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S.Y. B.Sc.

PSYCHOLOGY

Counselling Psychology

(Paper - II) (New Course) (Sem. - II)

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:

- 1) *Attempt all questions.*
- 2) *Draw the figures and diagrams wherever necessary.*
- 3) *Figures to the right indicate full marks.*

Q1) Answer in two or four sentences.

[16]

- a) Define Counselling.
- b) What is confidentiality in Communication?
- c) How to work with parents?
- d) What are the normative events in counselling agendas?
- e) What is reluctance to seek counselling?
- f) Who proposed the person centered counselling?
- g) Enlist the tools of assessment.
- h) What is the variability of individuals within the life stage?

Q2) Answer any two of the following in eight or ten sentences:

[8]

- a) Explain the predictable counselling agendas of older adults.
- b) How children differ from adults?
- c) Explain the characteristic of effective counsellor.

Q3) Write short notes on any two of the following.

[8]

- a) Purpose of assessment in counselling.
- b) Physiological change that affect counselling.
- c) Gestalt counselling.

P.T.O.

Q4) Explain the stages of counselling process.

[8]

OR

Explain the cognitive counselling in detail.

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S.Y. B.Sc. (Sem. - II)

DEFENCE AND STRATEGIC STUDIES

DS - 201: Strategic international Relations.

(New Course)

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:

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

Q1) Answer in 2 to 4 sentences each.

[16]

- a) Define 'Human Rights'.
- b) Define 'International Terrorism'.
- c) What is Foreign Policy?
- d) What is international Relations?
- e) What is SAARC?
- f) What is ASEAN?
- g) Define 'Diplomacy'.
- h) Define 'Military Pacts'.

Q2) Answer in 8 to 10 sentences (any two):

[8]

- a) Explain the significance of Human Rights.
- b) Discuss the importance of Foreign Policy.
- c) Discuss the nature and characteristics of Diplomacy.

Q3) Write short notes on (any two):

[8]

- a) SAARC and its role in south Asia.
- b) Transfer of Military Technology.
- c) Foreign Policy and Diplomacy.

P.T.O.

Q4) Answer in 16 to 20 sentences (any one):

[8]

- a) Discuss the conceptual difference between old and new diplomacy.
- b) Discuss the obstacles and difficulties in the execution of disarmament.

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S.Y. B.Sc. (Sem. - II)

DEFENCE AND STRATEGIC STUDIES

DS - 202: India's National Security

(New)

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:

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

Q1) Answer in 2 to 4 Sentences each.

[16]

- a) Define National interest.
- b) Define terrorism.
- c) What do you mean by strategic planning?
- d) Define Human Security.
- e) Explain the meaning of airspace security.
- f) Define Nuclear Doctrine.
- g) State the meaning of maritime security.
- h) Write any two determinants of defence policy.

Q2) Answer in 8 to 10 Sentences.

[8]

- a) Explain internal threats to India's Security.
- b) Discuss India's land border.
- c) Explain India's air space security.

Q3) Write short notes (any two):

[8]

- a) India's Freedom struggle.
- b) External threats to India.
- c) Explain India - Pakistan war of 1965.

P.T.O.

Q4) Answer in 16 to 20 Sentences (any one):

[8]

- a) Write a note on India's Nuclear programme.
- b) Write an essay on India's maritime security.

Total No. of Questions : 4]

[Total No. of Pages : 2

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S.Y. B.Sc. (Sem. - II)

ENVIRONMENTAL SCIENCE

ENV - 202: Soil Science

(Revised 2008 New) (Paper - II)

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*

Q1) Attempt the following in 1/2 lines each.

[10]

- a) Define the term: Soil.
- b) What is Bioaccumulation?
- c) State the difference between Micro & Macronutrients.
- d) Enlist the types of soil water.
- e) What is 'Catclay'?
- f) Name any 2 states of India where acidic soil occurs.
- g) Define the term : Eluviation.
- h) What is Soil Erosion?
- i) What are wind Breaks?
- j) What is Alluvial soil?

Q2) Write notes on any two of the following:

[10]

- a) Recent system of soil classification.
- b) Types of water induced soil erosion.
- c) Chemical reactions in soil.

P.T.O.

Q3) Answer any two of the following: **[10]**

- a) What is soil Profile? Describe it with suitable diagram.
- b) Describe any 4 factors affecting soil structure and give its importance.
- c) Discuss the types & role of soil microorganisms.

Q4) Answer any one of the following: **[10]**

- a) Write a detailed account on Physical & Chemical properties of soil.
- b) Discuss the major classes of soil pollutants & their effects.

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S.Y. B.Sc. (Vocational)

INDUSTRIAL CHEMISTRY

VOC - 221: Unit Processes in Organic Industries

(Paper - I) (Sem. - II)

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:

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

Q1) Give balanced equations with conditions for the following reactions____.[16]

- a) Benzene \rightarrow Chlorobenzene.
- b) Acetylene \rightarrow Vinyl Acetate.
- c) Bromobenzene \rightarrow phenyl - ethyl alcohol.
- d) Acetic acid \rightarrow Ethyl alcohol.
- e) Chlorobenzene \rightarrow Aniline.
- f) Acetanilide \rightarrow P-nitro acetanilide.
- g) CO \rightarrow CH₃OH.
- h) Acetic acid \rightarrow Ethyl acetate.

Q2) Attempt any two of the following: [8]

- a) Discuss the mechanism of nitration.
- b) Discuss the mechanism for the preparation of ester, with an example.
- c) Explain the commercial manufacture of maleic anhydride.

Q3) Attempt any two of the following: [8]

- a) Write a note on ozonolysis.
- b) Describe various sulphonating agents.
- c) Describe the preparation of toluene from benzoic acid.

Q4) Describe the process of hardening of oil, with the reaction. [8]

OR

Describe briefly the manufacture of chloral.

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S.Y. B.Sc. (Vocational)

BIOTECHNOLOGY

VOC - Biotech - 221: Plant and Animal Tissue Culture

(2008 Pattern) (Paper - I) (Sem. - II)

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:

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

Q1) Answer each of the following in 1-2 lines.

[10]

- a) Give role of inverted microscope in animal tissue culture.
- b) pH indicator is added in animal cell culture medium. Why?
- c) Define cell differentiation.
- d) What is enzymatic disaggregation of tissues?
- e) Give any two applications of cultured animal cells.
- f) What is sub - culture.
- g) Mention role of BAP in plant tissue culture.
- h) What are chelating agents?
- i) Define totipotency.
- j) What is organogenesis?

Q2) Write short notes on any two of the following:

[10]

- a) Laminar airflow cabinet.
- b) Organ culture.
- c) Maintenance of continuous cell lines.

P.T.O.

- Q3)** Attempt any two of the following: **[10]**
- a) Describe any one method of cell line characterization.
 - b) What is callus? Give applications of callus culture in plant tissue culture.
 - c) Discuss the methods of protoplast isolation.

Q4) What is primary culture? Describe in detail methods of initiation of primary cultures. **[10]**

OR

Explain various steps involved in micropropagation.

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[3817] - 239

S.Y. B.Sc. (Vocational)

ELECTRONIC EQUIPMENT MAINTENANCE (EEM)

VOC - EEM - 221: Audio, Video and Office Equipments - B

(New Course) (Paper - I) (Sem. - II)

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:

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

Q1) a) Attempt all:

- i) Give the typical requirement specifications of a modern multimedia computer. **[1]**
- ii) Give boot sequence of PC. **[1]**
- iii) List different softwares required for operation of multimedia computer. **[1]**
- iv) What is computer virus? Give two examples of recent viruses affecting PC. **[1]**

b) Attempt all:

- i) What is bar code? Where is it used? **[2]**
- ii) Which different connectors are available on motherboard of multimedia computer. **[2]**
- iii) What is touch screen? Where is it used? **[2]**
- iv) Which different types of memories are used in a PC? **[2]**

Q2) Attempt any two of the following:

- a) Explain with necessary diagram the operation of Ink-Jet printer. **[4]**
- b) Draw a neat diagram of over - head projector. Explain its working. **[4]**
- c) Explain the operation of flat bed scanner. **[4]**

P.T.O.

Q3) Attempt any two of the following:

- a) State different types of printers. Explain the operation of dot matrix printer. [4]
- b) What is meant by Fax? With neat diagram explain its working. [4]
- c) Write a note on light pen. [4]

Q4) Attempt all:

- a) What is CD? List the components of CD ROM drive. Explain the read cycle of CD ROM. [6]
- b) What is EPABX? Give its block diagram. Explain its working. Give its application. [6]

OR

- a) Explain with the help of neat diagram the operation of touch screen. [6]
- b) Explain the working of photo copies. Describe the sequence of copying process. [6]

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[3817] - 637

S.Y. B.Sc.

PHOTOGRAPHY AND AUDIO - VISUAL PRODUCTION

Colour Photography

(Sem. - II) (Paper - III) (Old Course) (Vocational)

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:

- 1) All questions are compulsory.*
- 2) Draw neat and labeled diagrams wherever necessary.*
- 3) Figures to the right indicate full marks.*

Q1) Answer in short.

[16]

- a) What is the use of a colour conversion filter in colour photography?
- b) What is the difference between the rods and the cones on the retina?
- c) Explain what will happen if a daylight film is exposed to tungsten light.
- d) Convert the colour temperature of 10000 K into mired.
- e) State the difference between a colour positive and a colour negative image.
- f) What is the use of the yellow filter in the colour film?
- g) A filter is designated as CC 20 M. Which colours it will transmit and absorb?
- h) Explain what you mean by the colour temperature of a light source.

P.T.O.

Q2) Attempt **ANY TWO** of the following: [8]

- a) Explain why orange mask is provided in a colour negative film.
- b) Discuss the reasons for using filters in a colour enlarger.
- c) What do you mean by a Mired shift? What is positive and negative Mired shift? How are these corrected?

Q3) Write short notes on **ANY TWO** of the following: [8]

- a) Use of filters in a colour enlarger.
- b) Colour vision.
- c) Removal of excess colour from a colour print.

Q4) Attempt **ANY ONE** of the following: [8]

- a) Discuss the various stages involved in the processing of a colour negative film.
- b) Draw a labeled diagram and describe the construction of a colour enlarger.

Total No. of Questions : 4]

[Total No. of Pages : 2

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[3817] - 642

S.Y. B.Sc. (Vocational Course)

INDUSTRIAL CHEMISTRY

222: Industrial Pollution

(Semester - II) (Paper - II) (Old Course)

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:

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

Q1) Answer the following questions:

[16]

- a) What is meant by reverse osmosis?
- b) Name the ill effects of NO_x on materials.
- c) What is the difference between COD and BOD?
- d) Define Eutrophication. How is it caused?
- e) State the causes of radiation pollution.
- f) List the names of major polluting industries.
- g) Define lithosphere and soil profile.
- h) What is photochemical smog? How is it harmful?

Q2) Attempt **any two** of the following:

[8]

- a) Describe a method to estimate **any two** of the following:
 - i) DO
 - ii) CN^-
 - iii) As.
- b) Discuss pesticide pollution.
- c) Write a note on vacuum filter for treatment of sludge.

Q3) Write short notes on **any two** of the following:

[8]

- a) Organic particulate matter and its ill effects.
- b) Write a note on anaerobic digestion of sludge.
- c) Green house effect.

P.T.O.

Q4) Describe how municipal water is treated for drinking purposes.

[8]

OR

Name the sources of sulphur dioxide in air. Describe its ill effects on plants, humans and materials? How it can be controlled?

P933

[3817] - 644

S.Y. B.Sc. (Vocational)

PHOTOGRAPHY AND AUDIO - VISUAL PRODUCTION

Sound for Media

(Semester - II) (Paper - IV) (Old Course)

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:

- 1) All questions are compulsory.*
- 2) Draw neat and labeled diagrams wherever necessary.*
- 3) Figures to the right indicate full marks.*

Q1) Answer the following:

[16]

- a) Define signal to noise ratio of a microphone.
- b) Define a sound recording and reproducing system.
- c) Sketch the directional characteristics of a carbon microphone.
- d) The sensitivity of a microphone is 60dB below 1 volt. Determine its output voltage.
- e) Sketch a diagram of a monophonic system.
- f) In a magnetic tape recording system, the gap width is 5 microns and the tape speed is 18cm/sec. Determine the highest frequency that can be recorded.
- g) State the characteristics of a HI - FI system.
- h) Compare two characteristics of ribbon and crystal microphones.

P.T.O.

Q2) Attempt **ANY TWO** of the following: [8]

- a) Explain the Dolby noise reduction system.
- b) Distinguish between condenser and carbon microphones.
- c) Explain the production of electronic music.

Q3) Attempt **ANY TWO** of the following: [8]

- a) Discuss the working of a moving coil microphone.
- b) Distinguish between stereophonic and monophonic systems.
- c) Explain the function of erase and reproduce heads.

Q4) Attempt **ANY ONE** of the following: [8]

- a) Sketch a block diagram of a tape recording system and explain its working.
- b) Write short notes on:
 - i) Surround systems.
 - ii) Characteristics of music.

Total No. of Questions : 4]

[Total No. of Pages : 2

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[3817] - 646

S. Y. B.Sc. (Vocational)

INDUSTRIAL MICROBIOLOGY

VOC - IND - MIC - 222: Quality Assurance in Industrial Products

(Paper - II) (Sem. - II)

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *All questions carry equal marks.*
- 3) *Draw neat - labeled diagrams wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of log tables, calculator is allowed.*

Q1) Answer the following:

[10]

- a) What is a 'pharmacopoeia'?
- b) What is the ISI Mark and what does it signify?
- c) 'BIS' has replaced:
 - i) ISO
 - ii) ISI
 - iii) FDA
 - iv) FPO.
- d) Ames test detects:
 - i) pyrogen
 - ii) allergen
 - iii) carcinogen
 - iv) microbial contamination.
- e) Name an organism other than *E. coli* that can be used for microbiological assay of Vitamin B₁₂
- f) State 2 tests carried out to assess quality of canned fruits.
- g) 'Water for injection' has to be pyrogen-free but need not be sterile. (True/false)
- h) Define 'commercial sterility'.
- i) Which of the assay methods, turbidimetric or gel diffusion is more sensitive to quantitate low concentrations of Vitamin B₁₂?
- j) State 2 tests carried out to assess quality of packaged drinking water.

P.T.O.

Q2) Answer **any two** of the following: [10]

- a) State and explain the precautions necessary while performing the microbiological assay for Vitamin B₁₂.
- b) Explain how the test used for detecting carcinogenicity of a pharmaceutical product is also suitable for detecting its mutagenicity.
- c) Give a protocol for testing the sterility of a filled penicillin vial.

Q3) Answer **any two** of the following: [10]

- a) Enlist three products for which toxicity testing is mandatory and explain the Procedure of testing.
- b) Explain in brief the procedure for allergen testing for a pharmaceutical product.
- c) List the QC tests carried out for 'water for injection'. Explain the significance of these tests.

Q4) Answer **any one** of the following: [10]

- a) Describe the procedure for checking presence of pyrogen in an injectible using an *in vitro* test.
- b) With the help of a suitable example, describe the procedure for sterility testing of a finished pharmaceutical product.

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S.Y. B.Sc. (Sem. - II)

DEFENCE AND STRATEGIC STUDIES

DS. No - 203: Military Geography

(New Course)

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:

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

Q1) Answer in 2 or 4 sentences each.

[16]

- a) State the meaning of Military Geography?
- b) What are the “means” of grand strategy?
- c) Define “Tactics”.
- d) Why the study of plain warfare is essential for us?
- e) What do you know about mules?
- f) State one example for “impact of war on environment”.
- g) Which tactics it was introduced by Hitler?
- h) Why “Desert warfare” being fought during night only?

Q2) Answer in 8 to 10 sentences (Any Two).

[8]

- a) How grand strategy would be decided?
- b) Explain in brief Tactical problems of Jungle warfare.
- c) Write in brief grand strategy of Allied countries during world war - II

Q3) Write short notes on (Any Two)

[8]

- a) Example of Tactics.
- b) Scope of Military Geography.
- c) Characteristics of High Altitude.

P.T.O

Q4) Answer in 18 to 20 sentences (Any one).

[8]

- a) Explain in detail principles of logistics.
- b) Highlight on Grand strategy and strategy of India during Indo-pak war of 1971.

Total No. of Questions : 4]

[Total No. of Pages : 2

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[3817] - 228

S.Y. B.Sc. (Sem. - II)

ENVIRONMENTAL SCIENCE

ENV - 201: Biological Diversity

(Paper -I) (Revised 2008 New)

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*

Q1) Attempt the following in 1 - 2 lines each.

[10]

- a) Define the term: Biodiversity.
- b) What is meant by endemic species?
- c) What are centres of Plant diversity?
- d) Give full form of RBA.
- e) What is Ramsar Convention?
- f) State the difference between Preservation & Conservation.
- g) What are Hotspots of biodiversity?
- h) What is seed bank?
- i) Give any 4 uses of biodiversity.
- j) What is Red Data Book?

Q2) Write short notes on any two of the following:

[10]

- a) Scope of Biodiversity.
- b) Molecular marker technique of biodiversity.
- c) History & Origin of species diversity.

P.T.O.

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

- a) Discuss the various reasons for loss of biodiversity.
- b) Describe 'Western Ghats as a hotspot'.
- c) Give in detail the threats to biodiversity.

Q4) Answer Any One of the following: **[10]**

- a) Give the broad & detailed classification of ecosystem.
- b) Discuss the role of Universities & Institutions of education in biodiversity conservation.

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[3817] - 230

S.Y. B.Sc. (Sem. - II)

OPTIONAL ENGLISH (New Course)

Enriching Oral and Written Communication in English

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:

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

Q1) Attempt any two of the following: **[10]**

- a) You applied for the post of a Customer Care Executive in a BPO and have been asked to appear for an interview. Write down five questions that you could be asked and their possible answers regarding qualification, experience, salary, contributions, plans in the concerned field etc.
- b) Imagine that you are the Chairman of a meeting. What as a chairman are your responsibilities for conducting a meeting?
- c) Rahul, Sanjay, Shamim and Shalaka are participants in a group discussion on the topic 'Importance of English'. Write a transcript of the discussion using the following points: Introduction - English today - World language - spread of English - users of English - language of science and technology, communication - business, trade, industry - role of English in IT - conclusion.

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

- a) Write a paragraph of about 15 sentences on the topic 'Solar Energy'.
- b) Punctuate the following sentences:
 - i) It's a lovely day said Ragini.
 - ii) How talented Hema is thought the cultural minister.
 - iii) Akshay says is it going to rain.
 - iv) I cant come to city pride today the boy said to his friend.
 - v) He was reading Gandhijis autobiography my experiments with truth.

P.T.O.

- c) Summarize the following paragraph to one third of its length. Suggest a suitable title. Prepare rough draft also.

The best breeding place of superstition is darkest ignorance. Superstition can never stand the light of knowledge. Like some worms, it grows and lives only where there is darkness. In dark ages, when education was at its lowest, superstition was the only religion and the only science of the people.

But science is the enemy of superstition. Science stands for facts; superstition stands for fiction. The discoveries of science expose the hollowness of all superstitions. Similarly, the spread of education gradually remove superstition from among people.

Superstition is prevalent in all the countries and villages of the world. It has greater influence in the villages where the villagers hardly know how to sign their own names. Superstition is a universal disease. It attacks the white man as well as the black man. Even the most enlightened country like England is not free from superstitions. Number 13 is considered very unlucky by the English people.

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

- a) Choose the more powerful of the two words or phrases given.
- i) The stars (sparkled/shone) in the night sky.
 - ii) The samosas in the hotel were stale. Mr Joshi (asked for/demanded) a refund from the management.
 - iii) My problems seem quite (trivial/unimportant) compared to that of Sarita.
 - iv) Eating plenty of fresh fruit and vegetables will help you to stay (fit/healthy).
 - v) The little girl (cried/howled) in pain when a sharp thorn pierced through her shoe.
- b) Write a review of a short story you have read. Take into account the following points: plot, character, setting, theme, social/moral implication, your opinion.
- c) Write a description of a postman taking into consideration his personality, character, mood and thoughts.

Q4) Attempt any two of the following: **[10]**

- a) You want to purchase some books that you need for further studies. Write an e-mail to a dealer in books placing an order and asking for discount.
- b) Prepare 5 slides of about 20 words each for power point presentation that you would like to make in a function on the topic 'Global Warming'. You can make use of the points: Introduction - cause - effects - solutions - social awareness - preventive approach.
- c) You have a problem in your cell phone billing. You talk to the Customer Care Executive of a company that provides mobile network. Write a piece of conversation based on the situation.

Total No. of Questions : 4]

[Total No. of Pages : 2

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[3817] - 608

S.Y. B.Sc. (Sem. - II)

BOTANY

BO - 221: Plant Biotechnology

(Paper - I) (Old Course)

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Draw neat labelled diagrams wherever necessary.*
- 3) *Figures to the right indicate full marks.*

Q1) Attempt the following:

[10]

- a) Name any two byproducts of fermentation.
- b) What is inoculation?
- c) Give any two applications of Biotechnology in medicine.
- d) Name any two blue green algae used as biofertilizers.
- e) Define plasmid.
- f) What is waste?
- g) Give the Botanical names of any two fuel wood plants.
- h) Name any two types of Bioreactors.
- i) Give any two advantages of micropropagation.
- j) Name any two types of wastes.

Q2) Answer any two of the following:

[10]

- a) Describe batch culture.
- b) Explain secure landfill.
- c) Give the applications of genetic engineering.

P.T.O.

