STATISTICS

ST-232 : Continuous Probability Distributions

(2019 Pattern) (Credit System) (Semester - III) (Paper - II) (23172)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates :

- 1) All questions are compulsory.
- 2) Figures to the right indicate full marks.
- 3) Use of calculator and statistical tables is allowed.
- 4) Symbols and abbreviations have their usual meanings.

Q1) Attempt each of the following :

a) Choose the correct alternative in each of the following : [1 each]

i) If a r. v. X has p.d.f.

$$f(x) = \frac{C}{x}; 2 < x < 5$$
$$= 0; \text{ otherwise}$$

then $E(x)$ is

- | | |
|---------|---------|
| a) C | b) $2C$ |
| c) $3C$ | d) $4C$ |

ii) If (x, y) is continuous bivariate r.v. then $E(E(x|y = y))$ is

- | | |
|---------------|----------------|
| a) $E(x)$ | b) $E(y)$ |
| c) $E(x)E(y)$ | d) $E(x)/E(y)$ |

iii) The mean deviation about mean of $N(20, 100)$ distribution is approximately

- | | |
|-------|-------|
| a) 6 | b) 8 |
| c) 70 | d) 80 |

b) State whether the given statement is true or false in each of the following : [1 each]

- i) If X and Y are uncorrelated then X and Y must be independent.
- ii) The third cumulant of a positively skewed distribution is positive.

P.T.O.

Q2) Attempt any two of the following :

[5 each]

- a) The joint p.d.f. of r.v. (x,y) is
 $f(x,y) = 4x(1-y) ; 0 < x,y < 1$
 $= 0$; otherwise
Find
i) Marginal p.d.f. of X and Y and
ii) Conditional p.d.f. of y given $X = x$
- b) State and prove additive property of two independent normal variates.
- c) Define uniform distribution over an interval $[a, b]$. Find its mean and variance.

Q3) Attempt any two of the following :

[5 each]

- a) A r. v. X has p.d.f. $f(x) = 3(1-x)^2 ; 0 < x < 1$
 $= 0$; otherwise
Find
i) $E(x)$
ii) p. d. f. of $\frac{x}{1-x}$
- b) The p. d. f. of a continuous r. v. x is $f(x) = \frac{1}{2\sqrt{2\pi}} e^{-\frac{1}{8}(x-2)^2} ; -\infty < x < \infty$
Identify the distribution of X. Also find $p(1 < x < 3)$.
- c) State and prove lack of memory property of exponential distribution.

Q4) Attempt any one of the following :

- a) i) The joint p. d. f. of a two dimensional continuous r. v. (X, Y) is
 $f(x, y) = x + y ; 0 \leq x, y \leq 1$
 $= 0$; otherwise.
Find the correlation coefficient between X and Y. **[7]**
- ii) State any three properties of distribution function. **[3]**
- b) i) Let $x_1 \rightarrow N(1, 9)$, $x_2 \rightarrow N(2, 16)$ and $x_3 \rightarrow N(3, 25)$. If x_1, x_2 and x_3 are independent then find $p(-8 < (2x_1 + 3x_2 - x_3) < 31)$ **[5]**
- ii) Distribution function of a r. v. X is **[5]**
 $F(x) = 0 ; x < 2$
 $= \frac{x-2}{4} ; 2 \leq x \leq 6$
 $= 1 ; x > 6$

If $A = \{x | 1 < x < 4\}$, $B = \{x | 2 < x < 5\}$ then find $p(A \cup B)$ and $p(A \cap B)$



Total No. of Questions : 5]

SEAT No. :

PE-1396

[Total No. of Pages : 2

[6501]-325

S.Y. B.Sc.

PSYCHOLOGY

RESEARCH METHODS IN BEHAVIOURAL SCIENCES

(2019 Pattern) (Credit System) (Semester - III) (23202) (Paper - II)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) Q.1 is compulsory.
- 2) Solve any three questions from Q.2 to Q.5.
- 3) Questions 2 to 5 carry equal marks.

Q1) Solve any Five of the following :

[5]

- a) What is experimental research?
- b) What is sampling?
- c) Name the methods of drawing random samples.
- d) What is primary data?
- e) State the examples of secondary data.
- f) What is research report?

Q2) a) Discuss the method of questionnaire as a tools of data collection. [6]

OR

- a) Explain the method of stratified random sampling.
- b) What is Ex-post - Facto research.

[4]

Q3) a) Differentiate between experimental research and non-experimental research. [6]

OR

- a) Discuss the meaning and need of interpretation of research findings.
- b) Differentiate between questionnaire and schedule as a tools of data collection.

[4]

P.T.O.

Q4) a) Explain survey research and its types. **[6]**

OR

- a) Discuss the factors influencing decision to sampling.
- b) Elaborate the sources of review of literature in research Report writing.

[4]

Q5) Write short notes on any Four of the following : **[10]**

- a) Laboratory experiment.
- b) Aim of writing a research report.
- c) Controlled observation.
- d) Structured interview method.
- e) Accidental or convenience sampling.
- f) Uses of interpretation of research findings.



Total No. of Questions : 4]

SEAT No. :

PE1397

[Total No. of Pages : 1

[6501]-326

S.Y. B.Sc. (Regular)

DEFENCE AND STRATEGIC STUDIES

DS-201 : Science, Technology & National Security

(2019 Pattern) (Credit System) (Semester - III) (23231)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

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

Q1) Define the following questions. [5]

- a) Define 'Joint Military Technology'.
- b) What is Armament Technology?
- c) Define 'Military Technology'.
- d) What is 'Space Vehicles'.
- e) What are military capabilities?

Q2) Write short notes on (any two) [10]

- a) Artificial Technology.
- b) Contemporary threats.
- c) Impact of Science on Warfare.

Q3) Attempt the following questions (any two) [10]

- a) What is State the role of Technology and Conduct of Warfare?
- b) Explain in detail about the crisis, and technology.
- c) Explain the impact of Science & Technology in National Security.

Q4) Answer in details (any one) [10]

- a) Explain the relevance of Science & Technology in National Security.
- b) State the proliferation of weapons of mass destruction.

x x x

Total No. of Questions : 5]

SEAT No. :

PE-1398

[Total No. of Pages : 2

[6501]-327

S Y. B.Sc. (Regular)

MICROBIOLOGY

**MB-231: Medical Microbiology and Immunology
(CBCS) (2019 Pattern) (Semester - III) (Paper - I) (23191)**

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates :

- 1) *Q. 1 is compulsory.*
- 2) *Solve any three questions from Q. 2 to Q. 5.*
- 3) *Questions 2 to 5 carry equal marks.*
- 4) *Draw neat labelled diagrams wherever necessary.*
- 5) *Figures to the right indicate full marks.*

Q1) Solve any Five of the following : [5]

- a) Enlist genera of dermatophytes causing human infection.
- b) Give characteristics of innate immunity.
- c) What are IMViC test results of Escherichia coli?
- d) Give two examples of active immunization.
- e) What is epidemic?
- f) State whether true or false - A person having A antibodies in serum have blood group either 'B' or 'O'.

Q2) a) Describe the following (any Two) : [6]

- i) MIC.
 - ii) Inheritance of A,B,H antigen.
 - iii) Antagonism in drug administration.
- b) Draw the neat labelled diagram of lymphoid lineage branch of hematopoiesis [4]

P.T.O.

Q3) a) Explain the following (any Two) : **[6]**

- i) Difference between attenuated and inactivated / killed vaccines.
 - ii) Toxins produced by Staphylococcus aureus.
 - iii) Prophylaxis and chemotherapy of dermatophytes.
- b) Write morphological, cultural and biochemical characters of Escherichia coli. **[4]**

Q4) a) Describe the following (any Two) : **[6]**

- i) General mechanism of antibiotic resistance.
 - ii) Apoptosis
 - iii) Toxic shock syndrome (TSS)
- b) Father's blood group is 'AB' and mother's blood group is 'O', what would be possible blood groups of their children? **[4]**

Q5) Write short notes on any four of the following : **[10]**

- a) Incubation period
- b) Antigenicity
- c) Inflammatory barriers of innate immunity
- d) Enterohemorrhagic E. coli
- e) Natural killer cells
- f) Clinical features of candidiasis



Total No. of Questions : 4]

SEAT No. :

PE-1399

[Total No. of Pages : 1

[6501]-328

S.Y. B.Sc.

DEFENCE AND STRATEGIC STUDIES

DS - 202 : Military Geography & Geopolitics

(2019 Pattern) (Semester - III) (23232)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

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

Q1) Define the following questions:

[5 × 1 = 5]

- a) Define Art of War.
- b) What are Land-Locked States?
- c) What is geographic information?
- d) Define Military Geography.
- e) Define Geopolitics.

Q2) Write short notes on (any two)

[10]

- a) Tactics
- b) Stability and Support Operations
- c) Grand Strategy

Q3) Attempt the following questions (any two)

[10]

- a) State the Problems of Land-Locked and Buffer States.
- b) Explain the Meaning & Concepts of Military Geography.
- c) Explain the importance of the study of military geography.

Q4) Answer in details (any one)

[10]

- a) Explain in detail the future Army military strategy of India.
- b) Explain in detail the Theories & Ideologies of State.



Total No. of Questions : 5]

SEAT No. :

PE-1400

[Total No. of Pages : 2

[6501]-329

S Y. B.Sc.

MICROBIOLOGY

**MB-232: Bacterial Physiology & Fermentation Technology
(CBCS) (2019 Pattern) (Semester - III) (23192)**

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates :

- 1) *Q. 1 is compulsory.*
- 2) *Solve any three questions from Q. 2 to Q. 5.*
- 3) *Questions 2 to 5 carry equal marks.*
- 4) *Figures to the right indicate full marks.*

Q1) Solve any five of the following :

[5]

- a) Name the part by which air is supplied in the fermenter.
- b) Define metabolism.
- c) Give full form of FAD.
- d) What is IUB?
- e) Give examples of any two products produced by genetically modified micro-organisms.
- f) Define probiotics.