Q3) Write short notes on (any two): **[10]**

- a) Biodiesel.
- b) Mycorrhizal biofertilizers.
- c) Chemical Oxygen Demand (COD).

Q4) Define tissue culture. Explain the various steps involved in tissue culture technique. **[10]**

OR

What is a bioreactor? Describe the stirred tank bioreactor.

Total No. of Questions : 4]

[Total No. of Pages : 2

P217

[3817] - 609

S.Y. B.Sc. (Sem. - II)

BOTANY

BO - 222: Plant Physiology

(Paper -II) (Old Course)

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Draw neat labelled diagrams wherever necessary.*
- 3) *Figures to the right indicate full marks.*

Q1) Attempt the following questions:

[10]

- a) What is Plant Physiology?
- b) Define hypertonic solution.
- c) What is diffusion?
- d) Define imbibition.
- e) Enlist any two micro nutrients.
- f) What is sand culture?
- g) State two theories of passive salt absorption.
- h) Draw the diagrammatic representation of path of ascent of sap.
- i) What is growth?
- j) Enlist external factors affecting growth.

Q2) Answer the following questions (any two)

[10]

- a) Discuss the role and deficiency symptoms of nitrogen.
- b) Explain the active absorption of salts by Bennet Clark theory.
- c) Describe the Characteristic features of long day plants.

P.T.O.

Q3) Write short notes on any two of the following: **[10]**

- a) Active absorption of water.
- b) Foliar nutrition.
- c) Bose's pulsatory movement theory.

Q4) What is transpiration? Explain the mechanism of opening and closing of stomata by Steward's hypothesis. **[10]**

OR

What are plant growth regulators? Explain practical applications of auxins.

Total No. of Questions : 4]

[Total No. of Pages : 2

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[3817] - 612

S.Y. B.Sc. (Sem. - II)

GEOLOGY

GL - 221: Petrology

(Paper -I) (Old Course)

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:

- 1) All questions are compulsory.*
- 2) Draw neat diagrams must be drawn wherever necessary.*
- 3) Figures to the right indicates full marks.*

Q1) Answer the following questions:

[10]

- a) Name any two Plutonic Igneous rocks.
- b) What is laterite?
- c) Define expansion cracks.
- d) Define metamorphism.
- e) Name two rocks showing granulose structure.
- f) What are phaneritic rocks?
- g) Define roundness of sediments.
- h) What are rudaceous deposits?
- i) What is labile region?
- j) What are stress minerals?

Q2) Write notes on (any two):

[10]

- a) Factors controlling grain size of Igneous rocks.
- b) Thermal metamorphism of arenaceous rocks.
- c) Differentiate between metamorphism, weathering, diagenesis and metasomatism.

P.T.O.

- Q3)** Explain the following (any two): **[10]**
- a) Crush breccia and crush conglomerate.
 - b) Clastic texture.
 - c) Effects of regional metamorphism on quartzofelspathic rocks.

Q4) Describe the different basis for classification of Igneous rocks with examples. **[10]**

OR

Define primary sedimentary structures. Explain the origin and environmental significance of ripple marks and mud cracks.

Total No. of Questions : 4]

[Total No. of Pages : 2

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[3817] - 613

S.Y. B.Sc. (Sem. II)

GEOLOGY

**GL - 222: Palaeontology and stratigraphy
(Old Course) (Paper - II)**

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Draw neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicates full marks.*

Q1) Answer the following questions.

[10]

- a) Define Biofacies.
- b) Give any two types of Microfossils.
- c) Define coelenterata.
- d) What are normal polarity?
- e) Give any two principles of stratigraphy.
- f) Define chronostratigraphic units.
- g) Give any two evidences, Which help in recognition of unconformity in the field.
- h) What are spot sampling?
- i) Define the term 'Mould'.
- j) Give the geological distribution of glossopteris.

Q2) Write short notes on (any two):

[10]

- a) Types of hinges in ostracod.
- b) Chemostratigraphy.
- c) Evolutionary trends in ammonoids.

P.T.O.

- Q3)** Explain the following (any two): **[10]**
- a) Chemical factors controlling stratification.
 - b) Evolutionary trends in glabella.
 - c) Unconformities involving a radical changes in the Environment.

Q4) What are vascular plants? Give the classification, characteristics and distribution of Gangamopteris. **[10]**

OR

Define correlation, Describe lateral continuity and lithological similarity for correlation.

Total No. of Questions : 4]

[Total No. of Pages : 2

P222

[3817] - 618

S.Y. B.Sc. (Sem. - II)

MICROBIOLOGY

MB - 221: Growth, Physiology & Systematics of Bacteria - II

(Paper -I) (Old Course)

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Figures to the right indicate full marks.*
- 3) *Draw neat labeled diagrams wherever necessary.*

Q1) Attempt the following questions:

[10]

- a) Name the medium used for citrate utilization test.
- b) Write the formula for % similarity coefficient.
- c) Define fermentation.
- d) Write any one reaction catalyzed by transketolase enzyme.
- e) Enlist the cofactors and Coenzymes required for conversion of pyruvate to Acetyl CoA.
- f) ATP yield when one molecule of Glucose is oxidized to CO₂ & H₂O is
i) 36 ii) 38 iii) 34 iv) 32
- g) Define dendrogram.
- h) Name any two organisms producing enzyme β galactosidase.
- i) Define T_m.
- j) The 2nd edition of Bergey's Manual of systematic Bacteriology uses _____ approach to classify bacteria.

Q2) Answer any two of the following:

[10]

- a) Define DNA hybridization. Explain any two methods in detail.
- b) Diagrammatically illustrate the Amphibolic nature of TCA. Cycle.
- c) Describe the homolactic fermentative pathway.

P.T.O.

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

- a) Define chemotaxonomy. Elaborate on cell wall composition in bacterial classification.
- b) What is substrate level phosphorylation? Explain with suitable examples
- c) Describe the principle of the V.P test.

Q4) Attempt any one of the following: **[10]**

- a) Describe in detail the glycolytic pathway with chemical structures . Add a note on ATP yield.
- b) Explain in detail the principle and method for detection of Amylase and gelatinase enzyme.

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[3817] - 619

S.Y. B.Sc. (Sem. - II)

MICROBIOLOGY

MB - 222: Bacterial Genetics and applied Microbiology - II

(Paper -II) (Old Course)

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Figures to the right indicate full marks.*
- 3) *Draw neat labeled diagrams wherever necessary.*

Q1) All questions are compulsory.

[10]

- a) Define aerosols.
- b) Define COD.
- c) Write significance of fish bioassay.
- d) What is Eutrophication?
- e) Define Distilled water.
- f) What do you mean by Svedberg unit?
- g) State principle of laminar air flow.
- h) BGLB stands for _____.
- i) Name any two air borne pathogens.
- j) State true or false.

Airflora of a particular locality never changes.

Q2) Attempt any two of the following:

[10]

- a) Enlist different methods of air sampling and explain any one method in detail.
- b) Write characters of indicators of faecal pollution. Explain it with the help of any two examples.
- c) Describe the principle and working of spectrophotometer.

P.T.O.

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

- a) Write a short note on biomagnification.
- b) What are the advantages and disadvantages of membrane filter technique.
- c) What are total solids and suspended solids? How these parameters are analysed?

Q4) Attempt any one of the following: **[10]**

- a) What is air sanitation? Enlist different physical and chemical agents used for air sanitation. Elaborate on sterilization of air with any one example.
- b) Explain secondary effluent treatment by using trickling filter and activated sludge process.

Total No. of Questions : 4]

[Total No. of Pages : 2

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[3817] - 624

S.Y. B.Sc. (Sem. II)

ELECTRONIC SCIENCE

EL - 221: Circuit Design principles and Applications - II

(Paper -I) (Old Course)

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicates full marks.*
- 4) *Use of non programmable calculator is allowed*

Q1) Attempt all of the following.

- a) State the Barkhausen criterion for sustained oscillations. [1]
- b) What do you mean by Zero - Crossing detector? [1]
- c) List any two advantages of SMPS. [1]
- d) What is the function of terminating resistor in R-2R ladder network? [1]
- e) "A Zener diode can be used as a reference voltage source." - Comment. [2]
- f) "The digital instruments uses dual-slope ADC." - Comment. [2]
- g) A monostable multivibrator using IC74121 has $R = 2K\Omega$ and $C = 0.01\mu F$. Calculate the monostable time period of it. [2]
- h) Determine the resolution of 8-bit DAC with a reference voltage 10 volts. [2]

Q2) Attempt any Two of the following:

- a) Draw the circuit diagram of Hartely oscillator using transistor and explain its working. [4]
- b) Explain monostable multivibrator by using OPAMP. [4]
- c) Draw the circuit diagram of positive low voltage regulator using IC 723 and explain it. [4]

P.T.O.

Q3) Attempt any Two of the following:

- a) Explain the working of Flash type ADC. [4]
- b) What is CVCC Power supply? Draw its functional block diagram and explain it. [4]
- c) Describe the working of schmitt trigger using OPAMP. [4]

Q4) Attempt all of the following:

- a) Draw the block diagram of DC regulated power supply and explain the function of each block in brief. [6]
- b) Explain basic triangular -square wave generator using OPAMP. Give the relation for frequency. [6]

OR

- a) Determine the frequency of phase shift oscillator whose feedback network uses $R=1\text{ k}\Omega$ and $C=0.01\text{ }\mu\text{F}$. [4]
- b) Design a voltage regulator circuit using LM 317 for $V_o = 5\text{V}$ and $I_L = 1\text{ AMP}$. With a current set resistor $R_1 = 240\text{ }\Omega$. [4]
- c) A 4,bit DAC using R-2R ladder network uses $V_{\text{ref}} = 16\text{ V}$. Calculate the output voltages for the digital inputs [DCBA]
 - i) 1011 ii) 1111. [4]

Total No. of Questions : 4]

[Total No. of Pages : 2

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[3817] - 625

S.Y. B.Sc. (Sem. II)

ELECTRONIC SCIENCE

EL - 222: Communication Systems - II

(Paper -II) (Old Course)

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:

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

Q1) All subquestions are compulsory.

- a) Give any two advantages of fiber optic cable over electric cable. [1]
- b) Define the term telephony. [1]
- c) List the drawbacks of parallel data transmission. [1]
- d) Give the applications of radio paging. [1]
- e) "A communication satellite is basically a radio relay station" - Comment. [2]
- f) "Ionospheric structure is same during day and night time" - Comment. [2]
- g) What is the bandwidth requirement of a data transmission channel if a word is transmitted at 1000 bits/second rate? [2]
- h) Find out total number of links required for fully connecting 50 telephone subscribers? [2]

Q2) Attempt any Two of the following:

- a) State different types of dialing methods used in telephone and compare their performance. [4]
- b) Describe bus topology along with neat diagram. [4]
- c) Write a short note on cordless telephone. [4]

P.T.O.

Q3) Attempt any Two of the following:

- a) Explain the working principle of a transponder with suitable block diagram. **[4]**
- b) What is line of sight propagation? Where it is used? State its draw backs and how can it be overcome? **[4]**
- c) What are different types of fiber optic cables? Explain the structure of any one type of cable. **[4]**

Q4) Attempt the following:

- a) Explain the concept of ISDN. How it is connected with other peripheral equipments.? List its advantages. **[6]**
- b) Withe neat block diagram explain the operation of electronic telephone exchange. **[6]**

OR

- a) Describe different tones in telephony. **[4]**
- b) Explain with block diagram digital data communication system. **[4]**
- c) What is Video conferencing? List the networks used for it. **[4]**

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[3817] - 626

S.Y. B.Sc.

DEFENCE AND STRATEGIC STUDIES

DS - 221: International Relations

(Old) (Sem. - II)

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:

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

Q1) Answer in 2 or 4 sentences each.

[16]

- a) Define 'International law'.
- b) What is Arms control?
- c) Where is the Headquarters of United Nations located?
- d) Define 'Diplomacy'.
- e) Introduce EEC.
- f) Define 'Terrorism'.
- g) What is Human Rights?
- h) Define 'Disarmament'.

Q2) Answer in 8 to 10 sentences (any two):

[8]

- a) Write the role of ICJ.
- b) Write the functions of diplomacy.
- c) Write about ASEAN.

Q3) Write short notes on (any two):

[8]

- a) SAARC.
- b) W.T.O.
- c) Human Rights.

P.T.O.

Q4) Answer in 16 to 20 sentences (any one)

[8]

- a) Explain the difficulties of Arms control and disarmament.
- b) Justify why terrorism is an international issue.

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[3817] - 627

S.Y. B.Sc. (Sem. - II)

DEFENCE AND STRATEGIC STUDIES

**DS. No. - 222: Geostrategy & Military Geography
(Old Course)**

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:

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

Q1) Answer in 2 to 4 sentences each.

[16]

- a) State any two principles of logistics.
- b) Where the maximum oil deposits situated in the world?
- c) Write any four names of energy production resources.
- d) Why the study of jungle warfare is essential for us?
- e) State the location of Jammu & Kashmir.
- f) What do you mean by OPEC?
- g) State the ideal period of Jungle warfare.
- h) Define "strategic minerals".

Q2) Answer in 8 to 10 sentences (any two):

[8]

- a) Write in brief characteristics of plain warfare.
- b) Highlight on geostrategic importance of Israel.
- c) Write in brief role of strategic minerals for Defence preparedness of the country.

P.T.O.

Q3) Write short notes on (any two): **[8]**

- a) Geostrategic importance of Andaman & Nicobar Islands.
- b) Logistic problems a High Altitude warfare.
- c) Geostrategic position of “Afghanistan”.

Q4) Answer in 18 to 20 sentences (any one): **[8]**

- a) Explain in detail the “Resources of Logistics”.
- b) Highlight on geostrategic position & importance of Diego - Garcia from American point of view.

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S.Y. B.Sc. (Sem. - II)

DEFENCE AND STRATEGIC STUDIES

DS - 223: India and Her Neighbours

(Old)

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:

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

Q1) Answer in 2 to 4 sentences.

[16]

- a) What do you mean by 'Threat perception'.
- b) How do you define 'Strategic Responses'.
- c) Write the name of member countries of SAARC.
- d) State the meaning of 'Ethnic conflict'.
- e) Define 'Foreign policy'.
- f) Explain the meaning of 'National Interest'.
- g) What do you mean by 'Strategic planning'?
- h) Define "International community".

Q2) Answer in 8 to 10 sentences (any two):

[8]

- a) Explain security issues in south Asia.
- b) Discuss Foreign policy of Bangladesh.
- c) Examine Historical Linkages between India and Myanmar.

Q3) Answer in short on (any two):

[8]

- a) India's role in Independence of Bangladesh.
- b) Discuss issues in India - Afganistan relations.
- c) Examine India's role in SAARC.

P.T.O.

Q4) Answer in 16 to 20 sentences (any one)

[8]

- a) Discuss India's relations with Sri-Lanka.
- b) Evaluate India's security challenges from South Asian security perspectives.

Total No. of Questions : 4]

[Total No. of Pages : 2

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S.Y. B.Sc. (Sem. - II)

ENVIRONMENTAL SCIENCE

Environment & Impact of Human Activities on Environment

(Paper -I) (Old 2004)

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Draw neat labelled diagrams wherever necessary.*
- 3) *Figures to the right indicate full marks.*

Q1) Attempt the following in 1 - 2 lines each.

[10]

- a) Define Urbanization.
- b) Write any two causes of land degradation.
- c) What is sustainable Agriculture.
- d) What is mulching?
- e) Define endangered species with example.
- f) Why Gypsum used to improve the soil pH.
- g) Write any two components of Green revolution.
- h) Define deforestation.
- i) What is vegetal cover.
- j) What are the effects of plant protection chemicals on environment.
(Any two)

Q2) Write short notes on (any two) of the following each in 8-10 lines.

[10]

- a) Depletion of micronutrients.
- b) Biological resources.
- c) Explain the effects of modern Agriculture on environment with suitable examples.

P.T.O.

- Q3)** Answer (any two) of the following each in 8 - 10 lines. **[10]**
- a) Define forest & give its importance.
 - b) Write in detail resources & their types with examples.
 - c) Evolution of induced Agroecosystem.

- Q4)** Discuss effects of over exploitation of biological resources. **[10]**

OR

Define soil degradation. Explain in detail the factors responsible for it.

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[3817] - 631

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

OPTIONAL ENGLISH (Old Course)

Text: Indian Prose for Effective Communication

By M. Nagarajan and Others

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:

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

Q1) a) Choose the right words from the list given below and fill in the blanks.
(AnyFour)

[received , increased, invented, flourished, preserved organised] **[4]**

- i) Many machines were in the beginning of the twentieth century.
- ii) The government toll charges on the highways.
- iii) India has its culture over the centuries.
- iv) Campaigns are to educate people on the evils of dowry system.
- v) The writer an award for his pioneering books in the field of women's education.
- vi) Many industries in different parts of India during last three decades.

b) Match the words in column 'A' with their antonyms given in 'B' **[3]**

A	B
i) adequate	a) destructive
ii) transparent	b) notorious
iii) constructive	c) inadequate
iv) famous	d) disperse
v) victory	e) opaque
vi) assemble	f) defeat

P.T.O.

- c) Arrange the following sentences into a coherent paragraph. [3]
- i) Someone said it would bring us luck and we moved ahead.
 - ii) It was the festive season in the month of October.
 - iii) Our location was seventy five miles away from Calcutta.
 - iv) I remember the first day's shooting of Pather Panchali very well.
 - v) We passed through several suburbs and heard drums and music.
 - vi) Last of the big poojas was taking place that day.

- Q2) a) Imagine that you are working as a Purchase Officer in a Mall. You want to place an order for some electrical goods to be purchased from L. G. Electronics, N. M. Joshi Marg, Mumbai, 10. Write a letter of order for electrical goods giving all the details about the purchases to be made, mode of payment and other necessary details. [5]

OR

Make a précis of the following passage to its one third of length and give a suitable title. (Rough work will be given credit) [5]

Speaking and writing are the two modes of communication we ordinarily use. The two, however, are not the same. Written English, for instance is not spoken English reduced to marks on paper. The two modes operate differently; each as its own characteristics strengths and weaknesses. In the first place , speech is much more direct and lively than writing. There is, for example, a much closer relationship between speaker and listener than between writer and reader.

Secondly, in a normal speaker-listener situation the listener frequently takes on the role of the speaker - he interrupts, questions, and seeks clarification. The listener, besides, is helped by the speaker's use of stress and intonation, gesture and facial expression. All these, which make for exact comprehension by the listener, are denied to the reader. A part from spoken English being more direct and effective than written English and the listener being more blessed than the reader, there are other differences between the two modes of communication. When you speak to someone, you don't as a rule take the trouble to organize your thoughts and ideas in fully intelligible remarks. You are relaxed and not so attentive to your grammar and your choice of words. Indeed, while speaking, you can get away with broken sentences, dangling modifiers, missing or misplaced articles and a host of other grammatical errors.

- b) Write a report of various activities conducted in your college on Annual Social Day. [5]

OR

You attended a lecture by an eminent educationist on the topic 'Student Discipline: Need of the Time'. Write down main points and sub-points of the lecture in the form of notes. [5]

Q3) Answer the following questions in about 30 words each. (Any Five) [10]

- i) Why does Mr. Tarkunde say that India has glorious past than any other country?
- ii) What is the modern concept of federalism? State two points.
- iii) What are R.K. Narayan's views on Headache?
- iv) What was Satyajit Ray's experience on the second day of shooting Pather Panchali?
- v) What are Dr. Ambedkar's views of political democracy?
- vi) Why does Swami Vivekananda say, 'physical help is least important'?
- vii) Explain the remark, 'Ashram was not in Pondichery but Pondichery was in Ashram.'

Q4) Answer the following questions in about 150 words each. (Any two). [10]

- i) What is Nehru's view about the judgement of the past and the present?
- ii) Sketch the character of M.S. Subbulakshmi.
- iii) What is the central idea of the text, 'The Last Letter to Indira'?



[3817] – 610

S.Y. B.Sc. (Sem. – II) Examination, 2010
ZOOLOGY
ZO-221 : Animal Systematics and Diversity

Time : 2 Hours

Max. Marks : 40

- Instructions :** 1) *All questions are compulsory.*
2) *Neat labelled diagrams must be drawn wherever necessary.*
3) *Figures to the right indicate full marks.*

1. Attempt the following : **10**
- a) Enlist any two affinities of Cyclostomata.
 - b) What is the significance of patagium ?
 - c) Define the term agnatha.
 - d) What is homocercal fin ?
 - e) Give any one use of scales of fishes.
 - f) What is synapsid skull ?
 - g) What are claspers ?
 - h) Mention the biological name of Indian cobra.
 - i) Write any two characters of Varanus.
 - j) Mention the name of Xth cranial nerve.
2. Write short notes on (**any two**) : **10**
- a) Structure of eye of scoliodon.
 - b) Accessory respiratory organs in clarias.
 - c) Snake Venom.

P.T.O.



3. Attempt the following (**any two**) : **10**

- a) Parental care in Hyla and Alytes.
- b) Sketch and label membranous labyrinth of Scoliodon.
- c) Male reproductive system of Scoliodon.

4. With neat labelled diagram describe the structure of heart of Scoliodon. Add a note on working of heart. **10**

OR

What is migration ? With suitable examples describe migration in fishes.