Q2) a) Describe any two of the following :

[6]

- i) Fermented food product - cheese
 - ii) Induced fit model of enzyme catalysis
 - iii) Role of ED pathway in metabolism.
- b) Describe seed culture and master culture.

[4]

P.T.O.

Q3) a) Explain any two of the following : **[6]**

- i) Control of foam in fermentation process
- ii) Screening of amylases enzyme producers
- iii) Effect of temperature in enzyme reaction.

b) Explain role of phosphoketolase enzyme with its reaction. **[4]**

Q4) a) Discuss any two of the following : **[6]**

- i) Apoenzymes and prosthetic group-write differences.
- ii) Dual fermentations.
- iii) Inducers used in fermentation process.

b) Discuss preservation of Industrial strains. **[4]**

Q5) Write short notes on any four of the following : **[10]**

- a) Production of primary metabolites.
- b) Production of Yoghurt
- c) Respiration and fermentation.
- d) Anabolism and catabolism (concept)
- e) Lock & Key model of enzyme catalysis.
- f) Role of HMP pathway in metabolism.



Total No. of Questions : 4]

SEAT No. :

PE-1401

[Total No. of Page : 1

[6501]-330

S.Y. B.Sc.

DEFENCE AND STRATEGIC STUDIES

DS - 203 : Contemporary Warfare

(2019 Pattern) (CBCS) (Semester - III) (23233)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

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

Q1) Define the following questions: **[5 × 1 = 5]**

- a) What is Unconventional war?
- b) What is international science?
- c) Define Energy Security.
- d) What is technology cooperation?
- e) Define Contemporary Warfare.

Q2) Write short notes on (any two): **[2 × 5 = 10]**

- a) Use of Modern Technology
- b) Comprehensive Security
- c) Hybrid War

Q3) Attempt the following questions (any two): **[2 × 5 = 10]**

- a) State the India and USA relations.
- b) State the role of Science and Technology in National Security.
- c) Explain the Meaning, Concept Nature & Scope Contemporary Warfare.

Q4) Answer in details (any one): **[1 × 10 = 10]**

- a) Discuss in detail the new security environment of India.
- b) Explain in detail Use of Modern Technology in Contemporary Warfare.



Total No. of Questions : 5]

SEAT No. :

PE-1402

[Total No. of Pages : 2

[6501]-331

S.Y. B.Sc.

GEOGRAPHY

GG-231: Environmental Geography - I
(CBCS) (2019 Pattern) (Semester - III) (Paper - I) (23181)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates :

- 1) *Q. 1 is compulsory.*
- 2) *Solve any three questions from Q. 2 to Q. 5.*
- 3) *Questions 2 to 5 carry equal marks.*
- 4) *Use of map stencils is allowed.*

Q1) Answer the following questions in 20 words (any five) : **[5]**

- a) What is terrestrial ecosystem?
- b) What are the abiotic components of the ecosystem?
- c) Define Environmental Determinism.
- d) Give any two natural causes of climate change.
- e) Give the main objective of 'Chipko Movement'?
- f) Name the states involve in 'Narmada Bachao Andolan'.

Q2) A) Answer the following questions in 100 words (any two) : **[6]**

- a) Describe food chain of the ecosystem.
- b) Describe different effects of the global climate change.
- c) Explain the concept Energy crisis.

B) Answer the following questions in 150 words (any one) : **[4]**

- a) Give an account of human activities in the desert region.
- b) Explain the man made causes of climate change.

P.T.O.

Q3) A) Answer the following questions in 100 words (any two) : [6]

- a) Explain the characteristics of mountainous region and its impact on human life.
- b) Explain the 'Chipko Movement' in brief.
- c) Explain the effects of Global Biodiversity depletion.

B) Answer the following questions in 150 words (any one) : [4]

- a) Give an account of Trophic Level with in a food chain of an ecosystem.
- b) Explain the concept 'Neo Determinism'.

Q4) A) Answer the following questions in 100 words (any two) : [6]

- a) Discuss the different causes of loss of biodiversity in India.
- b) Discuss the movement of 'Narmada Bachao Andolan' in brief.
- c) Explain Equatorial Ecosystem.

B) Answer the following questions in 150 words (any one) : [4]

- a) Write the significance of Environmental Geography.
- b) Explain the causes and effects of ozone depletion.

Q5) Write short notes on the followings (any four) : [10]

- a) Characteristics of the coastal region
- b) Problems of the mountainous region
- c) Causes of Noise Pollution.
- d) Nuclear pollution
- e) River ecosystem
- f) Silent Valley Movement



Total No. of Questions : 5]

SEAT No. :

PE-1403

[Total No. of Pages : 2

[6501]-332

S.Y. B.Sc. (Regular)

NANOSCIENCE AND NANOTECHNOLOGY

N.S - 231 : Physical Techniques for Synthesis of Nanomaterials
(2019 Pattern) (Credit System) (Paper - I) (Semester - III) (23261)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) Question 1. is compulsory.
- 2) Solve any *THREE* questions from Q.2 to Q.5.
- 3) Question 2 to 5 carry equal marks.
- 4) Draw neat & labeled diagram wherever necessary.
- 5) Figures to the right indicate full marks.

Q1) Attempt any FIVE of the following: [5]

- a) Give the two physical vapour deposition technique.
- b) Which major nanoparticles are synthesized by using plant extract?
- c) What is sputter deposition?
- d) Draw neat labelled diagram for Ball Milling.
- e) What is ultrasonic foliation?
- f) Give any two applications of Nanoparticles?

Q2) a) Attempt any ONE of the following: [6]

- i) Explain factors affecting Biological Synthesis of Nanoparticles.
- ii) Explain 'Ball Milling technique'.

b) Explain in detail mechanical exfoliation using scotch tape. [4]

Q3) a) Attempt any ONE of the following: [6]

- i) Explain synthesis of Gold and Silver nanoparticles by plant extract.
- ii) Explain laser irradiation in liquids.

b) Explain 'Electric arc-deposition'. [4]

P.T.O.

- Q4)** a) Attempt any ONE of the following: [6]
i) Explain synthesis of copper and copper oxide nanomaterials by plant extract.
ii) Explain 'Ion - beam deposition'.
b) Explain vacume evaporation technique. [4]

- Q5)** Write short notes on any FOUR of the following: [10]
a) Laser - Assisted exfoliation
b) Metallorgenic chemical vapour deposition.
c) Plasma inhanced chemical vapour deposition.
d) Explain R-F sputtering.
e) Molecular beam epitaxy.
f) Ultrasonic Folliation.



Total No. of Questions : 5]

SEAT No. :

PE-1404

[Total No. of Pages : 2

[6501]-333

S.Y. B.Sc.

GEOGRAPHY - II

**Gg 232 : GEOGRAPHY OF MAHARASHTRA (Physical - I)
(CBCS 2019 Pattern) (Semester - III) (Paper - II) (23182)**

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *Question number 1 is compulsory.*
- 2) *Attempt any three questions from Q.2 to Q.5.*
- 3) *Question 2 to 5 carry equal marks.*
- 4) *Use of map stencil is allowed.*

Q1) Answer the following questions in 20 words (any Five). **[5]**

- a) Write any two geological regions of the Maharashtra.
- b) What is mean by 'Deccan trap'?
- c) List any two highest peaks in the Sahyadri of Maharashtra.
- d) Enlist any two tributaries of the Godavari river.
- e) What is mean by 'Monsoon'?
- f) Define the term 'Soil'.

Q2) a) Answer the following questions in 100 words (any two). **[6]**

- i) Describe in short the deccan basalt province.
- ii) Describe the coastal lowland.
- iii) Describe the temperature distribution in Maharashtra.

b) Answer the following question in 150 words (Any one). **[4]**

- i) Write in short administrative and absolute location of Maharashtra.
- ii) Write in short on "Maharashtra Plateau"

P.T.O.

- Q3)** a) Answer the following questions in 100 words (any two). **[6]**
- i) Explain the evolution of Western ghat.
 - ii) Explain the role of government in the soil consevation in Maharashtra.
 - iii) Explain the role of government in forest conservation in Maharashtra.
- b) Answer the following question in 150 words (any one). **[4]**
- i) Write any four causes of soil erosion in Maharashtra.
 - ii) Write any four causes of deforestation in Maharashtra.
- Q4)** a) Answer the following questions in 100 words (any two). **[6]**
- i) Write the administrative divisions of Maharashtra.
 - ii) Write note on the sub ranges of the Sahyadri.
 - iii) Write the rainfall distribution in Maharashtra.
- b) Answer the following question in 150 words (Any one). **[4]**
- i) Write on the drought prone region of Maharashtra.
 - ii) Write any four methods of forest conservation in Maharashtra.
- Q5)** Write short notes on the followings (any four): **[10]**
- a) Historical and Political background of Maharashtra.
 - b) Harischandra - balughat ranges.
 - c) Characteristics of Monsoon in Maharashtra.
 - d) Tapi river
 - e) Black cotton soil
 - f) Sub - tropical dry deciduous forest in Maharashtra.



Total No. of Questions : 5]

SEAT No. :

PE-1405

[Total No. of Pages : 2

[6501]-334

S Y. B.Sc. (Regular)

(Nanoscience and Nanotechnology)

NS-232: Properties of Nanomaterials

(Physical, Chemical, Optical & Magnetic)

(2019 Pattern) (Credit System) (Semester - III) (Paper - II) (23262)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates :

- 1) *Q. 1 is compulsory.*
- 2) *Solve any three questions from Q. 2 to Q. 5.*
- 3) *Questions 2 to 5 carry equal marks.*
- 4) *Draw neat and labelled diagram wherever necessary.*
- 5) *Figures to the right indicate full marks.*

Q1) Attempt any Five of the following :

[5]

- a) Define exciton.
- b) What is diamagnetism?
- c) What is mean by hydrophilicity?
- d) What is transmission?
- e) What is scattering?
- f) What is mean by Bohr radius?