[3817] – 646

S.Y. B.Sc. (Sem. – II) Examination, 2010
INDUSTRIAL MICROBIOLOGY (Vocational)
Quality Assurance in Industrial Products
VOC. IND. MIC. – 222 (Paper – II)

Time : 2 Hours

Max. Marks : 40

- Instructions :** 1) *All questions are compulsory.*
2) *All questions carry equal marks.*
3) *Draw neat-labeled diagrams wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Use of log tables, calculator is allowed.*

1. Answer the following :

10

- i) What is a 'pharmacopoeia' ?
- ii) What is the ISI Mark and what does it signify ?
- iii) 'BIS' has replaced :
 - a) ISO
 - b) ISI
 - c) FDA
 - d) FPO
- iv) Ames test detects :
 - a) pyrogen
 - b) allergen
 - c) carcinogen
 - d) microbial contamination
- v) Name an organism other than *E.coli* that can be used for microbiological assay of Vitamin B₁₂.
- vi) State 2 tests carried out to assess quality of canned fruits.
- vii) 'Water for injection' has to be pyrogen-free but need not be sterile. (True/false)
- viii) Define 'commercial sterility'.
- ix) Which of the assay methods, turbidimetric or gel diffusion is more sensitive to quantitate low concentrations of Vitamin B₁₂ ?
- x) State 2 tests carried out to assess quality of packaged drinking water.

P.T.O.



2. Answer **any two** of the following : **10**
- a) State and explain the precautions necessary while performing the microbiological assay for Vitamin B₁₂.
 - b) Explain how the test used for detecting carcinogenicity of a pharmaceutical product is also suitable for detecting its mutagenicity.
 - c) Give a protocol for testing the sterility of a filled penicillin vial.
3. Answer **any two** of the following : **10**
- a) Enlist three products for which toxicity testing is mandatory and explain the Procedure of testing.
 - b) Explain in brief the procedure for allergen testing for a pharmaceutical product.
 - c) List the QC tests carried out for ‘water for injection’. Explain the significance of these tests.
4. Answer **any one** of the following : **10**
- a) Describe the procedure for checking presence of pyrogen in an injectible using an *in vitro* test.
 - b) With the help of a suitable example, describe the procedure for sterility testing of a finished pharmaceutical product.

Total No. of Questions : 3]

[Total No. of Page : 1

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[3817]-131

S.Y. B.Sc. (Sem. - I)

मराठी (Marathi)

विज्ञान कथा विश्व

(53111) (2008 Pattern)

वेळ : 2 तास]

[एकूण गुण : 40

सूचना :- 1) सर्व प्रश्न सोडविणे आवश्यक आहेत.

2) उजवीकडील अंक प्रश्नांचे पूर्ण गुण दर्शवितात.

प्रश्न 1) पुढीलपैकी कोणत्याही एका विषयावर 400 शब्दांपर्यंत निबंध लिहा. [10]

अ) प्रसारमाध्यमांचे सामाजिक परिणाम

ब) नदीजोड प्रकल्प एक आव्हान

क) अरे, पुन्हा आयुष्याच्या पेटवा मशाली (ललित)

प्रश्न 2) 'गुगली' या कथेतील सैद्धांतिक वास्तव सोदाहरण स्पष्ट करा. [15]

किंवा

'चंद्रलोकची सफर' या कथेच्या आधारे बार्बिकेनने कोणकोणती अनुमाने काढली ते सोदाहरण विशद करा.

प्रश्न 3) टिपा लिहा. (कोणत्याही तीन) [15]

अ) 'कनेक्शन' कथेतील परविश्वाचे चित्रण.

ब) 'चंद्रावरचा खून' कथेतील स्वामी आत्मानंद.

क) 'तरंगणारा संशोधक' कथेतील डॉ. समीर सदावर्ते यांना आलेला अनुभव.

ड) 'अंतराळातील मृत्यू' कथेमधील अंतराळ मोहीम.

इ) 'आकाश आणि जमीन' कथेतील अस्तमान.

फ) मराठी विज्ञान कथा विकासाचे स्वरूप.

□□□□

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[3817] - 132

S.Y. B.Sc. (Sem. - I)

हिंदी (HINDI)

(53211) (2008 Pattern) (नया पाठ्यक्रम)

समय : 2 घंटे]

[पूर्णांक : 40

पाठ्यपुस्तकें : i) प्रतिनिधि कहानियाँ :

संपादक – हिंदी विभाग, एस्. एन्. डी. टी. विश्वविद्यालय, मुंबई

ii) छायावाद : प्रतिनिधि रचनाएँ

संपादक – नीरा परमार

सूचनाएँ : i) सभी प्रश्न अनिवार्य हैं।

ii) दाहिनी ओर लिखे अंक प्रश्न के पूर्णांक हैं।

प्रश्न 1) अ) निम्नलिखित में से किन्हीं दस वाक्यों को शुद्ध करके फिर से लिखिए।

[10]

- 1) दस बजे तुम्हें आना है।
- 2) हमारा दफतर दस बजे खुलता है।
- 3) राम को पिताजी डाँटा।
- 4) सभा में अनेक श्रोते उपस्थित थे।
- 5) तूने मुझे अपने कार्यक्रम में बुलायाय नहीं।
- 6) पेड़ के ऊपर पंछी बैठे हैं।
- 7) आपका दर्शन हुआ।
- 8) स्कूल के निर्माण का कार्य पूरी हो गयी है।
- 9) पोलिस ने गुण्डे को पकड़ा।
- 10) शेर ने चीते की शिकार की।
- 11) नदी में बाढ़ आया था।
- 12) सुरेश ने अज्ञेय की उपन्यास पढ़ी है।

आ) निम्नलिखित अंग्रेज़ी अनुच्छेद का हिन्दी में अनुवाद कीजिए। [4]

Look at the sky on a dark clear night. Its appearance is beautiful. It is flooded with twinkling stars and planets distributed on a hemispherical surface called as 'celestial sphere'. All these celestial objects appear to move from east to west and their motion is periodic and orderly. This scene made man to think and think.

प्रश्न 2) अ) निम्नलिखित गद्य अवतरण की ससंदर्भ व्याख्या कीजिए। [5]

क) “यह झूठ है। बाबू साहब के ऐसा धर्मात्मा तो कोई है नहीं। कितनी विधवाएँ उनकी दी हुई धोती से अपना तन ढकती हैं। कितनी लड़कियों की ब्याह शादी होती है। कितने सताये हुए लोगों की उनके द्वारा रक्षा होती है।”

अथवा

“और एक-एक भागवान ऐसे पड़े हैं, जिनके पास जाड़ा जाय तो गर्मी से घबड़ा कर भागे ! मोटे-मोटे गद्दे, लिहाफ, कम्मल। मजाल है, जाड़े का गुजर हो जाय। तकदीर की खूबी है। मजूरी हम करें, मजा दूसरे लूटें।”

आ) निम्नलिखित पद्य अवतरण की ससंदर्भ व्याख्या कीजिए। [5]

ख) “सामान सभी तैयार,
कितने ही हैं असुर, चाहिए कितने तुझको हार ?
कर मेखला मुंड-मालाओं से वन मन-अभिरामा।”

अथवा

“इसमें सच्ची ममता के दाने बोने हैं,
इसमें जन की क्षमता के दाने बोने हैं,
इसमें मानव-ममता के दाने बोने हैं,
जिसमें उगल सके फिर धूल सुनहरी फसलें,
मानवता की-जीवन श्रम से हँसे दिशाएँ !”

प्रश्न 3) अ) निम्नलिखित प्रश्नों में से किन्हीं दो प्रश्नों के उत्तर लिखिए। [8]

ग) 'एक टोकरी भर मिट्टी' कहानी का आशय देकर शीर्षक की सार्थकता स्पष्ट कीजिए।

घ) 'उसने कहा था' कहानी के मार्मिक अंत पर प्रकाश डालिए।

ङ) 'सुनंदा आदर्श पत्नी है,' इस कथन के आलोक में उसका चरित्रचित्रण कीजिए।

च) चौधरी पीरबख्श का चरित्रचित्रण कीजिए।

आ) निम्नलिखित प्रश्नों में से किन्हीं दो प्रश्नों के उत्तर लिखिए। [8]

छ) 'जूही की कली' कविता में प्राकृतिक सौंदर्य का चित्रण किस प्रकार हुआ है? स्पष्ट कीजिए।

ज) कवि पंत जीवन में 'सुख-दुख' का बँटवारा किस प्रकार चाहते हैं?

झ) कवि पंत 'मानव' कविता द्वारा कौन-सा संदेश देना चाहते हैं?

ट) 'मानव ऐसी भी विरक्ति क्या जीवन के प्रति!' ऐसा कवि पंत 'ताज' कविता में क्यों कहते हैं?

□□□□

P158

[3817]-134

S.Y. B.Sc. (Sem. - I)

ARABIC (Functional)

(53711) (2008 Pattern)

Time : 2 Hours]

[Max. Marks : 40

N.B. : All questions are compulsory.

1. Translate into English/Urdu/Marathi 10
any two of the following Passages :

(أ) الْوَلَدُ الْمَجْتَهِدُ مَحْبُوبٌ لِهَ قَوْمٍ كَبِيرٍ -

فَصَوَّمَسْرُورٌ فِي كُلِّ وَقْتٍ - الْوَقْتُ عِنْدَهُ شَيْئٌ
شَمِيمٌ - ذَلِكَ وَلَدٌ كَسَلَانٌ - الْوَلَدُ الْكَسَلَانُ مُذْمُومٌ
صَوْمَحْزُونٌ فِي كُلِّ وَقْتٍ - الْوَقْتُ عِنْدَهُ لَيْسَ بِشَيْءٍ

(ب) هَذَا فَاوِءٌ هَذَا الْفَارُ صَغِيرٌ - ذَلِكَ قِطٌّ - ذَلِكَ

الْقِطُّ كَبِيرٌ - وَهُوَ أَبْيَضٌ - ذَلِكَ طَائِرٌ ذَلِكَ
الطَّائِرُ غُرَابٌ - وَهُوَ أَسْوَدٌ - هَذَا دَرَسٌ - هَذَا
الدَّرْسُ جَدِيدٌ - وَهُوَ سَهْلٌ لِاصْتِحَابٍ -

(ج) أَنَا وَلَدٌ - أَنْتَ وَالدُّ - أَنَا قَهِيرٌ - أَنْتَ لَطِيفٌ -

أَنَا سَمِينٌ - أَنْتَ هَزِيلٌ - أَنَا جَالِسٌ عَلَى
الْكُرْسِيِّ وَهُوَ مُشْغُولٌ - وَهُوَ وَقَفْتُ عَلَى الْأَرْضِ
أَنَا مُشْغُولٌ بِالْقِرَاءَةِ وَهُوَ إِلَيْنَا مُسَلِّمٌ -
أَنَا فِي الْقِرَاءَةِ وَهُوَ مُسَلِّمٌ إِلَيْنَا -

2. Translate and explain any Five Couplets
of the following:

10

(١) أَيُّهَا الْخَلَّةُ مَاذَا
لِيُشْغَلَ النَّاسُ بِجُبَّتِكَ

(٢) رَأَيْتَنِي فِي حُسْنِ تَشْهُلِي
لَسْتُ مَحْبُوبًا لِحُبِّكَ

(٣) شَمْسُ السَّمَاءِ السَّاطِعَةُ
فِي كُلِّ يَوْمٍ طَالِعَةٌ

(٤) تَبْدُلُنَا فِي الْمَشْرِقِ
لِحَدِّ الضِّيَاءِ الْمَشْرِقِ

(٥) فَكُلُّ حَيٍّ بَيْنَهُمْ
وَالْحَيَاةُ بِرُكْنِهِمْ

(٦) حَيَاتُنَا فِي الْعَمَلِ
وَسَعِينَا هُوَ الْأَمَلُ

(٧) كِتَابِي أَنْتَ تَمْرِيضُ عَلَيَّ
وَأَنْتَ لِمَا أَشْتَهِي مَوْرِدٌ

3. Answer in Arabic any Five of the following: 10

- (1) مَنْ رُئِبَتْ ؟
- (2) هَلْ أَنْتَ كَبِيرٌ ؟
- (3) مَتَى امْتِحَانُكَ ؟
- (4) مَا ذَا لِكَ ؟
- (5) مَا لَوْنُ الْقُرَابِ ؟
- (6) مَتَى هَذَا ؟
- (7) كَيْفَ خَالَكَ ؟

4. Write the Letter in Arabic to the College Principal. 10

أكتب الرسالة في العربية
إلى رئيس الكلية

□□□□

P165**[3817]-201****S.Y. B.Sc.****MATHEMATICS****MT-51121 : Linear Algebra****(Paper -I) (New Course) (Semester - II)***Time : 2 Hours]**[Max. Marks : 40**Instructions to the candidates:*

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

Q1) Solve the following questions : **[10]**

- a) What is $L(S)$? If $S = \{e_1, e_2, e_1 + e_2\}$ in \mathbb{R}^3 .
- b) Let $V = \mathbb{R}^3$ be the vector space and $W = \{(x, y, z) \in V/x^2 - y^2 = 0\}$. Is W a subspace of V ? Why?
- c) In a vector space V , prove that there exist unique additive inverse.
- d) Show that the vectors $V_1 = (2, -5)$ and $V_2 = (4, -10)$ are dependent in \mathbb{R}^2 .
- e) Compute the angle between two vectors (x, y) and $(-y, x)$ in \mathbb{R}^2 .
- f) Define dimension of vector space.
- g) Let $T = \mathbb{R}^2 \rightarrow \mathbb{R}^3$ be given by $T(x, y) = (x, x + y, y + 3)$. Is T a linear transformation? Why?
- h) Let $T_1 = \mathbb{R}^2 \rightarrow \mathbb{R}^2$ and $T_2 = \mathbb{R}^2 \rightarrow \mathbb{R}^3$ be given by $T_1(x, y) = (x + y, y)$ and $T_2(x_1, y_1) = (2x_1, y_1, x_1 + y_1)$. Find formula for $T_2 \circ T_1$.
- i) Write any two sub spaces of \mathbb{R}^2 .
- j) If $T : \mathbb{R}^2 \rightarrow \mathbb{R}^2$ be linear transformation given by $T(x, y) = \left(\frac{\sqrt{3}}{2}x + \frac{1}{2}y, -\frac{1}{2}x + \frac{\sqrt{3}}{2}y \right)$ then show that T is orthogonal.

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

- a) Prove that if a vector space V has a basis of n elements then any set of $(n + 1)$ vectors is linearly dependent.
- b) Find a basis and dimension of sub space $W = \{(x, y, z) \in \mathbb{R}^3/z = x + y\}$ of \mathbb{R}^3 .

- c) Determine whether the set of vectors $\{(1, 2, -3), (1, -3, 2), (2, -1, 5)\}$ are basis of \mathbb{R}^3 . Give reasons.

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

- a) Define Kernel of T and show that if $T: V \rightarrow W$ be a linear transformation then the Kernel of T is subspace of V.
- b) If $T: \mathbb{R}^3 \rightarrow \mathbb{R}^2$ be a linear transformation such that $T(1, 0, 0) = (0, 0)$, $T(0, 1, 0) = (1, 1)$ and $T(0, 0, 1) = (1, -1)$ then find the formula for $T(x, y, z)$ and hence determine the Nullity and Rank of T.

- c) Let P_2 be a vector space with inner product $\langle p, q \rangle = \int_{-1}^1 p(x)q(x)dx$, Find

- i) $\|p\|$ for $p = 1 - x$ and
 ii) $d \langle p, q \rangle$, if $p = x, q = x^2$.

Q4) Attempt any one of the following : **[10]**

- a) i) Find the eigen values of the matrix $A = \begin{bmatrix} 2 & -1 & 1 \\ 0 & 3 & -1 \\ 2 & 1 & 3 \end{bmatrix}$ then find the eigen vector corresponding to smallest eigen value.

- ii) Let \mathbb{R}^2 be Euclidean inner product. Use Gram-Schmidt process to transform the basis $u_1 = (1, -3)$ and $u_2 = (2, 2)$ to orthonormal basis of \mathbb{R}^2 .

- b) i) Let $A = \begin{bmatrix} 1 & 2 \\ 3 & 2 \end{bmatrix}$, verify Cayley Hamilton theorem and hence find A^{-1} .

- ii) If V is an inner product space then show that $\|u\| = \langle u, u \rangle^{1/2}$ for $u \in V$ satisfies the following properties. For all u and v in V and for any scalar K,

- 1) $\|ku\| = |k| \|u\|$.
 2) $\|u + v\| \leq \|u\| + \|v\|$.



P166**[3817]-202****S.Y. B.Sc.****MATHEMATICS****Paper - II (A) : Vector Calculus
(New Course) (Sem. - II)***Time : 2 Hours]**[Max. Marks : 40**Instructions to the candidates:*

- 1) All questions are compulsory.
- 2) Figures to the right indicate full marks.
- 3) Choose the relevant question paper and attempt the same.

Q1) Answer the following questions :**[10]**

- a) Evaluate the following limit, if it exists.

$$\lim_{t \rightarrow 0} \bar{f}(t) \text{ where } \bar{f}(t) = \begin{cases} ti - j, & t > 0 \\ ti + j, & t < 0 \end{cases}$$

- b) If $\bar{r} = \frac{a}{2}(x+y)i + \frac{b}{2}(x-y)j + \frac{xy}{2}k$, find $\frac{\partial^2 \bar{r}}{\partial x \partial y}$ at $(2, 2, -1)$.

- c) A space curve is given by $x = t, y = t^2, z = \frac{2}{3}t^3$. Find a unit tangent vector (\bar{T}) at $t = 1$.

- d) Give geometrical interpretation of the gradient of a scalar point function.

- e) If $\bar{r} = xi + yj + zk$, find $\text{curl } \bar{r}$.

- f) Find λ if $\bar{u} = (x+3y)i + (y-2z)j + (x+\lambda z)k$ is solenoidal.

- g) In what direction from the point $(2, 1, -1)$ is the directional derivative of $\phi(x, y, z) = xyz$ is a maximum?

- h) Evaluate the integral of $\bar{f} = x^2i - xyj$ from $(0, 0)$ to $(1, 1)$ along the parabola $y^2 = x$.

- i) State Gauss's divergence theorem.

- j) Use Stoke's theorem to show that $\oint_C [(y+z)i + (z+x)j + (x+y)k] \cdot d\bar{r} = 0$

where C is any closed path.

P.T.O.

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

- a) If a vector function $\vec{f}(t)$ is differentiable at $t = t_0$ then prove that it is continuous at $t = t_0$.
- b) For the curve $\vec{r}(t) = a \cos t i + a \sin t j + b t k$, find the equation of the normal plane at $t = \frac{\pi}{2}$.
- c) Show that $\vec{f} = (6xy + z^3)i + (3x^2 - z)j + (3xz^2 - y)k$ is irrotational. Find ϕ such that $\vec{f} = \nabla \phi$

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

- a) Prove with usual meaning, $\text{curl}(\phi \vec{u}) = \text{grad} \phi \times \vec{u} + \phi \text{curl} \vec{u}$.
- b) Show that $\nabla^2 \left(\frac{1}{r} \right) = 0$, $r = \sqrt{x^2 + y^2 + z^2}$.
- c) Find the directional derivative of $\phi = xy + yz + zx$ at the point $(1, -1, 1)$ along the line joining the points $(1, 1, 1)$ and $(2, -2, 2)$.

Q4) Attempt any one of the following : **[10]**

- a) State and prove Green's theorem.
- b) i) If $\vec{f} = (2x^2 - 2z)i - 2xyj - 4xk$, evaluate $\iiint_V \nabla \cdot \vec{f} \, dv$ where V is the closed region bounded by the planes $x = 0, y = 0, z = 0$ and $2x + 2y + z = 4$.
ii) Evaluate $\int_S \phi \vec{n} \, ds$ where $\phi = \frac{3xyz}{8}$ and S is the surface of the cylinder $x^2 + y^2 = 16$, included between $z = 0$ and $z = 5$ in the first octant.



P166

[3817]-202

S.Y. B.Sc.

MATHEMATICS

Paper - II (B) : Discrete Mathematics

(New Course) (Sem. - II)

Time : 2 Hours]

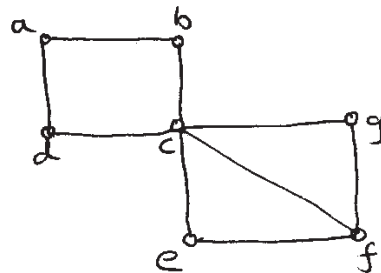
[Max. Marks : 40

Instructions to the candidates:

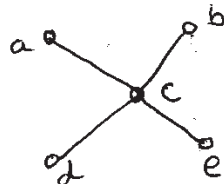
- 1) *Figures to the right indicate full marks.*
- 2) *Use of single memory, non-programmable scientific calculator is allowed.*

Q1) Attempt each of the following : **[10]**

- a) A man, a woman, a boy, a girl, a dog and a cat are walking down a long winding road one after the another. In how many ways can this happen?
- b) How many committees of five people can be chosen from 20 men and 12 women, if exactly four women must be on each committee?
- c) Consider the recurrence relation $C_n = C_{n-1} + 2 C_{n-2}$. Is it linear? What is its degree?
- d) Give two different subgraphs with four vertices and four edges for the graph shown below.

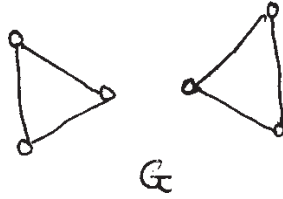


- e) Tell whether the following graph has an Euler circuit. Explain.



- f) Give one Hamiltonian circuit in K_5 .
- g) In how many ways can seven people form a circle?
- h) How many 5-card hands consist only of spades?

- i) Find the chromatic polynomial of the following graph.



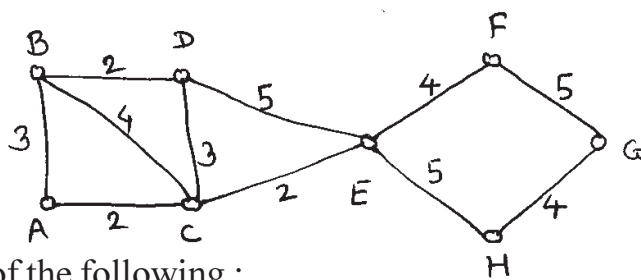
- j) Give an example of the connected graph that has a Hamiltonian cycle but no Euler circuit.

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

- a) Prove that for any positive integer n , the number $n^5 - n$ is divisible by 5.
- b) In how many ways can six men and six women be seated in a row if
 - i) any person may sit next to any other?
 - ii) men and women must occupy alternate seats?
- c) Show that if five points are selected in a square whose sides have length 1 inch, at least two of the points must be no more than $1/\sqrt{2}$ inches apart.

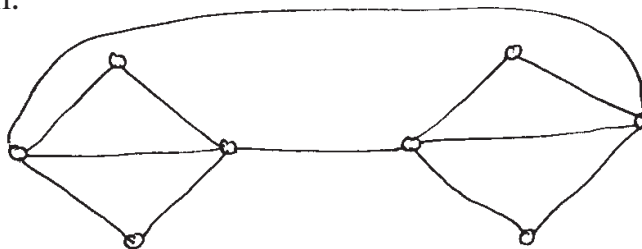
Q3) Attempt any two of the following : **[10]**

- a) Find an explicit formula for the sequence defined by $C_n = 3C_{n-1} - 2C_{n-2}$ with initial conditions $C_1 = 5$ and $C_2 = 3$.
- b) Let the number of edges of a graph G be m . Prove that G has a Hamiltonian circuit if $m \geq \frac{1}{2}(n^2 - 3n + 6)$.
- c) Use Kruskal's algorithm to find a minimal spanning tree for the following graph.



Q4) Attempt any one of the following : **[10]**

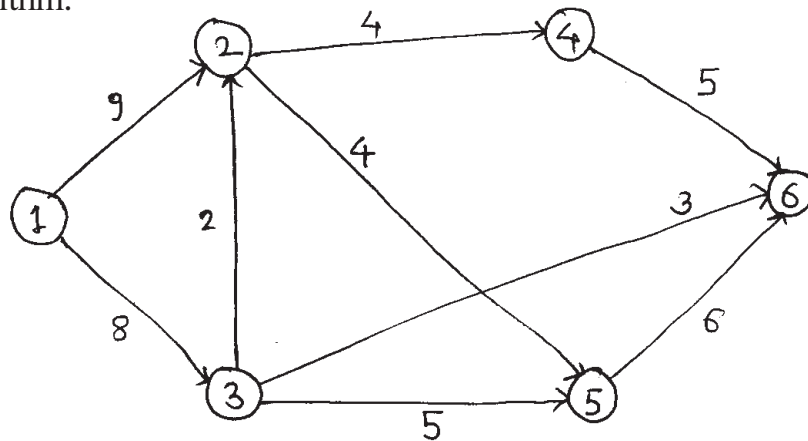
- a) i) Use Fleury's algorithm to construct an Euler circuit for the following graph.



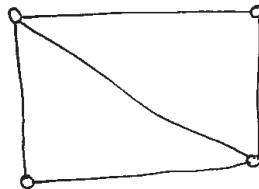
- ii) Let M_R be the matrix of a marriage suitability relation between five men and five women. Can each man marry a suitable woman?

$$M_R = \begin{bmatrix} 1 & 0 & 1 & 0 & 1 \\ 0 & 1 & 1 & 0 & 1 \\ 1 & 0 & 1 & 1 & 0 \\ 1 & 1 & 0 & 1 & 0 \\ 0 & 1 & 0 & 1 & 1 \end{bmatrix}$$

- b) i) Find a maximum flow in the following network by using the labelling algorithm.



- ii) Find the chromatic polynomial P_G for the following graph and use P_G to find $\chi(G)$.



P167

[3817]-203

S.Y. B.Sc.

PHYSICS

**PH-221 : Oscillations, Waves and Sound
(Paper - I) (New Course) (Semester - II)**

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Figures to the right indicate full marks.*
- 3) *Use of calculator and log table is allowed.*
- 4) *Neat diagrams must be drawn wherever necessary.*

Q1) Attempt all of the following :

- a) If the potential energy of the oscillator performing simple harmonic motion is $\frac{1}{2}kx^2$, then find the restoring force acting on it. [1]
- b) What do you mean by damped oscillatory motion? [1]
- c) Distinguish between forced oscillations and damped oscillations. [1]
- d) What are S-waves? [1]
- e) What is Doppler effect? Give its two applications. [1]
- f) State factors on which pitch of sound depends. [1]
- g) A simple harmonic oscillator of mass 50 gram oscillates with frequency 10 Hz. If total energy of the oscillator is 0.9859 J, determine the length of path of oscillations. [1]
- h) A metal wire of length 50 cm weighs 5 gm. If it is stretched by a force of 10 N, what would be the speed of a transverse wave passing on it? [1]
- i) Define half width of amplitude resonance curve. [1]
- j) A capacitor of 0.4 μ F, an inductor of 80 mH and a resistance of 400 ohms are connected in series. Can the electrical circuit be oscillatory?[1]

Q2) Attempt any two of the following :

- a) Show that the average rate of absorption of energy over period for an oscillator performing forced oscillation is $\frac{1}{2}A^2q^2R$. [5]

- b) A particle is subjected to two perpendicular simple harmonic motions have same frequency and amplitude. Prove that the resultant path of the particle is circle for the phase difference $\frac{\pi}{2}$. [5]
- c) Obtain the expression for acoustic pressure and show that the intensity of sound varies directly as square of excess pressure. [5]

Q3) Attempt any two of the following :

- a) Velocity of star moving away from the earth is 6×10^3 m/s. Find the displacement of a spectral line of wavelength 5000 \AA in the spectrum of star from its natural position. [5]
- b) The equation of forced oscillations of a body is given by

$$5 \frac{d^2x}{dt^2} + 20 \left(\frac{dx}{dt} \right) + 245x = f_0 \sin qt.$$

Determine the resonant angular frequency at which velocity resonance takes place. Also determine the half width of resonance curve. [5]

- c) The velocity of sound in water of density 1000 kg/m^3 is 1500 m/s . Determine the bulk modulus of elasticity. [5]

Q4) Attempt the following :

- a) i) Show that Doppler effect is assymmetric in sound. [4]
 ii) What are Lissajous figures? Explain mechanical method for obtaining Lissajous figures. [4]

OR

- i) Define quality factor and obtain expression for quality factor of the damped oscillator. [4]
 ii) Obtain expression for energy density of a plane progressive wave propagating through a medium. [4]
- b) Attempt any one of the following :
- i) A railway engine blowing a whistle of frequency 960 Hz and a listener are moving with velocities 10 m/s and 2 m/s towards each other. The speed of sound in air is 330 m/s . Determine the apparent frequency of sound as heard by the listener. [2]
 ii) The stroboscopic disc is illuminated by a neon lamp. Dots in a certain ring appeared stationary when disc was making 25 rev/sec . Determine the number of dots in the ring. The frequency of A.C. is 50 Hz . [2]



Total No. of Questions : 4]

[Total No. of Pages : 2

P168

[3817]-204

S.Y. B.Sc.

PHYSICS

PH-222 : Optics

(Paper - II) (New) (Semester - II)

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Figures to the right indicate full marks.*
- 3) *Use of calculator and log table is allowed.*
- 4) *Neat diagrams must be drawn wherever necessary.*

Q1) Attempt all of the following :

- a) Write Len's makers formula. [1]
- b) What is the condition for achromatic combination. [1]
- c) Define magnifying power of simple microscope. [1]
- d) What is an eye-piece? [1]
- e) State Brewster's law. [1]
- f) Two thin lenses of focal lengths 10 cm and 20 cm are placed coaxially 10 cm apart. Find focal length of combination of the lenses. [1]
- g) What is distortion? [1]
- h) Define grating element. [1]
- i) The polarizing angle for air and transparent material is 60° . Calculate refractive index of material. [1]
- j) If the movable mirror of Michelson's interferometer is moved through a distance of 0.0295 mm, a shift of 100 fringes is observed. Calculate wavelength of light used. [1]

Q2) Attempt any two of the following :

- a) Explain the working of Huygen's eye-piece and obtain its equivalent focal length. [5]
- b) Describe the principle, construction and working of Michelson's interferometer. [5]
- c) State and explain law of Malus. [5]

P.T.O.

Q3) Attempt any two of the following :

- a) A thin convex lens of focal length 30 cm is kept coaxially at a distance of 20 cm from a concave lens of focal length 20 cm. Locate the cardinal points. [5]
- b) A parallel beam of sodium light is incident on a oil film floating on water. When the film is observed at an angle of 30° with the normal, 8th dark fringe is seen. Determine thickness of the film. [5]
Given : $\mu = 1.46$ and $\lambda = 5890 \text{ \AA}$.
- c) A 60° calcite prism is cut with its faces parallel to the optic axis. Calculate the angle of minimum deviation for yellow colour of $\lambda = 6 \times 10^{-5} \text{ cm}$ for ordinary and extraordinary rays. [5]
Given : $\mu_o = 1.658$, $\mu_e = 1.486$.

Q4) Attempt the following :

- a) i) Show that the distance of the first principal plane from the first lens of an optical system is given by $\alpha = \frac{xf}{f_2}$. [4]
- ii) Show that the condition for minimum spherical aberration is $f_1 - f_2 = x$. [4]

OR

- i) Prove that for a combination of two thin lenses of focal lengths f_1 and f_2 separated by a distance x , the focal length of the combination is given by $\frac{1}{f} = \frac{1}{f_1} + \frac{1}{f_2} - \frac{x}{f_1 f_2}$. [4]
- ii) What is curvature of field? Explain how it is reduced. [4]
- b) Attempt any one of the following :
- i) Distinguish between interference and diffraction. [2]
- ii) Find the resolving power of grating which can just resolve the wavelengths 5890 \AA and 5896 \AA . [2]



P169

[3817]-205

S.Y. B.Sc.

CHEMISTRY - I

CH : 221 Inorganic Chemistry

(New Course) (Semester - II)

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Figures to the right indicate full marks.*
- 3) *Neat diagrams must be drawn wherever necessary.*

Q1) Answer the following :

[10]

- a) What is metallurgy?
- b) Which reagent is used in Bayer's process?
- c) Give commercial forms of iron.
- d) Draw structure of H_2SO_4 .
- e) Due to which metal ion 'Ouch-Ouch' disease occurred?
- f) Identify the conjugate acid-base pair from following reaction.
$$\text{NH}_3 + \text{H}_2\text{O} \rightleftharpoons \text{NH}_4^+ + \text{OH}^-$$
- g) Why transition metals form coloured compounds?
- h) What is passivity?
- i) Why HI is stronger acid than HF?
- j) Explain the term paramagnetism.

Q2) Attempt any two of the following :

[10]

- a) Write the names, symbols and electronic configurations of $\overline{\text{IV}}$ A group.
Explain the trends in the following properties of group $\overline{\text{IV}}$ A elements
 - i) Atomic size.
 - ii) Ionisation potential.
- b) Explain concept of acid-base according to Bronsted-Lowry theory. Give advantage and disadvantage of this theory.

- c) Answer the following :
- Compare between calcination and roasting.
 - Explain biochemical effect of Hg^{2+} .

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

- What are transition elements & comment on the following properties.
 - Catalytic activity.
 - Complex formation ability.
- Discuss the physico chemical principles involved in extraction of Aluminium.
- What is corrosion? Give any two methods for prevention of metal from corrosion.

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

- Explain acidic & basic Bessemer's process for manufacture of steel with diagram.
- Explain the manufacture of cast iron using blast furnace.

b) Attempt any one of following : **[4]**

- Explain structure & bonding in B_2H_6 .
- What are oxyacids? Give trends in the strength of oxyacids.
- Explain differential aeration principle.



P170

[3817]-206

S.Y. B.Sc.

CHEMISTRY

CH-222 : Analytical Chemistry

(New Course) (Semester - II) (51322)

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Figures to the right indicate full marks.*
- 3) *Use of logarithmic tables and calculator is allowed.*
- 4) *Neat diagrams must be drawn wherever necessary.*

Q1) Answer the following :

[10]

- a) What is mean by flux? Give its example.
- b) What is a group reagent?
- c) Define empirical formula.
- d) Define 'End point' in titration.
- e) What precautions are taken if $\text{Na}_2\text{S}_2\text{O}_3$ solution is to be preserved for a long time?
- f) Explain the term accuracy.
- g) How is carboxylic group detected and confirmed?
- h) Why NH_4Cl is added before adding NH_4OH ?
- i) What are the limitations of distribution coefficient?
- j) Give two examples of primary standard substances.

Q2) a) Answer any two of the following :

[6]

- i) Explain factors affecting solvent extraction.
 - ii) Discuss the use of yellow ammonium sulphide in qualitative analysis.
 - iii) Describe the method of estimation of available chlorine in bleaching powder.
- b) 0.4 gm of an organic compound gave on combustion 0.6 gm of carbondioxide, calculate the percentage of carbon in the compound. **[4]**

Q3) Answer any two of the following : [6]

- a) i) What are mixed indicators? Where are they used? Give preparation of any one mixed indicator.
- ii) What do you understand by the term significant figures? Give the rules of computation with significant figures.
- iii) How is ketone detected? Give two characteristic tests for ketones.
- b) Solve any one of the following : [4]
- i) The percentage of nitrogen in an organic compound was reported by four different chemists as 30.00, 30.10, 30.20 & 30.30. Calculate the mean deviation, standard deviation and relative mean deviation.
- ii) One litre of aqueous solution contains 10 gm of an organic acid. Calculate the amount of acid extracted in ether. Distribution ratio for the extraction is 10.

Q4) a) Explain the titration curve of a strong acid and weak base. Which indicator will you choose for this titration? [6]

OR

Describe Carius method of halogen estimation in organic compound with diagram.

- b) Answer any one of the following : [4]
- i) What are the requirements for a successful application of an adsorption indicator?
- ii) When does phosphate ion interfere in qualitative analysis? Discuss the ferric chloride method for the removal of phosphate ion.

* * *

P171

[3817]-207

S.Y. B.Sc.

BOTANY

BO-221 : Structural Botany

(Anatomy, Embryology and Palynology)

(New Course) (Paper - I) (Theory) (Semester - II)

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Figures to the right indicate full marks.*
- 3) *Draw neat and labelled diagrams wherever necessary.*

Q1) Attempt the following :

[10]

- a) Write any two functions of stomata.
- b) Mention any two functions of sclerenchyma.
- c) What is tylosis?
- d) Give basic principle used in distribution of mechanical tissue in plant.
- e) Define embryology.
- f) What is syngamy?
- g) Define orthotropous ovule.
- h) Give the role of tapetum in microsporogenesis.
- i) Define phormo palynology.
- j) What is colpate aperture of pollen grain?

Q2) Answer any two of the following :

[10]

- a) Describe the structure of mature dicot embryo.
- b) Explain the principle of inflexibility in distribution of mechanical tissues in plant.
- c) Describe with the help of neat labelled diagram exine stratification of pollen grains.

Q3) Write short notes on any two of the following : **[10]**

- a) Cellular endosperm.
- b) Importance of palynology in pollen allergy.
- c) Anomalous secondary growth in Bignonia stem.

Q4) What is normal secondary growth? Explain the process in perennial dicot stem. **[10]**

OR

What is mega sporogenesis? Describe the development of Polygonum type of embryo sac.



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[3817] - 208

S.Y. B.Sc. (Sem. - II)

BOTANY

BO-222: Fundamentals of Plant Biotechnology

(Paper-II) (New Course)

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:

- 1) All questions are compulsory.*
- 2) Figures to the right indicate full marks.*
- 3) Draw neat labelled diagrams wherever necessary.*

Q1) Attempt the following:

[10]

- a) Enlist the substrates for biotechnological processes.
- b) Define Genome.
- c) Give different methods of fermentation.
- d) Define vector.
- e) Give any two applications of enzymes.
- f) What is energy?
- g) Enlist the microorganisms used as sources of SCP.
- h) What is totipotency?
- i) What is synthetic seed?
- j) Enlist different types of wastes.

P.T.O.

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

- a) What are environmental hazards related to release of GM organisms?
- b) Describe the various properties of enzymes.
- c) Explain the economic importance of SCP.

Q3) Write short notes on (Any Two): [10]

- a) Biotechnology-an interdisciplinary subject.
- b) Secure landfill method.
- c) Sources of biomass.

Q4) What is bioprocess technology? Give the steps involved in the same. [10]

OR

Define embryogenesis. Explain the mechanism of embryogenesis and give the advantages of the same.



P173

[3817] - 209

S.Y. B.Sc.

ZOOLOGY

**Zy-221: General Zoology and Biological Techniques-II
(New Course) (Paper-I) (Sem. - II) (2008 Pattern)**

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:

- 1) All questions are compulsory.*
- 2) Figures to the right indicate full marks.*
- 3) Neat labelled diagrams must be drawn wherever necessary.*

Q1) Attempt the following:

[10]

- a) Write the names of any two cranial nerves of Scoliodon.
- b) Write any two examples of birds with cursorial feet.
- c) What do you mean by mud probing beak?
- d) What is the function of olfactory lobes of Scoliodon.
- e) What do you mean by dating of fossils?
- f) Give the name of portal system in Scoliodon.
- g) What is PPM?
- h) What do you mean by branchial heart?
- i) Explain serial dilution.
- j) What do you mean by latitudinal migration?

P.T.O.

- Q2)** Write short notes on (any two): **[10]**
- a) Method of preparation of molar solution.
 - b) Parental care in Hyla.
 - c) Habit, habitat and economic importance of Scoliodon.

- Q3)** Attempt the following (any two): **[10]**
- a) Explain cycloid and ctenoid scales.
 - b) Sketch and label membranous labyrinth of Scoliodon.
 - c) Explain principle of electron microscope.

- Q4)** Give an account of digestive system of Scoliodon. **[10]**

OR

Describe the method of total RBC count by haemocytometry and state its significance.



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[3817] - 210

S.Y. B.Sc.

ZOOLOGY

ZY - 222: Applied Zoology - II

(Apiculture & Sericulture)

(New Course) (Paper - II) (Sem. - II) (2008 Pattern)

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:

- 1) All questions are compulsory.*
- 2) Figures to the right indicate full marks.*
- 3) Neat labelled diagrams must be drawn wherever necessary.*

Q1) Attempt the following:

[10]

- a) Define Apiculture.
- b) Enlist any two types of Silkmoths.
- c) Define supersedure.
- d) What is hibernating eggs?
- e) What is univoltine?
- f) Enlist any two bee predators.
- g) Write any two disadvantages of shoot harvest method.
- h) What is bee pollination?
- i) What is stiffling?
- j) Enlist any two fungal diseases in silkworm.

P.T.O.

- Q2)** Write short notes on (Any Two): **[10]**
- a) Functions of worker bee.
 - b) Pebrine disease of silkworm.
 - c) Any two rearing methods of silkworm.

- Q3)** Attempt the following (Any Two): **[10]**
- a) Describe tail wagging dance in honey bees.
 - b) Sketch & label Hoffman type self spacing frame.
 - c) Explain dermestid beetle and uzi fly.

- Q4)** Describe in detail the life cycle of honey bee. **[10]**

OR

What is moriculture? Describe in detail cultivation of mulberry.



Total No. of Questions : 4]

[Total No. of Pages : 2

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[3817] - 211
S.Y. B.Sc.(Sem. - II)
GEOLOGY
GL - 221: Petrology
(Paper-I) (New Course)

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:

- 1) All questions are compulsory.*
- 2) Neat diagrams must be drawn wherever necessary.*
- 3) Figures to the right indicate full marks.*

Q1) Answer the following questions:

[10]

- a) What are polysilicates?
- b) Name any two anti-stress minerals.
- c) What is eutectic crystallisation?
- d) Define the term provenance.
- e) What is mylonite?
- f) What is roundness of sediments?
- g) What is granulose structure?
- h) Define the term devitrification?
- i) What is diagenetic differentiation?
- j) What is mica garnet schist?

P.T.O.

- Q2) Write notes on(Any Two):** **[10]**
- a) Regional metamorphism of basic igneous rocks.
 - b) Types of sandstones.
 - c) Crush breccia and crush conglomerate.

- Q3) Explain the following (Any Two):** **[10]**
- a) Xenolithic and spherulitic structures.
 - b) Effects of regional metamorphism on quartzo-felspathic rocks.
 - c) Phosphatic and ferruginous biochemical deposits.

- Q4) Define primary sedimentary structures, Explain the origin & environmental significance of ripple marks and mud cracks.** **[10]**

OR

Describe the crystallisation of a unicomponent magma.



P176

[3817] - 212

S.Y. B.Sc.

GEOLOGY

GL-222: Palaeontology & Stratigraphy

(Sem. - II) (New Course)

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:

- 1) All questions are compulsory.*
- 2) Figures to the right indicate full marks.*
- 3) Neat diagrams must be drawn wherever necessary.*

Q1) Answer the following questions:

[10]

- a) State the principles of stratigraphy.
- b) Define chronostratigraphic unit.
- c) Define an Assemblage zone.
- d) What are alternations?
- e) Define assymmetrical cycles.
- f) What is marine transgression?
- g) What is an index fossil?
- h) Define microevolution in organisms.
- i) What are diatoms?
- j) Define unconformity.