Q2) a) Attempt any One of the following :

[6]

- i) What is luminescence? Explain cathodoluminescence in brief.
- ii) With neat labelled diagram explain TEM

b) What is wear? Explain in detail.

[4]

P.T.O.

Q3) a) Attempt any One of the following : **[6]**

i) With neat labelled diagram explain surface plasmon resonance technique.

ii) With labelled diagram explain the atomic absorption spectroscopy.

b) What is ferromagnetism. Explain in brief. **[4]**

Q4) a) Attempt any One of the following : **[6]**

i) Explain Atomic Force Microscopy technique with neat labeled diagram.

ii) Explain the Neel relaxation in absence of magnetic field.

b) Explain tribology in brief. **[4]**

Q5) Write a short notes on any Four of the following : **[10]**

a) Elasticity.

b) Blocking temperature in superparamagnetism.

c) Spintronic GMR Bridge sensor.

d) Antiferromagnetic substances.

e) Quantum size effect.

f) Blue shift and red shift in semiconducting nanomaterials.



[6501]-335

S.Y. B.Sc.

PHYSICS

PHY-232(A) : Electronics - I

(2019 Pattern) (CBCS) (Semester - III) (Paper - IIA) (23122A)

Time : 2 Hours]

[Max. Marks : 35]

Instructions to the candidates:

- 1) Q.1 is compulsory.
- 2) Solve any three questions from Q.2 to Q.5.
- 3) Questions 2 to 5 carry equal marks.
- 4) Use of calculator and log table is allowed.
- 5) Figures to the right indicate full marks.

Q1) Solve any five of the following :**[5]**

- a) State Kirchhoff's voltage law.
- b) Draw symbol of npn transistor.
- c) Define Q point (operating point) of a transistor.
- d) What is input bias current of Op-Amp?
- e) What is operational amplifier?
- f) What is byte?

Q2) Answer the following :

- a) With circuit diagram, explain collector to base bias method of transistor biasing. Give its advantages. **[6]**

OR

Explain the construction and working of UJT. **[6]**

- b) Explain EX-OR and EX-NOR gates with symbol and truth table. **[4]**

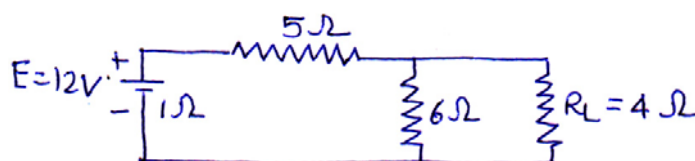
Q3) Answer the following :

- a) Define Feedback. Obtain equation of gain of amplifier with negative feedback. **[6]**

OR

Explain with circuit diagram, OP-AMP as a subtractor. **[6]**

- b) Thevenize the following circuit. **[4]**



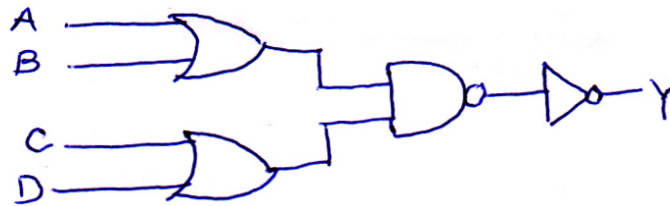
Q4) Answer the following :

- a) Explain input and output characteristics of common Base configuration of a transistor. [6]

OR

What is oscillator? Discuss the phase shift oscillator with circuit diagram. [6]

- b) Find the Boolean expression for the output of following figure. Evaluate it when, A = 1, B = 1, C = 0, D = 1. [4]



Q5) Write short notes on any four of the following :

[10]

- a) Maximum power transfer theorem.
- b) Construction of BJT.
- c) Current gain factors α and β .
- d) Ideal characteristics of OP-AMP.
- e) Inverting amplifier with OP-AMP.
- f) AND gate.



Total No. of Questions : 5]

SEAT No. :

PE1407

[Total No. of Pages : 2

[6501]-336

S.Y. B.Sc. (Regular)

PHYSICS

PHY - 232(B) : Instrumentation

(2019 Pattern) (CBCS) (Semester - III) (Paper - II) (23122B)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *Question 1 is compulsory.*
- 2) *Solve any 3 questions from Q.2 to Q.5.*
- 3) *Questions 2 to 5 carry equal marks.*
- 4) *Use of calculator is allowed.*
- 5) *Figures to the right indicate full marks.*

Q1) Solve any five of the following :

[5]

- a) What is linearity?
- b) What do you mean by transducer?
- c) What is piezoelectric effect?
- d) Define absolute pressure.
- e) Define Acquisition time.
- f) Calculate the sensitivity of the LVDT if an output voltage of 2mv is produced when core of LVDT moves through a distance of 0.5 mm.

Q2) Answer the following questions :

- a) Explain principle and working of platinum resistance thermometer. State their applications. **[6]**

OR

Draw circuit diagram and explain voltage to current converter using OPAMP.

- b) What is piezoelectric transducer? Explain its applications. **[4]**

P.T.O.