P.T.O.

- Q2) Write notes on(Any Two):** **[10]**
- a) Biostratigraphic units.
 - b) Classification of unconformities based on no radical change in environment.
 - c) Logging as a method for collection of stratigraphic data.

- Q3) Write notes on (Any Two):** **[10]**
- a) Branches of micropalaeontology.
 - b) Uses of pollens and spores.
 - c) Palaeoecological significance of foraminifers.

- Q4) Explain the chemical factors controlling stratification.** **[10]**

OR

Describe the morphology of hard parts of a typical ostracod.



P177

[3817]-213

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

STATISTICS

ST-221 : Statistical Methods and National Income

(New Course) (2008 Pattern)

Time : 2 Hours]

[Max. Marks : 40

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 meaning.*

Q1) Attempt each of the following :

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

- i) The residual $X_{1.23}$ is called as residual of order.
 - A) 0
 - B) 1
 - C) 2
 - D) 3
- ii) A null hypothesis is a
 - A) hypothesis of interest.
 - B) hypothesis of no difference.
 - C) hypothesis which assigns value 0 to the parameter.
 - D) hypothesis which is simple.
- iii) Net export =
 - A) Subsidies – Indirect taxes.
 - B) Import - Export.
 - C) Indirect taxes - Subsidies.
 - D) Export - Import.

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

[1 each]

- i) A tool scatter diagram is very much useful to guess the regression equation in case of logistic regression.
- ii) In test of significance two types of errors are possible.
- iii) Index numbers are unitless.

- c) If $r_{12} = r_{13.2} = \frac{1}{2}$ find $R_{1.23}$. [1]
- d) Define the term 'unbiased estimator'. [1]
- e) In testing of significance of difference between two population proportions, the first sample gives 20 success in 100 trials and the second sample of 50 trials gives 13 success. What is the pooled estimate of P. [1]
- f) If $P_{23} = 230$, $P_{02} = 150$, find P_{03} . [1]

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

- a) i) With usual notations, prove that necessary and sufficient condition for the three regression planes to coincide is

$$r_{12}^2 + r_{13}^2 + r_{23}^2 - 2r_{12}r_{13}r_{23} = 1$$

- ii) If all total correlation coefficients in a set of three variables are

equal to ρ then show that $R_{1.23}^2 = \frac{2\rho^2}{1+\rho}$.

- b) Describe the test procedure to test $H_0: P = P_0$ against the alternative hypothesis.
- i) $H_1: P > P_0$
 ii) $H_1: P < P_0$
 iii) $H_1: P \neq P_0$

Using the large sample, where P_0 is population proportion.

- c) From the following series of chain base indices, construct fixed base index numbers.

Year	2001	2002	2003	2004	2005	2006	2007
Chain base index number	100	108	122	130	128	132	140

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

- a) Derive the expression for the partial correlation coefficient $r_{12.3}$ in terms of total correlation coefficients.
- b) A random sample of 400 persons from country A gave mean height 170 cm. Another sample of 800 persons from country B gave mean height 178 cm. Can you say that persons in country B are taller than those of country A given that their population standard deviations are 6 cm. and 8 cm. respectively? Use 5% level of significance.

- c) Explain the product method and income method of measuring national income.

Q4) Attempt any one of the following :

- a) i) Explain how to construct $100(1 - \alpha)\%$ confidence interval for the population proportion. [4]
- ii) Compute GNP and NNP, given that :
GDP = 24000 crore Rs., Net export = 1000 crore Rs., [3]
Depreciation = 500 crore Rs.
- iii) Explain the method of 'base shifting'. State the two situations under which base shifting is essential. [3]
- b) i) Derive the equation of least square regression plane of X_1 on X_2 and X_3 . [7]
- ii) If $R_{1.23} = 1$ then find $R_{2.13}$ [3]

* * *

P178**[3817]-214****S.Y. B.Sc.****STATISTICS****ST-222 : Continuous Probability Distributions - II and Demography
(New Course) (Semester - II) (2008 Pattern)***Time : 2 Hours]**[Max. Marks : 40**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 meaning.*

Q1) Attempt each of the following :a) Choose the correct alternative for each of the following :**[1 mark each]**

i) If D: Annual deaths and P: Annual mean population then the Crude Death Rate (C.R.D) per thousand is calculated as ;

- | | |
|------------------------------|------------------------------|
| A) $\frac{P}{D} \times 1000$ | B) $\frac{P}{D} \times 100$ |
| C) $\frac{D}{P} \times 100$ | D) $\frac{D}{P} \times 1000$ |

ii) If X follows Chi-Square distribution with variance equal to 12 then the mode of the distribution is

- | | |
|-------|------|
| A) 8 | B) 4 |
| C) 12 | D) 6 |

iii) If $X \rightarrow F_{(5,3)}$ and $Y \rightarrow F_{(3,5)}$ and $P[X \geq 5] + P[Y \geq a] = 1$ then the value of constant 'a' is

- | | |
|------------------|------------------|
| A) 5 | B) $\frac{3}{5}$ |
| C) $\frac{1}{5}$ | D) 3 |

- b) State whether following statements are true or false. [1 mark each]
- The critical region for the Chi-Square test for goodness of fit is always one sided.
 - Statistic is a constant while the parameter is a random variable (r.v.).
 - All the even order moments of t -distribution are zero.
- c) A continuous r.v. X with moment generating function (m.g.f.),
- $$M_x(t) = (1 - 2t)^{-8}, t < \frac{1}{2}, \text{ find mean of } X. \quad [1]$$
- d) Give one real life situation where Chi-square test for goodness of fit can be used. [1]
- e) If T follows t -distribution with 8 degrees of freedom (d.f.), find $P[|T| \geq 2.306]$. [1]
- f) Define Snedecor's F -distribution. [1]

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

- Explain the term sampling distribution of a statistic. Also obtain the sampling distribution of sample mean of a random sample of size ' n ', drawn from $G(\alpha, \lambda)$ distribution.
- Describe paired t test with one real life situation.
- Define Gross Reproduction Rate (G.R.R.) and Net Reproduction Rate (N.R.R.) and state their limitations.

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

- Describe the test procedure for testing $H_0 : \sigma_1^2 = \sigma_2^2$ against $H_1 : \sigma_1^2 > \sigma_2^2$, where σ_1^2 and σ_2^2 are the variances of two populations.
- If $F \rightarrow F_{n_1, n_2}$ then find the probability distribution of $n_1 F$ as $n_2 \rightarrow \infty$.
- Following data were obtained in a survey of 500 individuals. Do the data support the claim that interest in political activities is associated with level of education? Use 1% level of significance (l.o.s.)

Interest in political activities	Level of Education	
	Graduate	Non-graduate
Yes	170	190
No	135	5

Q4) Attempt any one of the following :

- a) i) If X and Y are independent Chi-square variates with m and n d.f. respectively then show that, $X + Y$ and $\frac{X}{Y}$ are independently distributed. [7]
- ii) Compute the Standardised Death Rate (S.T.D.R.) for Town B taking population of Town A as standard population. [3]

Age group	Town A		Town B	
	Population	Number of Deaths	Population	Number of Deaths
Below 10	30,000	720	80,000	2000
10-40	40,000	800	1,04,000	2080
40 and above	20,000	560	16,000	1080

- b) i) A.r.v. X follows t -distribution with ' n ' d.f. then show that, as $n \rightarrow \infty$ the probability distribution of X tends to $N(0, 1)$. [5]
- ii) In order to start new S.T. bus to a certain remote village it is required to get the average fair of Rs. 400 daily. Reports on number of passengers for 21 days revealed that the average daily collection of fare from the passengers was Rs. 390 with standard deviation of Rs. 40. Do these data support the demand of people for starting new bus to the village? Use 5% level of significance. [5]



P179

[3817] - 215

S.Y. B.Sc.

GEOGRAPHY

**Gg. 221: Distribution, Development and Planning of Resources
(Paper-I) (Sem. - II)**

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:

- 1) All questions are compulsory.*
- 2) Figures to the right indicate full marks.*
- 3) Draw neat diagrams and sketches wherever necessary.*
- 4) Use of map stencil is allowed.*

Q1) Answer the following questions in two or three sentences.

[10]

- a) Name the various types of iron ore.
- b) List the countries producing bauxite.
- c) Name any two states producing petroleum in India.
- d) Write the advantages of nuclear energy.
- e) Name any two countries producing natural gas.
- f) List the countries producing atomic energy.
- g) What do you mean by optimum population?
- h) State any two industrial uses of water.
- i) What is resource planning?
- j) What is solar energy?

P.T.O.

Q2) Write short notes (Any Two): **[10]**

- a) Atomic power plants in India.
- b) Importance of solar energy.
- c) Need of resource planning.

Q3) Answer the following (Any Two): **[10]**

- a) Give an account of distribution and production of coal in India.
- b) Explain the significance of wind energy.
- c) Describe the role of land resources in economic development.

Q4) Explain the role of energy resources in economic development of a country. **[10]**

OR

Give an account of population distribution in India.



P180

[3817] - 216

S.Y. B.Sc.

GEOGRAPHY

**Gg. 222: Surface Water and Ground Water Hydrology
(Paper-II) (Sem. - II)**

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:

- 1) All questions are compulsory.*
- 2) Figures to the right indicate full marks.*
- 3) Draw neat diagrams and sketches wherever necessary.*
- 4) Use of map stencil is allowed.*

Q1) Answer the following questions in two or three sentences.

[10]

- a) Define evapotranspiration.
- b) What is river regime?
- c) What is ground water flow?
- d) What is SWMM?
- e) State any one method transpiration control.
- f) What is hydrograph?
- g) State one cause of flood.
- h) What is groundwater basin development?
- i) What is peak flow?
- j) What is hydrology?

P.T.O.

Q2) Write short notes (Any Two): **[10]**

- a) Urban hydrology.
- b) Methods of evaporation control.
- c) Snowmelt hydrology.

Q3) Answer the following (Any Two): **[10]**

- a) What is runoff?
- b) What are components of flood hydrographs? Describe.
- c) What is rational method of peak flow for urban areas?

Q4) State the importance of controls of evaporation and transpiration in water resource development. **[10]**

OR

Describe subsurface distribution of water.



P181

[3817]-217

S.Y. B.Sc.

MICROBIOLOGY

**MB-221 : Bacterial Systematics and Analytical Microbiology
(Paper - I) (New Course) (Semester - II)**

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Figures to the right indicate full marks.*
- 3) *Draw neat labelled diagrams wherever necessary.*
- 4) *Use of calculators, log tables and statistical tables allowed.*
- 5) *Use graph paper if necessary.*

Q1) Attempt the following questions : **[10]**

- a) Define T_m .
- b) Novel peptidoglycan present in Methanobacterium is called as _____.
- c) _____ diagram consists of equally spaced vertical rectangles of equal width.
- d) Derivative of e^x is _____.
 - i) e^x
 - ii) 0
 - iii) 1
 - iv) e^{-x} .
- e) Write the formula for calculation of percentile.
- f) Write the formula for estimation of G+C content.
- g) The 2nd edition of Bergey's Manual of systematic Bacteriology places prokaryotes into _____ phyla.
- h) The size of a bacterial population at time t (measured in hours) is given by $P(t) = 10,000 + 1000t - 300t^2$. Determine the initial population $P(0)$.
- i) Calculate median from following observations :
5, 4, 9, 12, 17, 3, 1, 6, 10.
- j) Data obtained by researcher from personal experimental studies is called
 - i) Primary data.
 - ii) Secondary data.
 - iii) Arrayed data.
 - iv) Chronological data.

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

- a) Write the significance of 16S rRNA in bacterial classification.
- b) Construct a pie diagram for distribution of blood groups from the given data.

Blood groups	Percentage
A	26.5
B	34.5
O	31.6
AB	7.4

- c) Find out the area under the normal curve when $z = 1.85$.

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

- a) Find the standard deviation from following data :
11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21.
- b) Explain any two methods of DNA hybridization.
- c) Solve the following :

- i) Find $\frac{dy}{dx}$ if $Y = x.e^x$

- ii) Evaluate $\int \left(x^7 + 7x + \frac{x}{7} + \frac{7}{x} \right) dx$

Q4) Attempt any two of the following : **[10]**

- a) Comment on Numerical taxonomy.
- b) Sketch the graph of the following set of inequality in XY plane : $2x + 3y < 6$.
- c) Calculate range, from the given data.

Class interval	Frequency
16-20	3
21-25	3
26-30	2
31-35	2
36-40	2



P182

[3817] - 218

S.Y. B.Sc. (Sem. - II)

MICROBIOLOGY

**MB-222: Applied Microbiology-I
(Paper-II) (New Course)**

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:

- 1) All questions are compulsory.*
- 2) Figures to the right indicate full marks.*
- 3) Draw neat labelled diagrams wherever necessary.*

Q1) All questions are compulsory:

[10]

- a) What is an impeller?
- b) Define: Primary screening.
- c) What is a working culture?
- d) Write any two examples of compounds causing biomagnification.
- e) What are droplet nuclei?
- f) Name any two filters used in water purification process.
- g) State true or false.
Use of septic tank is a method of aerobic waste water treatment.
- h) Define: Distilled water.
- i) Give the significance of fish bioassay.
- j) Enlist any two methods of air sanitation.

P.T.O.

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

- a) Describe different methods for control and monitoring of airflora of hospitals.
- b) What are indicators of faecal pollution? Comment on use of E-coli as an indicator of faecal pollution.
- c) Describe various methods used for screening of antibiotic producers.

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

- a) Explain working of trickling filter with the help of diagram.
- b) Elaborate on airborne infections with the help of any two examples.
- c) Illustrate diagrammatically - A typical continuous stirred tank reactor.

Q4) Attempt any one of the following: [10]

- a) Explain the steps involved in bacteriological analysis of water for potability.
- b) Elaborate with examples, different components of fermentation medium with respect to their nutritional aspects.



Total No. of Questions : 4]

[Total No. of Pages : 2

P183

[3817] - 219
S.Y. B.Sc. (Sem. - II)
PSYCHOLOGY
Health Psychology
(Paper-I) (New course)

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:

- 1) Attempt all questions.*
- 2) Draw the figures and diagrams wherever necessary.*
- 3) Figures to the right indicate full marks.*

Q1) Answer in two to four sentences.

[16]

- a) State Biomedical model of illness.
- b) Define health psychology.
- c) State the two examples of chronic illness.
- d) Define stress.
- e) Define coping.
- f) What is emotion-focused coping?
- g) Define resilience.
- h) What is anorexia nervosa?

P.T.O.

- Q2)** Attempt any two of the following in 8/10 sentences. [8]
- a) Describe Biopsychosocial model of illness.
 - b) Explain problem-focused constructive coping.
 - c) Illustrate the mind-body connection of illness.

- Q3)** Write short notes on any two of the following. [8]
- a) Stress-major types.
 - b) Coping patterns.
 - c) Alcohol drinking.

- Q4)** Describe potential effects of stress. [8]

OR

Explain the interventions to reduce the spread of AIDS.



Total No. of Questions : 4]

[Total No. of Pages : 2

P185

[3817]-223

S.Y. B.Sc.

ELECTRONIC SCIENCE

Digital System Design

(Paper - I) (Sem. -II) (New Course)

Time : 2 Hours]

[Max. Marks :40

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Neat and labelled diagrams wherever necessary.*
- 3) *Figures to the right indicate full marks.*

Q1) Answer all the following:

- a) What is the Gray code? [1]
- b) What do you mean by Universal shift register. [1]
- c) Define Fan-in or Fan-out parameters for the digital ICs. With suitable examples. [1]
- d) Give an example of D/A converter IC? [1]
- e) The 74147 is called a priority encoder. Comment. [2]
- f) Exclusive - OR gates are useful as parity generator/checker. Comment. [2]
- g) Convert binary to gray: [2]
 - i) 11000110.
 - ii) 11011.
- h) If $A = 1000$ and $B = 1010$ are applied to the inputs of a T4HC85. Determine the outputs. [2]

Q2) Attempt any two of the following:

- a) Draw the logic symbol for the BCD - TO - 7 segment decoder/driver. Explain the basic function of IC-74LS 47 along with other features. [4]
- b) Draw the logic diagram of a 4-bit asynchronous binary counter, and its timing diagram and verify its operation. [4]
- c) Explain the concept of current sourcing and current sinking with a neat logic diagram. [4]

P.T.O.

Q3) Attempt any Two of the following.

- a) Design mod-7 counter by using IC 7490. [4]
- b) Explain the concept of Tri-state logic. Draw TTL NOT with tri-state logic. [4]
- c) Draw the block diagram of a basic UART interface. Explain briefly its operation. [4]

Q4) a) Attempt the following.

- i) Draw the state diagram for a 3-bit up counter or down counter. Design 3-bit synchronous down counter. Explain the operation using timing diagram. [6]
- ii) Explain briefly how counters are used in a basic digital clock system. Draw the logic diagram of a digital clock that display seconds, minutes and hours. [6]

OR

b) Attempt All of the following:

- i) A 4-bit DAC using R-2R ladder network uses $V_{ref} = 16v$. Calculate the output voltages for the digital inputs:
 - a) 1011.
 - b) 1111. [4]
- ii) An analog voltage in the range of $-v + 0 + v$ is required to be converted into 3-bit 2's complement digital format. The digital values for 0v should be 000 and the maximum quantization error should not exceed $\pm \frac{1}{2}$ LsB. Determine the quantization error. [4]
- iii) A 8-bit converter has a maximum of $2^8=256$ units. With a 500 kHz clock. Find [4]
 - a) The maximum conversion time.
 - b) The average conversion time.
 - c) The maximum conversion for a counter type A/D converter.



Total No. of Questions : 4]

[Total No. of Pages : 2

P185

[3817]-223

S.Y. B.Sc.

ELECTRONIC SCIENCE

EL - 221: Digital System Design

(Paper - I) (Sem. - II) (New Course)

Time : 2 Hours]

[Max. Marks :40

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*

Q1) Answer all of the following:

- a) What is the Gray code? [1]
- b) What do you mean by universal shift register. [1]
- c) Define Fan-in or Fan-out parameters for the digital ICs. With suitable examples. [1]
- d) Give an example of D/A converter IC? [1]
- e) The 74147 is called a priority encoder. Comment. [2]
- f) Exclusive - OR gates are useful as parity generator/checker. Comment. [2]
- g) Convert binary to gray: [2]
 - i) 11000110.
 - ii) 11011.
- h) If $A = 1000$ and $B = 1010$ are applied to the inputs of a 74HC85. Determine the outputs. [2]

Q2) Attempt any two of the following:

- a) Draw the logic symbol for the BCD - TO - 7 segment decoder/driver. Explain the basic function of IC-74LS 47 along with other features. [4]
- b) Draw the logic diagram of a 4-bit asynchronous binary counter, and its timing diagram and verify its operation. [4]
- c) Explain the concept of current sourcing and current sinking with a neat logic diagram. [4]

P.T.O.

Q3) Attempt any two of the following.

- a) Design mod-7 counter by using IC 7490. [4]
- b) Explain the concept of Tri-state logic. Draw TTL NOT with tri-state logic. [4]
- c) Draw the block diagram of a basic UART interface. Explain briefly its operation. [4]

Q4) Attempt all of the following.

- a) Draw the state diagram for a 3-bit up counter or 3-bit down counter. Design 3-bit synchronous down counter. Explain the operation using timing diagram. [6]
- b) Explain briefly how counters are used in a basic digital clock system. Draw the logic diagram of a digital clock that displays seconds, minutes and hours. [6]

OR

Attempt all of the following:

- a) A 4-bit DAC using R-2R ladder network uses $V_{ref} = 16V$. Calculate the output voltages for the digital inputs:
 - i) 1011.
 - ii) 1111. [4]
- b) An analog voltage in the range of $-V + 0 + V$ is required to be converted into 3-bit 2's complement digital format. The digital values for 0V should be 000 and the maximum quantization error should not exceed $\pm \frac{1}{2}$ LSB. Determine the quantization error. [4]
- c) An 8-bit converter has a maximum of $2^8 = 256$ counts. With a 500 kHz clock. Find [4]
 - i) The maximum conversion time.
 - ii) The average conversion time.
 - iii) The maximum conversion, for a counter type A/D converter.



Total No. of Questions : 4]

[Total No. of Pages : 2

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[3817]-224

S.Y. B.Sc.

ELECTRONIC SCIENCE

EL-222 : Communication System

(Paper - II) (Sem. -II) (New Course)

Time : 2 Hours]

[Max. Marks :40

Instruction to the candidates:

- 1) All questions are compulsory.
- 2) Figures to the right indicate full marks.
- 3) Draw the neat diagram wherever necessary.
- 4) Use of non-programmable calculator is allowed.

Q1) Attempt all of the following:

- a) Give the put pose of blanking pulses in TV. [1]
- b) Define Noise in communication system. [1]
- c) What does DTMF stand for? [1]
- d) State applications of coaxial cable. [1]
- e) "To dial digit 1 requires less time than to dial digit 9 in pulse dailing system"—comment. [2]
- f) "MODEM is necessary to establish internet connection"— comment. [2]
- g) An AM wave display on an oscilloscope has value of V_{\max} 4.6 divisions and V_{\min} 0.7 divisions. Calculate modulation index. [2]
- h) If receiver has input signal power of $1.5 \mu w$ and the noise power is $0.2 \mu w$ then find signal to noise ratio. [2]

Q2) Attempt any two of the following:

- a) Draw and explain block diagram of communication system. [4]
- b) What is FAX? With neat block diagram explain FAX transreceiver system. [4]
- c) With the help of neat block diagram explain superhetrodyne receiver design for reception of FM signal. [4]

P.T.O.

Q3) Attempt any two of the following.

- a) Explain space Wave propagation. State co-relation between antenna height and distance of horizon. [4]
- b) What is internet? State its applications. Explain any one application of internet. [4]
- c) What is fiber optic cable? Explain construction of it. State its different types. [4]

Q4) Attempt the following.

- a) Describe the concept of PSTN and cellular telephone with block diagram explain telephone handset. [6]
- b) What is composite video signal? Sketch the composite video signal for at least two horizontal lines and explain it in brief. [6]

OR

Attempt the following:

- a) The output of transmitter is given by $200(1+0.5 \sin 20t) \sin 2.14 \times 10^7 t$. Calculate
 - i) Carrier Frequency
 - ii) Modulating Frequency.
 - iii) Upper side band Frequency.
 - iv) Lower side band frequency. [4]
- b) In radio receiver if chosen is 455 kHz and desired frequency is 550 kHz. Calculate local oscillator frequency and image Frequency. [4]
- c) If a FM wave represented by equation $e = 10 \sin (8 \times 10^8 t + 4 \sin 1500t)$ Calculate carrier frequency, modulating frequency, modulation index and maximum frequency deviation. [4]



Total No. of Questions : 3]

[Total No. of Pages : 2

P193

[3817]-231

S.Y. B.Sc. (Sem. - II)

मराठी (Marathi)

व्यावहारिक मराठी

(नवा व जुना अभ्यासक्रम)

वेळ : 2 तास]

[एकूण गुण : 40

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

प्रश्न 1) अ) पुढील उताऱ्याचे मराठीत भाषांतर करा.

[8]

Science has made our life more miserable. Hurry, worry and unrest are the salient features of the civilization fostered by Science. Our forefathers were never so unhappy and discontented as we are today. There is perpetual unrest in our life. Although science has enabled us to produce enormous wealth we have not been able to remove poverty. A large part of world population is living in slums, is diseased and underfed. The problem of unemployment is more acute than ever before. The gifts of science in the sphere of weapons threaten humanity with total destruction. Science has increased our dependence on machines. Goodness, that is the real source of human happiness, has been completely eroded by science. Thus it can be said that science has, indeed, destroyed our peace and happiness, while it has given powers fit for the goods.

P.T.O.

ब) पुढील उताऱ्याचा शीर्षकासह एक तृतीयांश सारांश लिहा. [7]

अल्लाउद्दीन व त्याच्या जादूच्या दिव्याची गोष्ट अनेकांना माहिती असेल. हा दिवा घासताच एक राक्षस निर्माण होत असे व त्याला सांगितलेले काम करित असे. विज्ञान हाही असाच एक जादूचा दिवा आहे. त्यावर शास्त्रज्ञांनी आपली डोकी घासताच त्यातून एक राक्षस बाहेर पडतो. त्या जुन्या गोष्टीत, जेव्हा जेव्हा सज्जनांच्या हातात हा दिवा गेला, तेव्हा तेव्हा त्या राक्षसाने चांगली कृत्ये केली. दुर्जनांच्या हातात जेव्हा दिवा गेला, तेव्हा त्याच राक्षसाच्या हातून वाईट कृत्ये घडली.

विसाव्या शतकात माणसाने विज्ञानाचे सामर्थ्य काय असते ते पाहिले आहे. रस्ते, पूल, धरणे इत्यादींमधील विज्ञानाची प्रगती दिसली आहे. शेती व औषधीशास्त्र यांच्यातील प्रगतीमुळे मानवी जीवन किती सुखावह होऊ शकते हे अनुभविले आहे. तसेच तंत्रशास्त्राची अणुबाँब, प्रदूषण अशी सैतानी अपत्येही दिसत आहेत. विज्ञानाच्या जादूच्या दिव्याकडून चांगली व वाईट अशी दोन्ही प्रकारची फळे मिळतात हे सिद्ध झालेले आहे. मनुष्यस्वभाव लक्षात घेता नजिकच्या भविष्यकाळात ही परिस्थिती आमूलाग्र बदलेल असे काही वाटत नाही. तरीदेखील मनुष्य हा एक विचार करणारा प्राणी आहे अन् त्याची विवेकबुद्धी त्याला या जादूच्या दिव्याकडून केवळ कल्याणकारकच कामे करवून घेण्यास सांगते.

भविष्यकाळात परिस्थिती अधिक बिघडू न देण्याची ताकद माणसाच्या याच विवेकबुद्धीत आहे. मानवाच्या अस्तित्वाबद्दलच्या साऱ्या आशा येथेच केंद्रित होतात. मानवजातीच्या कल्याणासाठी हा विज्ञानाचा दिवा कसा वापरावा ? याचे उत्तर साधे सरळ नाही. त्यामुळेच भ्रंती पडून चुकीची दिशा धरली जाते.

(शब्द संख्या - १९६)

प्रश्न 2) पुढीलपैकी कोणत्याही दोन प्रश्नांची उत्तरे लिहा. [15]

- अ) 'जागतिक तापमानवाढ' या विषयावर वर्तमानपत्रासाठी 300 शब्दांत लेख लिहा.
ब) 'संगणक साक्षरता-काळाची गरज' या विषयावर आकाशवाणीसाठी 300 शब्दांचे भाषण तयार करा.
क) 'स्वाइन फ्ल्यू : लक्षणे व खबरदारी' या विषयावर दूरदर्शनसाठी लघुपट तयार करावयाचा आहे, संहिता लेखन करा. (लघुपट कालावधी - 5 मिनिटे)

प्रश्न 3) खालील इंग्रजी शब्दांसाठी मराठीतील पारिभाषिक शब्द लिहा. [10]

- | | |
|------------------------|--------------|
| 1. Atomic Energy | 2. Premature |
| 3. Notification | 4. Frequency |
| 5. Data | 6. Document |
| 7. Passport | 8. Format |
| 9. Information Officer | 10. Chemist |

□□□□

Total No. of Questions : 3]

[Total No. of Pages : 2

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[3817]-232

S.Y. B.Sc. (Sem. - II)

हिंदी (Hindi)

(नया पाठ्यक्रम)

समय : 2 घंटे]

[पूर्णांक : 40

पाठ्यपुस्तके :- 1) प्रतिनिधि कहानियाँ

संपादक - हिंदी विभाग, एस.एन.डी.टी. विश्वविद्यालय, मुंबई.

2) छायावाद : प्रतिनिधि रचनाएँ

संपादक - नीरा परमार

सूचनाएँ :-

1) सभी प्रश्न अनिवार्य हैं।

2) दाहिनी ओर लिखे अंक प्रश्न के पूर्णांक हैं।

प्रश्न 1)अ) निम्नलिखित में से किन्हीं दस संक्षिप्तियों के हिंदी पूर्ण पर्याय लिखिए।

[10]

i) B.B.C.

ii) C-DAC.

iii) D.R.D.A.

iv) G.A.T.T.

v) I.D.A.

vi) I.T.D.C.

vii) M.L.A.

viii) N.A.S.A.

ix) R.R.B.

x) S.E.B.I.

xi) U.K.

xii) W.H.O.

आ) निम्नलिखित अनुच्छेद का एक-तिहाई सारांश लिखते हुए उसे उचित शीर्षक दीजिए। [4]

ऋतुराज वसंत के सुशासन और व्यवस्था की छटा हर ओर दिखाई पड़ती है। कलियों के यौवन की अंगड़ाई भ्रमरों को आमंत्रण दे रही है। अशोक के अग्निवर्ण, कोमल एवं नवीन पत्ते वायु के स्पर्श से तरंगित हो रहे हैं। शीतकाल के ठिठुरे अंग में नई स्फूर्ति उमड़ रही है। वसंत के आगमन के साथ ही जैसे जीर्णता और पुरातन का प्रभाव तिरोहित हो गया है। प्रकृति के कण-कण में नये जीवन का संचार हो गया है। आम्र मंजरियों की भीनी, गंध और कोयल का पंचम आलाप, भ्रमरों का गुंजन और कलियों की चटक, वनों और उद्यानों के अंगों में शोभा का संचार - सब ऐसा लगता है, जैसे जीवन में सुख ही सत्य है, आनंद के एक क्षण का मूल्य पूरे जीवन को अर्पित करके भी नहीं चुकाया जा सकता।

P.T.O.

प्रश्न 2)अ) निम्नलिखित में से किन्हीं दो प्रश्नों के उत्तर लिखिए। [8]

- i) हरगोबिन बड़ी बहुरिया का संदेश क्यों नहीं दे पाया ?
- ii) शादी में जाने के लिए सोमा बुआ किस प्रकार तैयारी करती है ?
- iii) 'चीफ की दावत' कहानी में चित्रित समस्या स्पष्ट कीजिए।
- iv) रेहान का चरित्र-चित्रण कीजिए।

आ) निम्नलिखित अवतरण की ससंदर्भ व्याख्या कीजिए। [5]

- i) "वे सब उन्हें घेरकर चुपचाप खड़े हो गए थे.... वे अदृश्य लोग अंतिम फैसला दे चुके थे और पिताजी निहायत बेचारगी में उसे अपने फैसले का रूप देते हुए, सामने रखने के लिए जैसे मजबूर थे।"

अथवा

- ii) "उसके सिर में भारीपन था, मुँह में कड़वाहट, पैर में जैसे एक भारी पत्थर बँधा था। सारा दिन हो गया था, पर उसे कोई खोजता हुआ नहीं आया।"

प्रश्न 3)अ) निम्नलिखित में से किन्हीं दो प्रश्नों के उत्तर लिखिए। [8]

- i) 'भारती-वंदना' कविता में चित्रित प्रकृति का वर्णन कीजिए।
- ii) 'हिंदी के सुमनों के प्रति पत्र' कविता में कवि ने अपना परिचय किस तरह दिया है ?
- iii) 'प्रथम रश्मि' कविता में कवि क्या संदेश देना चाहते हैं ?
- iv) 'द्रुत झरो' कविता का भावार्थ अपने शब्दों में लिखिए।

आ) निम्नलिखित अवतरण की ससंदर्भ व्याख्या कीजिए। [5]

- i) "तुम मध्य भाग के, महाभाग !
तरु के उर के गौरव प्रशस्त,
मैं पढ़ा जा चुका पत्र न्यस्त,
तुम अलि के नव-रस-रंग-राग।"

अथवा

- ii) "सोच मग्न
जीवन विकासिनी !
उसे चाहिए लौह संगठन,
सुन्दर तन, श्रद्धा दीपित मन,
भू जीवन प्रति अधक समर्पण।"

□□□□

Total No. of Questions : 4]

[Total No. of Pages : 1

P196

[3817]-235

S.Y. B.Sc. (Sem. - II)

URDU (General)

(Paper - II) (New Course)

Time : 2 Hours]

[Total Marks : 40

Instructions :

- 1) Attempt all questions.
- 2) Figures to the left indicate full marks.

- [10] سوال نمبر ۱ :- پریم چند کے افسانہ نگاری کی خصوصیات بیان کیجیے
- [10] سوال نمبر ۲ :- " بڑے گھر کی بیٹی " اس افسانہ کا خلاصہ لکھیے
- [10] سوال نمبر ۳ :- ذیل میں سے کوئی دو کرداروں پر روشنی ڈالیے -
- [10] (۱) گھیسو (۲) آنندی (۳) بہاری لال (۴) الوکی دین
- [10] سوال نمبر ۴ :- کوئی دس انگریزی الفاظ کے لیے اردو الفاظ لکھیے

Radiation Mixture Voltage
Conduction Pesticide Vaccine
Haemophilia Biomass Density
Micro Organism.

□□□□

[3817]-240

P200

S.Y. B.Sc. (Vocational)

COMPUTER HARDWARE AND NETWORK ADMINISTRATION

Microprocessor and Interfacing Techniques - II

(Paper - I) (Sem. -II) (New Course) (58712)

Time : 2 Hours]

[Max. Marks :40

Instructions to the candidates:

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

Q1) a) Attempt the following: [4 × 1 = 4]

- i) Which Add-on card is needed to enhance the audio performance of a PC?
- ii) Write the full-form of MPEG.
- iii) Write two broad categories of Serial data transmission.
- iv) Name two popular storage devices that are commonly used nowadays.

b) Attempt the following: [4 × 2 = 8]

- i) List atleast four device controllers.
- ii) Why is a Green PC called so?
- iii) Write the storage capacity of CD-R/W and DVD.
- iv) Which media can be used for wireless Communication?

Q2) Attempt any two of the following: [2 × 4 = 8]

- a) Describe the features of Zigbee Wireless Communication Standard.
- b) Describe the features of a Multimedia PC and its minimum requirement.
- c) Explain different types of Plotters and their typical uses.

Q3) Attempt any Two of the following [2 × 4 = 8]

- a) Describe Thick and Thin Concept of reference to a Green PC.
- b) Describe the basic features, storage capacities and applications of Latest Storage device you know.
- c) Explain the Principle of Card Reader as a input device.

Q4) Attempt any Two of the following: [2 × 6 = 12]

- a) Explain the concept of speech with its typical applications.
- b) Explain the important functions of BIOS and the enhancements in Flash BIOS.
- c) Classify the Computer Networks on the basis of geographical area covered with examples.



Total No. of Questions : 4]

[Total No. of Pages : 2

[3817]-240
P200 S.Y. B.Sc. (Vocational)
COMPUTER HARDWARE AND NETWORK ADMINISTRATION
Microprocessor and Interfacing Techniques - II
(Paper - I) (Sem. -II) (New Course) (58712)

Time : 2 Hours]

[Max. Marks :40

Instructions to the candidates:

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

Q1) a) Attempt the following: [4 × 1 = 4]

- i) Which Add-on card is needed to enhance the audio performance of a PC?
- ii) Write the full-form of MPEG.
- iii) Write two broad categories of Serial data transmission.
- iv) Name two popular storage devices that are commonly used nowadays.

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- i) List atleast four device controllers.
- ii) Why is a Green PC called so?
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- a) Describe the features of Zigbee Wireless Communication Standard.
- b) Describe the features of a Multimedia PC and its minimum requirement.
- c) Explain different types of Plotters and their typical uses.

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- a) Describe Thick and Thin Concept with reference to a Green PC.
- b) Describe the basic features, storage capacities and applications of Latest Storage device you know.
- c) Explain the principle of Card Reader as a input device.

Q4) Attempt any two of the following:

[2 × 6 = 12]

- a) Explain the concept of speech recognition along with its typical applications.
- b) Explain the important functions of BIOS and the enhancements in flash BIOS.
- c) Classify the Computer Networks on the basis of geographical area covered with examples.



Total No. of Questions : 4]

[Total No. of Pages : 1

P201

[3817]-241

S.Y. B.Sc. (Vocational)

SEED TECHNOLOGY

Vegetable Seed Production

(Paper - III) (Sem. -II) (New Course)

Time : 2 Hours]

[Max. Marks :40

Instructions to the candidates:

- 1) All questions are compulsory.
- 2) Figures to the right indicate full marks.
- 3) Draw neat and labelled diagrams wherever necessary.

Q1) Attempt the following:

[10 × 1 = 10]

- a) Define Apomixis.
- b) What is self incompatibility?
- c) Define pollination.
- d) Enlist the types of hybridization.
- e) What is selection?
- f) What do you mean by seed production?
- g) Give any two objectives of vegetable seed production.
- h) What is seed drying?
- i) Define emasculation.
- j) What is mass selection?

Q2) Attempt (any two) of the following:

[2 × 5 = 10]

- a) Explain in detail the development of microspores.
- b) Describe modes of pollination.
- c) Explain in brief the procedure of hybridization.

Q3) Write notes on (any two):

[2 × 5 = 10]

- a) Pureline selection.
- b) Applications & achievements of progeny selection.
- c) Classification based on growing season.

Q4) Describe the stepwise procedure for seed production of bitter melon. [10]

OR

Describe the stepwise procedure for seed production of Okra.



P202

[3817]-242

S.Y. B.Sc. (Vocational)

INDUSTRIAL MICROBIOLOGY

VOC-IND-MIC- 221 : Microbial Fermentations and
Downstream Processing

(2008 Pattern) (Theory Paper - I) (Sem. - II)

Time : 02 Hours]

[Max. Marks :40

Instructions to the candidates:

- 1) All questions are compulsory.
- 2) Figures to the right indicate full marks.
- 3) All questions carry equal marks.
- 4) Draw neat labelled diagrams wherever necessary.
- 5) Use of scientific calculators is allowed.

Q1) Answer each sub-question in one or two lines: Fill in the blanks: State whether the statement is true or false. **[10]**

- a) State whether the statement is **True** or **False**.
Affinity chromatography involves binding of solute to the solid phase primarily by weak Van der Waal's forces.
- b) State whether the statement is **True** or **False**.
Penicillin is produced during exponential phase of microbial growth.
- c) Fill in the blank:
Use of _____ facilitates settling of bacterial cells after the fermentation process is complete.
- d) Name a fermentation product produced by two-step process.
- e) What is the first step involved in the recovery of an intracellular product.
- f) Define secondary metabolite.
- g) Name any one organism responsible for flavour enhancement in cheese production.
- h) Give one example each, of symbiotic and non-symbiotic nitrogen fixing bacteria.
- i) Give the biological method used for bacterial cell disruption.
- j) Give the name a solvent used in liquid-liquid extraction of a fermentation product.

P.T.O.

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

- a) Illustrate the working of Podbialniak centrifuge in downstream processing of Penicillin G.
- b) With the help of a suitable example, explain the principle of ion-exchange chromatography.
- c) Explain the biochemical mechanism involved in overproduction of a primary metabolite such as glutamic acid.

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

- a) Give the role of distillation plant in downstream processing.
- b) List the types of centrifuges used in downstream processing of fermentation products. Describe any one of them in detail.
- c) Give the biochemistry involved in methane production.

Q4) Answer any one of the following: [10]

- a) With the help of a flow sheet, describe the production of Vitamin B₁₂ by fermentation.
- b) Describe methods of cell disruption used as the primary step in downstream processing to recover intracellular products.



Total No. of Questions : 4]

[Total No. of Pages : 1

P203

[3817]-243

S.Y. B.Sc. (Vocational)

INDUSTRIAL CHEMISTRY

Voc - 222 : Industrial Pollution

(Paper - II) (Sem.-II)

Time : 2 Hours]

[Max. Marks :40

Instructions to the candidates:

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

Q1) Answer the following questions. **[16]**

- a) Define COD.
- b) Explain reverse osmosis.
- c) State units of radioactivity used to measure water pollution.
- d) How is CO harmful to health?
- e) Define nightsoil.
- f) Define lagooning.
- g) Name types of chlorination.
- h) Explain the layers of atmosphere.

Q2) Attempt any two of the following **[8]**

- a) Discuss green house effect.
- b) Explain the construction of a septic tank.
- c) Describe the nitrogen cycle.

Q3) Write notes on any two of the following. **[8]**

- a) Electrodialyzer.
- b) Tannery wastes.
- c) Electrostatic precipitator.

Q4) Explain the phenomenon of global warming. **[8]**

OR

Explain the use of wet washers and scrubbers in controlling pollution.



P204 [3817]-244
S.Y. B.Sc. (Vocational)
BIOTECHNOLOGY
VOC-Biotech - 222 : Immunology
(Paper - II) (Sem.-II) (2008 Pattern)

Time : 2 Hours]

[Max. Marks :40

Instructions to the candidates:

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

Q1) Answer each of the following in 1-2 lines. **[10]**

- a) Define : antigens.
- b) Enlist the methods of ELISA techniques.
- c) Give the role of Nk cells in immunity.
- d) Describe the significance of IgE.
- e) What are lymphoid organs?
- f) Give any one example of attenuated vaccine?
- g) Explain immunodiffusion technique with example.
- h) How are killed vaccines prepared?
- i) What is innate immunity?
- j) What are the types of cells involved in specific immune response?

Q2) Write short notes on any two of the following (8-10 lines) **[10]**

- a) IgG structure and function.
- b) Cell mediated immune response.
- c) Macrophages in immune system.

Q3) Attempt any two of the following. (8-10 lines) **[10]**

- a) What are interferons? Give the details of mechanism of action of interferons.
- b) Write a note on primary lymphoid organs.
- c) Write a significance of clonal selection theory in antibody production.

Q4) What are vaccines? Write in detail the types of vaccines. **[10]**

OR

What are MHC complexes? Give their roles in immune system.



P205

[3817]-246

S.Y. B.Sc. (Vocational)

ELECTRONIC EQUIPMENT MAINTENANCE (EEM)

**VOC.EEM-222: Maintenance & Repair of Audio, Video,
Office and Communication Equipment
(Paper - II) (New Course) (Sem. - II)**

Time : 2 Hours]

[Max. Marks :40

Instructions to the candidates:

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

Q1) Answer the following.

- a) Define - Horizontal keystoneing. [1]
- b) What is the function of Squelch circuit? [1]
- c) State the number of photo diodes in the detector block of a CD player.[1]
- d) Give the image frequency in superhet receiver. [1]
- e) State the possible causes if PC donot boot. [2]
- f) Explain the reasons for noisy picture in case of VCR during playback.[2]
- g) 'Talk-time' and 'Standby time' for a mobile phone battery are important.
Comment. [2]
- h) Care must be taken while arranging the loudspeakers in a PA system.
Comment. [2]

Q2) Answer any Two.

- a) State the difference between a VCD and DVD. How do the players differ? [4]
- b) Give the different causes of irregular tape movement in a tape recorder.[4]
- c) Explain the typical faults in inkjet printer and their remedies. [4]

P.T.O.

Q3) Attempt any Two.