Q3) Answer the following questions :

- a) What are standards of measurements? Explain international standards of length, mass and time. [6]

OR

- i) What are functional elements of a typical measurement system? [3]
ii) Explain seismic motion transducer. [3]
- b) Calculate the gain of non-inverting amplifier when input resistance at inverting terminal is $10\text{k}\Omega$ and feedback resistance is $200\text{k}\Omega$. [4]

Q4) Answer the following questions :

- a) Explain different types of classification of transducers. [6]

OR

What is thermistor? What is NTC and PTC?

- b) The diameter of wire measured with a vernier callipers with least count of 0.1 mm is 3.15 cm . Find the percentage error in the measurement. [4]

Q5) Write short notes on any four of the following : [10]

- a) Hysteresis
b) Buffer amplifier
c) Temperature scales
d) Linear potentiometer
e) Bonded strain gauge
f) Low pass filter

x x x

Total No. of Questions : 5]

SEAT No. :

PE-1408

[Total No. of Pages : 2

[6501]-337

S.Y. B.Sc.

ELECTRONIC SCIENCE

EL - 231 : Communication Electronics

(CBCS) (2019 Pattern) (Paper - I) (Semester - III) (23221)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *Question 1 is compulsory.*
- 2) *Solve any THREE questions from Q.2 to Q.5.*
- 3) *Questions 2 to 5 carries equal marks.*

Q1) Attempt any FIVE of the following: [5]

- a) Define the term bandwidth in communication system.
- b) Write the formula of frequency deviation in FM.
- c) Define the term: Time division multiplexing.
- d) What is sensitivity in AM receiver.
- e) State the advantages of digital communication system.
- f) State the types of the digital modulation.

Q2) a) Attempt the following:

- i) What is the need of modulation? [2]
- ii) Draw and explain block diagram of MODEM. [4]
- b) Explain the importance of the modulation index in AM. [4]

Q3) a) Attempt the following:

- i) Explain the concept of sampling theorem. [2]
- ii) Explain pulse amplitude modulation with neat block diagram. [4]
- b) What is Frequency demodulation? Explain slope detector. [4]

- Q4)** a) Attempt the following:
- i) Define bandwidth in FM and write its expression. [2]
 - ii) Explain the amplitude modulation using transistor with neat block diagram. [4]
- b) An amplifier operating over the frequency range from 18 to 20 MHz has $10\text{ k}\Omega$ input resistor. Calculate the r.m.s. noise voltage at the input to this amplifier if the ambient temperature is 27°C . [4]
- Q5)** Write short notes on any FOUR of the following: [10]
- a) Internal noise
 - b) FM demodulator
 - c) Frequency shift keying
 - d) Pulse position modulation
 - e) Serial and parallel communication
 - f) Double Side band communication



Total No. of Questions : 5]

SEAT No. :

PE-1409

[Total No. of Pages : 2

[6501]-338

S.Y. B.Sc. (Regular)

ELECTRONIC SCIENCE

EL - 232 : Digital System Design

(2019 Pattern) (Credit System) (Semester - III) (23222)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) Question 1 is compulsory.
- 2) Solve any *THREE* questions from Q.2 to Q.5.
- 3) Q.2 to Q.5 carry equal marks.

Q1) Attempt any FIVE of the following: [5]

- a) State different series of TTL logic family.
- b) What is combinational circuit?
- c) Give the structure of 3 variable k-map.
- d) What is sequential circuit?
- e) How many flip-flop needed for mod -5 counter?
- f) What is setting time of DAC?

Q2) a) Answer the following:

- i) State any two differences between TTL & CMOS logic family. [2]
- ii) Explain 4 bit parallel adder with block diagram. [4]

b) Design mod 3 counter using JK flip - flop. [4]

Q3) a) Answer the following:

- i) What is Hamming code? How many redundant bits required to transmit 7 data bits? [2]
- ii) Obtain the logical expression for segment b of BCD to 7 segment decoder to drive common anode display. [4]

b) Find the output voltage of 4 bit R-2R ladder DAC if digital inputs are [4]

- i) 0001
 - ii) 1000
- if $v_{ref} = 10 \text{ V}$

P.T.O.

- Q4)** a) Answer the following:
- i) State and explain any two performance parameters of ADC. [2]
 - ii) Explain 3 bit down counter with block diagram and timing diagram. [4]
- b) Explain 3 bit flash ADC with circuit diagram. [4]
- Q5)** Write short notes on any FOUR of the following: [10]
- a) CMOS inverter circuit.
 - b) Keyboard encoder
 - c) Use of AND gate in frequency measurement circuit.
 - d) State table and state diagram
 - e) Up - down counter
 - f) R - 2R ladder DAC.



Total No. of Questions : 5]

SEAT No. :

PE-1410

[Total No. of Pages : 2

[6501]-339

S Y. B.Sc. (Vocational)

BIOTECHNOLOGY

VBt-211: Cell Biology and Microbial Genetics

(CBCS) (2019 Pattern) (Semester - III) (23571) (Paper - III)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates :

- 1) Q. 1 is compulsory.
- 2) Solve any three questions from Q. 2 to Q. 5.
- 3) Questions 2 to 5 carry equal marks.
- 4) Draw neat labelled diagrams wherever necessary.

Q1) Solve Any Five of the following :

[5]

- a) Define cell
- b) Name any two cell organelles.
- c) Name any two types of cell junctions.
- d) Name the organism used to carry out transformation experiment.
- e) Define recombination
- f) Give full form of ECM.

Q2) a) Answer the following (Any Two) :

[6]

- i) Explain in detail Generalized Transduction.
- ii) Discuss an mechanism of Transformation
- iii) Explain signalling pathways during Apoptosis.

b) Answer the following (Any One) :

[4]

- i) Distinguish between plant cell and Animal cell.
- ii) Explain in detail Henidesmosomes as cell junction molecule.

P.T.O.

Q3) a) Answer the following (Any Two) : **[6]**

- i) What are retrotransposons Add a note.
- ii) Explain different types of recombination
- iii) Explain in detail Hfr conjugation.

b) Answer the following (Any One) : **[4]**

- i) Explain G-protein pathway
- ii) Comment an introduction to membrane transport.

Q4) a) Answer the following (Any Two) : **[6]**

- i) Comment on “Neoplasia’
- ii) What are cell junction molecule. Give their significance.
- iii) Draw diagram for Griffiths experiment.

b) Answer the following (Any One) : **[4]**

- i) Explain in detail hederberg and Tatuns experiment.
- ii) Comment on Discovery of conjugation.

Q5) Write short notes on the following : **[10]**

- a) Mobile elements
- b) Immunoglobulin superfamily
- c) Cell matrix interaction
- d) Gap junctions
- e) Golgi complex



Total No. of Questions : 5]

SEAT No. :

PE-1411

[Total No. of Pages : 2

[6501]-342

S.Y. B.Sc. (Vocational)

**COMPUTER HARDWARE AND NETWORK
ADMINISTRATION**

**CHNA - 231 : Operating System & Diagnostics Tool's
(CBCS) (2019 Pattern)(Semester - III) (Paper - III) (23871)**

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *Question 1 is compulsory.*
- 2) *Solve any three questions from Q.2. to Q.5.*
- 3) *Q.2 to Q.5 carry equal marks.*

Q1) Solve any Five of the following:

[5 × 1 = 5]

- a) What is an operating system?
- b) What is a Graphics Card?
- c) List names of any two operating system's.
- d) Long form of SCSI is
- e) Define Computer Virus.
- f) Write the use of FAT.

Q2) a) i) Write short note on LAN card.

[2]

ii) Write a maintenance Tools of PC.

[4]

b) Write a difference between window's 8 and window's 10.

[4]

Q3) a) i) How to install SCSI Card?

[2]

ii) Explain the effect of virus on computer system.

[4]

b) Write a short note on Corel - Draw X3.

[4]

P.T.O.

- Q4)** a) i) Explain multi boot operating system. [2]
ii) Write the electrical power issues in PC. [4]
b) Explain unix operating system and Red Hat Linux operating system.[4]

- Q5)** Write short notes on any Four of the following: [10]
a) MS-DOS 6.22
b) Modem
c) Web Camera
d) Troubleshooting issues in computer system.
e) Software and Hardware
f) Pendrive



Total No. of Questions : 5]

SEAT No. :

PE-1412

[Total No. of Pages : 2

[6501]-343

S.Y. B.Sc. (Vocational - III)

SEED TECHNOLOGY

ST2.1: Hybrid Seed Production

(CBCS) (2019 Pattern) (Semester - III) (2 Credits) (23891)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates :

- 1) *Q. 1 is compulsory.*
- 2) *Solve any three questions from Q. 2 to Q. 5.*
- 3) *Question 2 to 5 carry equal marks.*

Q1) Solve any Five of the following :

[5]

- a) What is hybrid seed production?
- b) Write the significance of apomixis
- c) Define cytoplasmic genetic male sterility
- d) Give any one example of insect pollination
- e) What is isolation distance?
- f) Define stigma receptivity

Q2) a) Define apomixis. What are the types of apomixis?

[6]

b) Comment on commercial utilization of heterosis

[4]

P.T.O.

Q3) a) What is male sterility? Comment on genetic male sterility? **[6]**

b) Explain the measures to overcome self incompatibility. **[4]**

Q4) a) Describe the process of hybrid seed production in cotton w.r.t source of seed, Land requirement, isolation distance cultural practices, roughing, harvesting and threshing. **[6]**

b) Comment on planting ratio and seed rate w.r.t hybrid seed production. **[4]**

Q5) Write short notes on any four of the following : **[10]**

a) Hand pollination

b) Compact area approach

c) Plant protection in cotton

d) Pollen viability

e) Gametocides

f) Use of CMS in hybrid seed production.



Total No. of Questions : 5]

SEAT No. :

PE-1413

[Total No. of Pages : 2

[6501]-344

S.Y. B.Sc. (Vocational)

BIOTECHNOLOGY

VBt - 212 : Molecular Biology

(CBCS) (2019 Pattern) (Semester - III) (23572) (Paper-IV)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) Question 1 is compulsory.
- 2) Solve any three questions from Q.2. to Q.5.
- 3) Q.2 to Q.5 carry equal marks.
- 4) Draw neat labelled diagrams wherever necessary.