- a) What are the typical faults in a mobile phone? What are their remedies?[4]
- b) Explain “user controls-software-power supply” in case of MP3 player.[4]
- c) How will you locate faulty section in case of
 - i) Snowy picture with distorted sound.
 - ii) No raster but sound normal. [4]

Q4) Answer the following.

- a) Explain the function of user and service controls of B/W TV receiver.[6]
- b) Explain alignment procedure for AM radio receiver. [6]

OR

Answer the following

- a) Explain what is deguassing in picture tube and how it is done? [6]
- b) What is ‘stereo’ effect? What are the parts in a typical music system? Explain any two typical faults occurring in such system. [6]



[3817]-247

P206

S.Y. B.Sc. (Vocational)

COMPUTER HARDWARE & NETWORK ADMINISTRATION

Computer System Management - II

(Paper - II) (Sem.-II) (New Course) (58722)

Time : 2 Hours]

[Max. Marks :40

Instructions to the candidates:

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

Q1) a) Attempt the following: **[4 × 1 = 4]**

- i) What do you mean by Access Control?
- ii) What is a Role of CFO?
- iii) What does DBMS stand for?
- iv) What is a Heartware?

b) Attempt the following. **[4 × 2 = 8]**

- i) What is a Access Control List (ACL)?
- ii) What is a Black Berry device?
- iii) What is a Blue tooth device? Give its one use.
- iv) What is a Role of programmer?

Q2) Attempt any two of the following: **[2 × 4 = 8]**

- a) Define LAN controls in operation Management.
- b) List any four accessories of a desktop P.C. Explain their uses.
- c) Why upgradation of P.C is necessary.

Q3) Attempt any two of the following **[2 × 4 = 8]**

- a) Differentiate between end user and data entry user.
- b) Can database administrator be given the role of Network administrator? Why?
- c) Write a note on Portable devices.

Q4) Attempt any two of the following: **[2 × 6 = 12]**

- a) Write the steps involved in installation of Win 2003 Server.
- b) What is a change process? Give its importance.
- c) Define Responsibilities of
 - i) Team Leader
 - ii) Project Manager.
 - iii) CEO.



Total No. of Questions : 4]

[Total No. of Pages : 1

P207

[3817]-248

S.Y. B.Sc. (Vocational)

SEED TECHNOLOGY

Seed Quality Control

(Paper - IV) (Sem. -II) (New Course)

Time : 2 Hours]

[Max. Marks :40

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Figures to the right indicate full marks.*
- 3) *Draw neat and labelled diagrams wherever necessary.*

Q1) Attempt the following:

[10 × 1 = 10]

- a) What is foundation seed?
- b) Define genetic purity.
- c) What is seed legislation?
- d) Enlist any two equipments used for seed inspection.
- e) Sketch any two walking pattern's in field inspection.
- f) Give any two objectives of seed certification.
- g) Define tagging.
- h) Enlist statutory bodies established under seed Act in India.
- i) Give any two advantages of isolation distance.
- j) What is ISTA?

Q2) Attempt any two of the following:

[2 × 5 = 10]

- a) Explain in detail the concept of quality control.
- b) Describe the duties of seed inspector.
- c) Comment on International organisation and seed certification.

Q3) Write notes on any two of the following:

[2 × 5 = 10]

- a) Central seed certification Board.
- b) State seed testing Laboratory.
- c) Seed Law enforcement.

Q4) Describe in detail the method of field inspection in any one crop.

[10]

OR

Describe in detail minimum seed certification standards.



P208

[3817]-249

S.Y. B.Sc. (Vocational)

INDUSTRIAL MICROBIOLOGY

VOC-IND-MIC-222 : Quality Assurance in Industrial Products

(Theory Paper - II) (2008 Pattern) (Semester - II)

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Figures to the right indicate full marks.*
- 3) *All questions carry equal marks.*
- 4) *Draw neat labelled diagrams wherever necessary.*
- 5) *Use of scientific calculators is allowed.*

Q1) Answer each sub-question in one or two lines; Fill in the blanks: State whether the statement is true or false : **[10]**

- a) Define “Carcinogen”.
- b) Define “Allergen”.
- c) Define “ISO”.
- d) What does the term “IP” stand for?
- e) Name the organism used in the modified Ames test.
- f) State the principle of test for “undue toxicity”.
- g) State which of the following microbiological assays is more accurate/sensitive when testing the potency of a vitamin, the gel diffusion test or the turbidimetric test.
- h) State whether the following statement is TRUE/FALSE. All pyrogenic bacteria are Gram negative.
- i) State whether the following statement is TRUE/FALSE. The main test (using rabbits) for checking presence of pyrogen in a product, is not significant if the Sham test is not done properly.
- j) State whether the following statement is TRUE/FALSE. The term ‘BP’ means ‘Bombay Pharmacopoeia’.

Q2) Answer any two of the following : **[10]**

- a) Explain the limitations of the LAL test used for sterility testing.
- b) Diagrammatically explain the Ames Test.
- c) Briefly explain the differences between the gel diffusion assays used for vitamins and antibiotics.

Q3) Answer any two of the following : **[10]**

- a) All quality assurance tests need to be standardized. Explain with a suitable example.
- b) State the names of two products which need to be tested for allergens. Briefly explain the test.
- c) Explain the role of the FDA in Quality Assurance of products.

Q4) Answer any one of the following : **[10]**

- a) You are given a vial of Vitamin B₁₂. The label states that the vial contains 500 mcg of Vitamin B₁₂. Diagrammatically explain the procedure to verify the potency of the contents.
- b) Enlist the quality assurance tests carried out for antibiotics, and explain in detail any one of the tests carried out, other than potency testing by microbiological assays.



P209**[3817]-601****S.Y. B.Sc.****MATHEMATICS****MT - 221 : Linear Algebra - II
(Old Course) (Paper - I) (Sem. - II)***Time : 2 Hours]**[Max. Marks : 40**Instructions to the candidates:*

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

Q1) Answer the following questions :**[10]**

- a) If A is invertible and B is any matrix then prove that $\det(ABA^{-1}) = \det B$.
- b) By using signed elementary product, evaluate the determinant of

$$A = \begin{bmatrix} 2 & 7 \\ 1 & 8 \end{bmatrix}$$

- c) Find the condition that a 's must satisfy for the system to be consistent

$$2x - 3y = a_1$$

$$4x - 6y = a_2$$
- d) Write the number of inversions in the permutation (2, 1, 6, 4, 3, 5).
- e) Let V be the vector space of polynomials with inner product

$\langle f, g \rangle = \int_{-1}^1 f(t) g(t) dt$ show that $f(t) = 3t^4 - 2t^2$ and $g(t) = 5t^3 - 6t$ are orthogonal.

- f) If \bar{u} and \bar{v} are orthonormal vectors then find $\|\bar{u} + \bar{v}\|$.
- g) Find the acute angle between the vectors

$$\bar{u} = (1, 0, 1, 0), \bar{v} = (-3, -3, -3, -3).$$

- h) Show that the matrix $A = \begin{bmatrix} 0 & 0 & 1 \\ 0 & -1 & 0 \\ 1 & 0 & 0 \end{bmatrix}$ is orthogonal.

i) Show that $X = \begin{bmatrix} 1 \\ 2 \end{bmatrix}$ is an eigen vector of A. Hence find eigen value of A

$$\text{where } A = \begin{bmatrix} 3 & 0 \\ 8 & -1 \end{bmatrix}.$$

j) Express the quadratic form $2x_1^2 + 5x_2^2 + 5x_3^2 + 6x_1x_2 - 4x_1x_3 - 8x_2x_3$ in matrix notation $X^t A X$ where A is a symmetric matrix.

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

a) Find the inverse of matrix A by adjoint method, where

$$A = \begin{bmatrix} 2 & 5 & 5 \\ -1 & -1 & 0 \\ 2 & 4 & 3 \end{bmatrix}.$$

b) If A is any $n \times n$ matrix then prove that $A (\text{adj}A) = \det (A) I$.

c) Show that the vectors $\bar{v}_1 = \left(\frac{-3}{5}, \frac{4}{5}, 0 \right)$, $\bar{v}_2 = \left(\frac{4}{5}, \frac{3}{5}, 0 \right)$, $\bar{v}_3 = (0, 1, 1)$ form an orthonormal basis for \mathbb{R}^3 .

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

a) Let \mathbb{R}^3 have Euclidean inner product use Gram-Schmidt process to transform the basis $\{\bar{u}_1, \bar{u}_2, \bar{u}_3\}$ to orthonormal basis where $\bar{u}_1 = (1, 0, 0)$ $\bar{u}_2 = (3, 7, -2)$ $\bar{u}_3 = (0, 4, 1)$.

b) If $S = \{\bar{v}_1, \bar{v}_2, \dots, \bar{v}_n\}$ is a set of non-zero vectors in an inner product space such that all pairs of distinct vectors of S are orthogonal then show that S is linearly independent.

c) Evaluate $\det (A)$ by row reduction method where

$$A = \begin{bmatrix} 1 & -2 & 3 & 1 \\ 5 & -9 & 6 & 3 \\ -1 & 2 & -6 & -2 \\ 2 & 8 & 6 & 1 \end{bmatrix}.$$

Q4) Attempt any one of the following :

[10]

- a) If A is a square matrix of order n then prove that A is diagonalizable if and only if it has n -linearly independent eigenvectors.
- b) i) Verify Cayley-Hamilton theorem for matrix $A = \begin{bmatrix} -2 & -7 \\ 1 & 2 \end{bmatrix}$.
- ii) Let V be an inner product space and \bar{v} be any vector in V . Show that the set W of vectors in V that are orthogonal to \bar{v} forms a subspace of V .



P210**[3817]-602****S.Y. B.Sc.****MATHEMATICS****MT - 222 : Vector Calculus****(Old Course) (Paper - II) (Sem. - II)****Time : 2 Hours]****[Max. Marks : 40****Instructions to the candidates:**

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

Q1) Answer the following questions :**[10]**

- a) If $\vec{r} = \vec{a} \cos wt + \vec{b} \sin wt$, where \vec{a} and \vec{b} are constant vectors, and 'w' is constant scalar, then show that $\frac{d^2 \vec{r}}{dt^2} = -w^2 \vec{r}$.
- b) If $\vec{f}(t) = \frac{\tan 3t}{t} \vec{i} + \frac{2^t - 1}{t} \vec{j}$, ($t \neq 0$) and $\vec{f}(0) = 3\vec{i} + \log 2 \vec{j}$ then show that \vec{f} is continuous at $t = 0$.
- c) Find acute angle between the tangents to the curve $\vec{r}(t) = t\vec{i} + t^2 \vec{j} + t^3 \vec{k}$ at $t = 1$ and $t = -1$.
- d) Find the maximum directional derivative of $\phi(x, y, z) = xy^2z$ at $(2, -1, 1)$.
- e) Find $\phi(x, y, z)$ if $\text{grad } \phi = 2x\vec{i} + z\vec{j} + y\vec{k}$.
- f) Show that the vector $\vec{v} = 3xy^2\vec{i} - y^3\vec{j} + x^3\vec{k}$ is solenoidal.
- g) Show that the vector $\vec{v} = 2xy\vec{i} + x^2\vec{j}$ is irrotational.
- h) If $\vec{f} = (y + \sin z)\vec{i} + x\vec{j} + x \cos z \vec{k}$, find $\text{Curl } \vec{f}$.
- i) Let S is a closed surface enclosing the volume V, and \vec{n} is out ward unit normal, then using divergence theorem prove that $V = \frac{1}{3} \iiint_S \vec{r} \cdot \vec{n} \, ds$.
- j) Evaluate $\int_C (x^2 \vec{i} + 2xy \vec{j}) \cdot d\vec{r}$, where C is the segment of straight line $y = x$ from $(0, 0)$ to $(1, 1)$.

P.T.O.

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

- a) Find the tangential and normal components of acceleration of a particle moving along a curve $\vec{r} = e^{-t}\vec{i} + \cos t \vec{j} + \sin t \vec{k}$ at $t = 0$.
- b) If $\vec{r} = \frac{a}{2} (x + y)\vec{i} + \frac{b}{2} (x - y)\vec{j} + xy\vec{k}$, where a and b are constants, then show that $\left[\frac{\partial \vec{r}}{\partial x}, \frac{\partial \vec{r}}{\partial y}, \frac{\partial^2 \vec{r}}{\partial x \partial y} \right]$ is equal to $\frac{-ab}{2}$.
- c) Find directional derivative of $\phi(x, y, z) = 2xy + z^2$ at the point $(1, -1, 3)$ in the direction from $(2, 3, 3)$ to $(1, 1, 1)$.

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

- a) Prove that a vector \vec{u} is of constant magnitude if and only if $\vec{u} \cdot \frac{d\vec{u}}{dt} = 0$.
- b) Find equation of tangent plane to the surface $xy + yz + zx = 7$ at $(1, 1, 3)$.
- c) Show that the vector field $\vec{f} = 2xz\vec{i} + 2y\vec{j} + (x^2 + 2z)\vec{k}$ is conservative, hence find scalar potential ϕ associated to \vec{f} .

Q4) Attempt any one of the following : **[10]**

- a) State divergence theorem. Using divergence theorem evaluate $\iint_S \vec{f} \cdot \vec{n} \, ds$ where $\vec{f} = 4xz\vec{i} - y^2\vec{j} + yz\vec{k}$ and S is the surface bounded by $x = 0$, $y = 0$, $z = 0$ and $2x + 2y + z = 6$.
- b) i) Using Green's theorem evaluate $\int_C \vec{f} \cdot d\vec{r}$, where $\vec{f} = (xy + y^2)\vec{i} + x^2\vec{j}$ and C is boundary of the region bounded by $y = x$ and $y = x^2$.
- ii) Using Stoke's theorem evaluate $\iint_S \nabla \times \vec{f} \cdot \vec{n} \, ds$ where $\vec{f} = e^x\vec{i} + 2y\vec{j} - \vec{k}$ and S is the surface of cylinder $x^2 + y^2 = 4$ bounded by $z = 0$ and open at $z = 2$.



P211**[3817]-603****S.Y. B.Sc.****MATHEMATICS****MT - 223 AND MT - 224****(Old Course) (Sem. - II)***Time : 2 Hours]**[Max. Marks : 40**Instructions to the candidates:*

- 1) *Candidates are advised to see the relevant question paper and solve the same.*
- 2) *In each question paper, all questions are compulsory.*
- 3) *Figures to the right indicate full marks.*

MT - 223 : Complex Variables**Q1)** Answer the following questions :**[10]**

- a) Describe the set $\{z \in \mathbb{C} \mid |z - 1 + 3i| \leq 1\}$ geometrically.
- b) Is the set $S = \{z/z \text{ is real and } 0 \leq z \leq 1\}$ open? Justify.
- c) Evaluate $\lim_{z \rightarrow i} \frac{z^2 + 1}{z^6 + 1}$.
- d) Determine the points of discontinuity of the function $f(z) = \frac{z + 5}{z^2 - 3z + 2}$.
- e) Evaluate $\exp\left(-\frac{\pi}{4}i\right)$.
- f) Derive the formula $\frac{d}{dz} (\cosh z) = \sinh z$.
- g) Find all values of $\text{Log } i$.
- h) Determine the poles and their orders of the function $f(z) = \frac{z + 3}{z^4 - 1}$.
- i) Find residue of $f(z) = \frac{z^2}{z^2 + 1}$ at $z = -i$.
- j) Show that $\int_C (3z - 1) dz = -2i$ where C is the straight line segment from $z = -i$ to $z = i$.

P.T.O.

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

- a) Prove that, if $\lim_{z \rightarrow z_0} f(z)$ exists, then it is unique.
- b) Show that the function $f(z) = \sqrt{|x \cdot y|}$ is not differentiable at the origin, even though Cauchy-Riemann equations are satisfied there.
- c) Determine the analytic function $f(z) = u + i v$, if $u = x^2 - y^2$.

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

- a) Prove that, the necessary condition for a function $f(z) = u(x,y) + i v(x,y)$ to be analytic at a point $z = x + iy$ of its domain is that the first partial derivatives of u and v with respect to x and y exist and they satisfy Cauchy-Riemann equations

$$\frac{\partial u}{\partial x} = \frac{\partial v}{\partial y} \text{ and } \frac{\partial u}{\partial y} = -\frac{\partial v}{\partial x}.$$

- b) Find all values of $(1 + i)^{(1+i)}$.
- c) If $\sin(a + ib) = x + iy$, then show that

$$\frac{x^2}{\cosh^2 b} + \frac{y^2}{\sinh^2 b} = 1 \text{ and } \frac{x^2}{\sin^2 a} - \frac{y^2}{\cos^2 a} = 1$$

Q4) Attempt any one of the following : **[10]**

- a) If $f(z)$ is analytic within and on a closed contour C and z_0 is any point inside C , then prove that $\int_C \frac{f(z)}{z - z_0} dz = 2\pi i f(z_0)$ and hence evaluate

$$\int_C \frac{dz}{z^3(z+4)} \text{ where } C \text{ is the circle } |z| = 2.$$

- b) i) Obtain Laurent's series which represent the function

$$f(z) = \frac{z^2 - 1}{(z+2)(z+3)} \text{ in the region } 2 < |z| < 3.$$

- ii) State Cauchy's Residue theorem and apply it to evaluate

$$\int_C \frac{5z - 2}{z(z-1)} dz \text{ where } C \text{ is the circle } |z| = 3 \text{ taken counter clockwise.}$$



[3817]-603
S.Y. B.Sc.
MATHEMATICS
MT - 223 AND MT - 224
(Old Course) (Sem. - II)

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:

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

MT - 224 : Differential Equations and Laplace Transforms

Q1) Attempt each of the following : **[10]**

- a) Solve the equation $(\Delta^2 - 1)(\Delta^2 + 1)y = 0$.
- b) Verify that $y = \sin x$ is a solution of the equation $\frac{d^2 y}{dx^2} - 2 \tan x \frac{dy}{dx} + 3y = 0$.
- c) Find the Wronskian of the functions x, xe^{-x} .
- d) Find particular integral of $\frac{d^3 y}{dx^3} + 9 \frac{dy}{dx} = \cos 3x$.
- e) State the formula for $\frac{1}{\Delta - a} q(x)$ and hence find $\frac{1}{\Delta + 1} e^{2x}$.
- f) Let $f(t) = \begin{cases} e^t & \text{if } 0 < t \leq 1 \\ 0 & \text{if } t > 1 \end{cases}$. Find $L\{f(t)\}$.
- g) Prove that $L\{\cosh(at)\} = \frac{S}{S^2 - a^2}$.
- h) If $L\{f(t)\} = \frac{S}{S^2 - 25}$ then find $\int_0^{\infty} e^{-2t} f(t) dt$.
- i) Define exponential order of a function $f(t)$ as $t \rightarrow \infty$.
- j) What is Laplace transform of $e^{at} \sin bt$?

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

a) Let $f(\Delta)$ be a polynomial in D with constant coefficients. Prove that

$$\frac{1}{f(\Delta)} e^{ax} = \frac{1}{f(a)} e^{ax}, \text{ provided } f(a) \neq 0.$$

b) Find particular solution of $(\Delta^3 - 7\Delta - 6)y = e^x(1+x)$.

c) Solve the equation $(\Delta^2 + 1)y = xe^{2x}$.

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

a) Explain the method of variation of parameter to solve the non-homogeneous differential equations $f(x)y = q(x)$.

b) Solve the equation $(\Delta^2 - 1)y = e^x \sin 2x$ by using the method of undetermined coefficients.

c) Find $L^{-1} \left\{ \frac{S^2}{(S-1)^4} \right\}$.

Q4) Attempt any two of the following : **[10]**

a) If $L \{f(t)\} = \phi(s)$, then prove that $L \left\{ \frac{f(t)}{t} \right\} = \int_0^\infty \phi(s) ds$, provided the integral on right exists.

b) If $L^{-1} \{ \phi(s) \} = f(t)$ then prove that $L^{-1} \left\{ \int_0^\infty \phi(\beta) d\beta \right\} = \frac{f(t)}{t}$.

c) Solve the equation $y'' - 4y' + 4y = e^{2t}$, given that $y(0) = \frac{1}{2}$, $y'(1) = 0$ by using Laplace transform.



Total No. of Questions : 4]

[Total No. of Pages : 2

P212

[3817]-604

S.Y. B.Sc.

PHYSICS

**PH - 221 : Oscillations, Waves and Sound
(Paper - I) (Old Course) (Sem. - II)**

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Figures to the right indicate full marks.*
- 3) *Use of calculator and log table is allowed.*
- 4) *Neat diagrams must be drawn wherever necessary.*

Q1) Attempt all of the following :

- a) Explain unstable equilibrium. [1]
- b) What is meant by critically damped motion? [1]
- c) Distinguish between forced oscillations and damped oscillations. [1]
- d) What do you mean by wave velocity and particle velocity? [1]
- e) What is Doppler Effect? Give its two applications. [1]
- f) Define intensity level of sound. [1]
- g) A 5kg block extends a spring 20cm from its unstretched position. The block is removed a body 900 gram is hung from the same spring. Find extension produced in it. [1]
- h) The velocity of transverse waves over a stretched string is 300cm/s. If its mass per unit length is 4g/cm; find the tension in the string. [1]
- i) Define half width of amplitude resonance curve. [1]
- j) A capacitor of 0.3rf, an inductor of 60mH and a resistance of 300 ohms are connected in series. Can the electrical circuit be oscillatory? [1]

Q2) Attempt any two of the following :

- a) Obtain the expression for average power absorbed during the forced oscillations. [5]
- b) A particle is subjected to two simple harmonic motions perpendicular to each other given by $x = a \sin (2 wt + \theta)$ and $y = b \sin wt$. Prove that the resultant path of the particle is parabola for the phase difference $\frac{\pi}{2}$. [5]

P.T.O.