Q1) Solve any Five of the following: [5]

- a) Define nucleoside.
- b) What do you understand by phosphodiester bond?
- c) Define submetacentric chromosome.
- d) What is nucleosome?
- e) Name any two post translational modifications.
- f) What is meant by renaturation of DNA?

Q2) Answer any One of the following: [6]

- a)
 - i) Explain the steps involved in initiation of translation in Prokaryotes.
 - ii) Describe any two levels of eukaryotic genome organization.
 - iii) Explain the steps involved in elongation of transcription in prokaryotes.
- b) Describe the structure of eukaryotic m-RNA in detail. [4]

P.T.O.

Q3) Answer any Two of the following: **[6]**

- a)
 - i) Explain the concept of Wobble Hypothesis.
 - ii) Write a short note on oxidising agents.
 - iii) Explain the inhibitors of translation in eukaryotes.
- b) Discuss the steps involved in 3' polyadenylation of eukaryotic m-RNA. **[4]**

Q4) Answer any Two of the following: **[6]**

- a)
 - i) Write a short note on ubiquitination.
 - ii) Explain the role of DNA polymerase I in prokaryotic replication of DNA. Add a note on its features.
 - iii) Give the function of DNA topoisomerases. Distinguish between type I topoisomerases and type II topoisomerases.
- b) Enlist the proteins involved in nucleotide excision repair mechanism. Add a note on their functions in nucleotide excision repair mechanism. **[4]**

Q5) Write short notes on any Four of the following. **[10]**

- a) Features of replication
- b) Names and functions of any two proteins involved in initiation of transcription in Prokaryotes.
- c) Any 2 features of Watson and Crick model of DNA.
- d) Features of genetic code.
- e) Group II introns.
- f) Central dogma of molecular biology.



Total No. of Questions : 5]

SEAT No. :

PE1414

[Total No. of Pages : 2

[6501]-347

S.Y. B.Sc. (Vocational)

COMPUTER HARDWARE & NETWORK ADMINISTRATION

CHNA - 232 : Microprocessor & Interfacing - I

(2019 CBCS Pattern) (Semester - III) (Paper - IV) (23872)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *Q.1 is compulsory.*
- 2) *Solve any three questions from Q.2 to Q.5.*
- 3) *Questions 2 to 5 carry equal marks.*

Q1) Solve any five of the following :

[5×1=5]

- a) Define Resolution of ADC.
- b) What is function of Address bus?
- c) List any two conditional flag of 8086.
- d) What is cache memory?
- e) What is the size of 8086 microprocessor?
- f) Write any two Non-Intel processors?

Q2) a) i) Define transducer. Write anyone transducer.

[2]

ii) Describe working of Flash ADC.

[4]

b) What is USB? Differentiate USB 2.0 & 3.0.

[4]

Q3) a) i) What is DAC? Write its types.

[2]

ii) Explain 8086 Flag register.

[4]

b) Explain PCI Bus architecture.

[4]

P.T.O.

Q4) a) i) What is Interrupt? Write one software interrupts of 8086 microprocessor. [2]

ii) Explain eSATA in short. [4]

b) Write main features of core is processor. [4]

Q5) Write short notes on any four of the following : [10]

a) DRAM

b) LVDT

c) DMA controller

d) DOS Interrupts

e) Dual core processors

f) Maximum mode of 8086.

x x x

Total No. of Questions : 5]

SEAT No. :

PE1415

[Total No. of Pages : 2

[6501]-348

S.Y. B.Sc. (Vocational - IV)

SEED TECHNOLOGY

ST - 2.2 : Seed Testing

(2019 CBCS Pattern) (Semester - III) (2 Credits) (Paper - II) (23892)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *Q.1 is compulsory.*
- 2) *Solve any three questions from Q.2 to Q.5.*
- 3) *Questions 2 to 5 carry equal marks.*

Q1) Solve any five of the following : **[5]**

- a) Define seed testing.
- b) What is certification seed sample?
- c) What is a abnormal seedling?
- d) Define seed germination.
- e) Enlist any two equipments used for seed sampling.
- f) What is the use of physical purity work board.

Q2) a) Discuss the history and importance of seed testing. **[6]**

b) Explain any two equipments used in seed testing Laboratory. **[4]**

Q3) a) Comment on certification and official seed sampling. **[6]**

b) Explain reporting and results of physical purity analysis. **[4]**

P.T.O.

Q4) a) What are the tools used for seed sampling. **[6]**

b) Write the procedure of germination testing w.r.t. sand method. **[4]**

Q5) Write notes on any four of the following : **[10]**

a) Central Seed testing Laboratory.

b) Service seed sample.

c) Universal OSAW moisture tester.

d) Germination testing.

e) Seed evaluation w.r.t. multigerm seed and ungerminated seed.

f) Seed vigour.

x x x