- c) Describe stroboscopic method to determine frequency of tuning fork. Derive the necessary expression for frequency. [5]

Q3) Attempt any two of the following :

- a) The equation of motion of damped oscillator is $x = 5 e^{-3t} \cos \pi t$. What is the initial displacement? What is periodic time? What is log decrement? [5]
- b) A longitudinal disturbance generated by an earthquake travels 1500km in 3 minutes. If the average density of rock is 2800 kg/m^3 , calculate the bulk modulus for the rock. [5]
- c) The equation of forced oscillations of a body is given by

$$5 \frac{d^2x}{dt^2} + 20 \left(\frac{dx}{dt} \right) + 245x = f_0 \sin qt.$$

Determine the resonant angular frequency at which velocity resonance takes place. Also determine the half width of resonance curve. [5]

Q4) Attempt the following :

- a) i) What are Lissajous figures? Explain electrical method for obtaining Lissajous figures. [4]
- ii) Show that the apparent wavelength of light increases when the star moves away from the earth. [4]

OR

- i) Define quality factor and obtain the expression for quality factor of the damped oscillator. [4]
- ii) What is intensity of wave? Show that intensity of a wave at a point is directly proportional to the square of the amplitude of a particle, situated at the point. [4]
- b) Attempt any one of the following :
- i) A spectral line in the spectrum of star is observed to be shifted from its normal position towards red end by 0.22\AA . If the star is moving away from the earth with velocity 10^4 m/s determine the wavelength of the spectral line. [2]
- ii) The stroboscope disc is illuminated by a neon lamp. Dots in certain ring appeared stationary when disc was making 25 revolutions/sec. Determine the number of dots in the ring. (Given : Frequency of A.C is 50 Hz). [2]



P213

[3817] - 605

S.Y. B.Sc.

PHYSICS

PH : 222 - Electronics

(Old) (Paper - II) (Sem. - II)

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Figures to the right indicate full marks.*
- 3) *Draw neat diagrams wherever necessary.*
- 4) *Use of log-table and calculator is allowed.*
- 5) *Symbols have their usual meanings.*

Q1) Attempt all of the following :

- a) What is LDR? [1]
- b) What do you mean by NTC thermister? [1]
- c) What is ripple factor? [1]
- d) What is load regulation? [1]
- e) What is role of capacitor filter in power supply? [1]
- f) Define current gain β in common emitter amplifier. [1]
- g) Convert $(2c7)_{16}$ into decimal number. [1]
- h) Define the term accuracy. [1]
- i) What is extrinsic semiconductor. [1]
- j) What should be bias voltages employed for transistor amplifier in active region. [1]

Q2) Attempt any two of the following :

- a) State maximum power transfer theorem and explain it with suitable diagram. [5]
- b) Explain construction and working of FET. [5]
- c) State De-Morgan's theorems and verify with logic diagrams. [5]

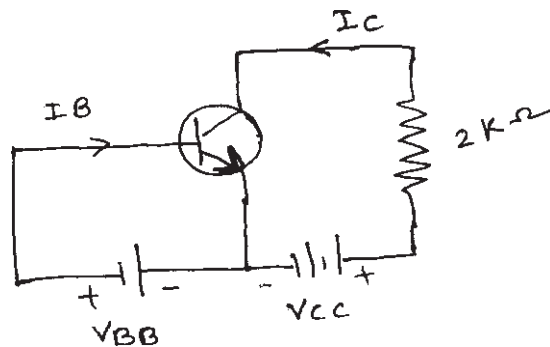
P.T.O.

Q3) Attempt any two of the following :

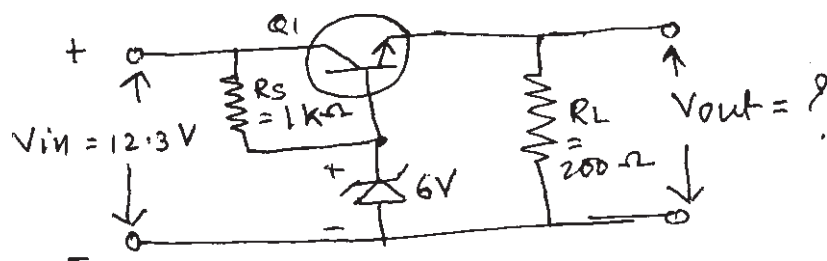
- a) Discuss micro electrode in detail with necessary diagram. [5]
- b) Draw the circuit symbol of SCR. Explain how SCR acts as a switch with the help of its I-V characteristics. [5]
- c) Draw logic diagram for [5]
 - i) $Y = \bar{B} + A.B$
 - ii) $Y = (A + B). (C + D)$

Q4) Attempt (a) or (b) of the following :

- a) i) For a transistor shown below, the voltage drop across $2k\Omega$ collector resistance is 1V. If $B = 50$, find the base current. [5]



- ii) Explain with the help of circuit diagram working of single-stage transistor amplifier. [5]
- b) i) In the following emitter follower voltage regulator circuit calculate value of V_{out} , I_L and V_{CE} . [5]



- ii) With suitable diagram explain working of LVDT. State its uses in Biomedical studies. [5]



P213

[3817] - 605

S.Y. B.Sc. (Sem. - II)

PHYSICS

PH : 222 - Instrumentation

(Old) (Paper - II) (21222)

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Figures to the right indicate full marks.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Use of calculators and log-table are allowed.*

Q1) Attempt all of the following :

- a) What are the aims of measurement? [1]
- b) What is thermistor? [1]
- c) A strain gage with a gage factor 3 is cemented to a steel member which is subjected to a strain of 10^{-6} . If for no strain, the original resistance of the gage is 100Ω . Calculate the change in gage resistance. [1]
- d) Define the term repeatability. [1]
- e) State the functions of a transducer. [1]
- f) Convert 86° Fahrenheit to degree celsius. [1]
- g) State different units of pressure. [1]
- h) What is principle of operation of piezoelectric transducer? [1]
- i) Explain Hall effect. [1]
- j) What is MRI? [1]

Q2) Attempt any two of the following :

- a) Explain with block diagram a typical instrumentation system. [5]
- b) Explain the principle, construction and use of Ringelmann chart for smoke density measurement. [5]
- c) With neat diagram explain ultrasonic flow meter. [5]

P.T.O.

Q3) Attempt any two of the following :

- a) When input voltage of an instrument changes from 10V to 12V, the corresponding output voltage changes from 50V to 60V. What will be the sensitivity of the instrument? [5]
- b) Water flowing in a horizontal pipe has a speed 20 cm/s at one end point and 15 cm/s at another point. Determine the pressure drop between two points. [5]
- c) A voltmeter having range 0-200V is connected across a resistor. It reads 180V. If actual voltage across the resistor is 175V, calculate the accuracy of measurement in terms of percentage of true value and percentage of full scale deflection. [5]

Q4) a) Attempt (A) or (B) of the following :

- A)
 - i) State the principle and working of liquid filled thermometer. [4]
 - ii) With neat diagram, describe the bourdon pressure gauge. [4]
 - B)
 - i) With neat diagram, explain B-H curve and its applications. [4]
 - ii) Describe the construction and working of pyranometer used for solar insolation measurement. [4]
- b) Attempt any one of the following :
- i) Write short note on calibration of instruments. [2]
 - ii) The dead zone in certain thermometer is 0.125 percent of span. The calibration is 400°C to 1200°C. What temperature change might occur before it is defected? [2]



Total No. of Questions : 4]

[Total No. of Pages : 2

P214

[3817]-606

S.Y. B.Sc.

CHEMISTRY - I

CH - 221 : Inorganic Chemistry

(Old) (Sem. - II)

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Figures to the right indicate full marks.*
- 3) *Neat diagrams must be drawn wherever necessary.*

Q1) Answer the following :

[10]

- a) What do you mean by term ore?
- b) Give the names of two ores of aluminium.
- c) What is Thomas Slag?
- d) Why Ionisation potential of Gallium and Aluminium is nearly same?
- e) Which elements are enzyme inhibitors?
- f) What is mean by protic solvents?
- g) Glycerol has higher B.P. than ethanol.
- h) What are non-stoichiometric compounds?
- i) What is desalination of water?
- j) What is hard acid?

Q2) Attempt any two of the following :

[10]

- a) Write the names, symbols and electronic configurations of Gr.VA elements. Explain the trends in the following properties of these elements.
 - i) Atomic size.
 - ii) Electronegativity.
- b) Explain the concept of acid-base according to Bronsted-Lowry theory. Give advantage and disadvantage of this theory.
- c) Answer the following :
 - i) Explain the process of concentration by magnetic separation method.
 - ii) What is calcination?

PTO.

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

- a) What are the transition elements? Explain the following properties of these elements.
 - i) Atomic Size.
 - ii) Oxidation States.
- b) Give the electrolysis process to get aluminium from alumina with a suitable diagram.
- c) Answer the following :
 - i) What is hydrogen bonding? Explain the effect of intermolecular hydrogen bonding on melting point and boiling point.
 - ii) Write note on adulterants in milk.

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

- i) Describe the extraction of iron using blast furnace with the help of neat diagram and chemical reactions.
 - ii) What is steel? How is it manufactured by Acid Bessemer Process?
- b) Attempt any one of the following : **[4]**
- i) What is anomalous behaviour? Explain your answer with special reference to fluorine.
 - ii) What are hydrides? Discuss the trends in strength of hydrides.



P215

[3817] - 607

S.Y. B.Sc.

CHEMISTRY

CH - 222 : Analytical Chemistry

(21322) (Old) (Theory) (Sem. - II)

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Figures to the right indicate full marks.*
- 3) *Use of logarithmic tables and calculator is allowed.*
- 4) *Neat diagram must be drawn wherever necessary.*

Q1) Answer the following :

[10]

- a) What is mean by flux?
- b) What is the group reagent for IIIA group?
- c) How is sulphur from an organic compound detected using sodium fusion test?
- d) Define the term accuracy.
- e) Draw a labelled diagram of wheat stone's bridge circuit.
- f) Define the equivalence point of titration.
- g) State Lambert-Beer's law.
- h) Which is the stationary and mobile phase in Ion exchange chromatography?
- i) Which indicator is used for a redox titration of Ce^{4+} and Fe^{2+} .
- j) What is the role of yellow ammonium sulphide in separation of group II cations?

Q2) a) Answer any two of the following :

[6]

- i) What is the common ion effect? Explain its any one application in qualitative analysis.
- ii) Give reasons for deviation from Beer's law.
- iii) What are the different methods used to minimise determinate errors?

P.T.O.

- b) The resistance of a 0.1N solution of an electrolyte was found to be 220 Ohm at 25°C. Calculate the equivalence conductance of solution at 25°C, if the electrodes in the cell are 0.8 cm apart and an area of 0.7782 cm². [4]

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

- i) Explain the “Kjeldahl’s method for the estimation of nitrogen in organic compounds.
 - ii) What are the requirements for successful application of an adsorption indicator?
 - iii) Discuss any two applications of ion exchange chromatography.
- b) Solve any one of the following : [4]
- i) Four different samples of silver alloy were analysed for silver and were found to contain 18.32, 18.35, 18.16 & 18.10 percentage of Ag. Calculate mean deviation, relative mean deviation and standard deviation.
 - ii) 0.512 gm of an organic compound containing chloride gave 0.666 gm of AgCl in a carius estimation. Find the percentage of chlorine in the compound.

Q4) Answer any two of the following : [10]

- a) Explain the titration curve for weak acid and strong base in volumetric analysis.
- b) Describe the match box model of chromatographic separation.
- c) Explain the variation of equivalence conductance and specific conductance with concentration.



Total No. of Questions : 4]

[Total No. of Pages : 3

P220

[3817]-614

S.Y. B.Sc.

STATISTICS

**ST - 221 : Statistical Methods - I
(2004 Pattern) (Old Course) (Sem. - II)**

Time : 2 Hours]

[Max. Marks : 40

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 meaning.*

Q1) Attempt each of the following :

- a) Choose the correct alternative in each of the following : **[1 each]**
- i) Cost of living index numbers depends on
 - A) Wholesale prices.
 - B) Retail Prices.
 - C) Wholesale and Retail Prices.
 - D) Government Prices.
 - ii) If $\text{var}(X_{1,23}) = 0$ then $R_{1,23}$ is
 - A) - 1
 - B) 1
 - C) 0
 - D) 0.5
 - iii) The regression planes coincide iff
 - A) $|R| = 0$
 - B) $|R| = 1$
 - C) $|R| > 0$
 - D) $|R| < 0$
- b) State whether the given statement is true or false in each of the following : **[1 each]**
- i) In multiple regression analysis $b_{31.2} \times b_{13.2} = r_{13.2}$.
 - ii) Level of significance always lies between 0 & 1.
 - iii) Drobish-Bowely's index number is an average of Laspeyre's and Paasche's index number.

P.T.O.

- c) Define the term : Type II error. [1]
- d) Comment on statement “Index numbers are called as economic barometer.” [1]
- e) Compute the real income of a officer getting Rs.25000 in Feb.2010 if cost of living index number for Feb.2010 is 175. [1]
- f) In testing of significance of difference between two proportions, the first sample gives 40 successes in 200 trials and the second sample of size 50 gives 13 successes, what is the pooled estimate of P? [1]

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

- a) With usual notations show that,

$$b_{12.3} = \frac{b_{12} - b_{13} b_{23}}{1 - b_{23} b_{32}}$$

- b) What is factor reversal test? Check whether Laspeyre’s index number satisfies factor reversal test.
- c) A random sample of 400 persons from country A give mean height 170cm. Another sample of 800 persons from country B give mean height 178cm. Can you say that, person in country B are taller than those of A? Given that there population standard deviations are 6cm and 8cm respectively. Use 5% level of significance.

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

- a) Discuss the problems of
- i) Selection of commodities and
 - ii) Selection of average in the construction of price index numbers.
- b) Describe large sample test for testing $H_0 : P = P_0$ against the alternatives,
- i) $H_1 : P \neq P_0$
 - ii) $H_1 : P < P_0$
 - iii) $H_1 : P > P_0$, when a sample of size n is drawn from the population with proportion of certain type of items is P.
- c) Show that the correlation coefficient between the residuals $X_{1.23}$ and $X_{2.13}$ is equal in magnitude and opposite in sign to that between $X_{1.3}$ and $X_{2.3}$.

Q4) Attempt any one of the following :

- a) i) Derive the equation of least squares regression plane of X_2 on X_1 and X_3 . [7]
- ii) Obtain index number of clothing from the given data if the cost of living index number is 244. [3]

Group	Food	Fuel	Clothing	House Rent	other
Index Number	300	200	?	150	200
Weight	45	15	10	12	18

- b) i) Derive the formula for the multiple correlation coefficient $R_{1.23}$ in terms of total correlation coefficients. [5]
- ii) Describe the test procedure for $H_0 : \rho_1 = \rho_2$ against $H_1 : \rho_1 \neq \rho_2$ where ρ_1 and ρ_2 are correlation coefficients of two bivariate normal populations. [5]



P221

[3817]-615

S.Y. B.Sc. (Sem. - II)

STATISTICS

ST - 222 : Continuous Probability Distributions - II
(Old Course) (2004 Pattern)

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:

- 1) All questions are compulsory.
- 2) Figures to the right indicate full marks.
- 3) Use of calculator and statistical tables are 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 $X \rightarrow \beta_2(m, n)$ then the distribution of $1/(1 + X)$ is,
A) $\beta_1(m, n)$
B) $\beta_2(n, m)$
C) $\beta_1(n, m)$
D) $G(m, n)$
 - ii) If X has a chi-square distribution with variance 8, then its mean is,
A) 8
B) 4
C) 16
D) 6
 - iii) If $X \rightarrow F_{n, n}$, then mode of the distribution is,
A) $\frac{n + 2}{n - 2}$
B) $\frac{n - 2}{n + 2}$
C) $\frac{n(n + 2)}{(n - 2)}$
D) $\frac{n(n - 2)}{(n + 2)}$

- b) State whether the given statement is true or false in each of the following: **[1 each]**
- In a paired t-test observations in two samples are independent of each other.
 - All raw moments and central moments for t-distribution are same.
 - Chi-Square distribution is a symmetric distribution.
- c) If $t \rightarrow t_{15}$, find C such that $P(-C \leq t \leq C) = 0.8$ **[1]**
- d) If $X \rightarrow G(9,6)$, $Y \rightarrow G(9,12)$ and X and Y are independent variables then state the distribution of $X|Y$. **[1]**
- e) State the interrelation between normal and Chi-Square distribution. **[1]**
- f) If $X \rightarrow \chi_{10}^2$, find $P(X \geq 7.267)$. **[1]**

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

- Find the mean of F distribution with n_1 and n_2 degrees of freedom.
- A random sample of size 18 from a bivariate normal population gave correlation coefficient of 0.1044. At 5% level of significance test whether the population correlation coefficient is significant?
- If \bar{X} and S^2 are mean and variance of a random sample of size 16 from $N(3,64)$, find $P(-1 < \bar{X} < 5, 34.188 < S^2 < 77.244)$.

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

- Obtain the sampling distribution of mean of a random sample drawn from a gamma distribution.
- Describe the test procedure for testing $H_0 : \sigma^2 = \sigma_0^2$ against $H_1 : \sigma^2 \neq \sigma_0^2$. State the underlying assumptions.
- A sample of 20 women enrolled in a health program shows mean diastolic blood-pressure of 99 and standard deviation 32. Can you conclude that women enrolled in the program has diastolic blood-pressure greater than 75 recommended by doctors? (Use $\alpha = 0.05$).

Q4) Attempt any one of the following :

- If X and Y are independent Chi-Square variates with m and n degrees of freedom respectively, then show that $V = X + Y$ and $V = X|(X + Y)$ are independently distributed. Further identify the distributions of U and V. **[10]**
- Define student's t distribution and derive its probability density function. **[8]**
 - If $X \rightarrow \beta_1(2,2)$ then show that the median of the probability distribution is 0.5. **[2]**



Total No. of Questions : 4]

[Total No. of Pages : 2

P230

[3817] - 630

S.Y. B.Sc.

ENVIRONMENTAL SCIENCE

Effects of Changed Environment on Man & Management of Environment

(Paper-II) (Sem. - II) (Old) (2004)

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*

Q1) Attempt the following in 1-2 lines each:

[10]

- a) What are the aims of conservation.
- b) Enlist any 2 reasons for extinction of wild life.
- c) Define urbanization.
- d) What are the methods to disseminate environmental information.
- e) What are the major sources of air pollutants?
- f) Define climatology.
- g) What is water pollution?
- h) Mention any 2 important roles of BNHS in environmental education.
- i) What is biochemical oxygen demand?
- j) Enlist any 2 effects taken for development of non-polluting energy system.

P.T.O.

Q2) Write short notes on Any Two of the following : **[10]**

- a) Project Tiger.
- b) Causes of ignorance & absence of informed opinion.
- c) Effects of pollution on non-biological system.

Q3) Attempt Any Two of the following: **[10]**

- a) Describe the secondary methods of sewage treatment.
- b) Explain the need to improve social awareness for environmental management concerning the industry.
- c) Explain the primary & secondary air pollutants.

Q4) Attempt Any One of the following: **[10]**

- a) Explain the role of mass media & non-governmental organization in disseminating environmental information.
- b) What are innovative agricultural technologies? Add a note on water conservation & agriculture.



Total No. of Questions : 3]

[Total No. of Pages : 2

P232

[3817]-633

S.Y. B.Sc. (Sem. - II)

हिंदी (Hindi)

(पुराना पाठ्यक्रम)

समय : 2 घंटे]

[पूर्णांक : 40

पाठ्यपुस्तके :- 1) मेरी श्रेष्ठ व्यंग्य रचनाएँ

लेखक - हरिशंकर परसाई

2) आधुनिक काव्य संग्रह

संपादक - डॉ. विजयेन्द्र स्नातक

सूचनाएँ :-

1) सभी प्रश्न अनिवार्य हैं।

2) दाहिनी ओर लिखे अंक प्रश्न के पूर्णांक हैं।

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

[8]

क) 'चूहा और मैं' पाठ के व्यंग्य को स्पष्ट कीजिए।

ख) 'राम का दुख और मेरा' पाठ में भवन निर्माण में होने वाले भ्रष्टाचार पर लेखक ने किस प्रकार व्यंग्य किया है ?

ग) जमाखोरों ने किस प्रकार क्रांति की ?

आ) निम्नलिखित अवतरण की ससंदर्भ व्याख्या कीजिए।

[5]

घ) "कहा हैं वे कवि जो वर्षा मंगल गाते हैं, जो सावन की झड़ी को उद्दीपन बताते हैं ? अगर अब किसी कवि को कवि सम्मेलन में वर्षा गीत गाते देखा तो पत्थर फेंक कर मार दूँगा।"

अथवा

घ) "यौवन सिर्फ काले बालों का नाम नहीं है। यौवन नवीन भाव, नवीन विचार ग्रहण करने की तत्परता का नाम है।"

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

[8]

च) किसान के लिए कविता क्या करना चाहती है ?

छ) 'गुलाबी चूड़ियाँ' कविता में कवि का वात्सल्य भाव किस प्रकार प्रकट हुआ है ?

ज) 'वे और तुम' कविता का आशय अपने शब्दों में लिखिए।

P.T.O.

आ) निम्नलिखित अवतरण की ससंदर्भ व्याख्या कीजिए। [5]

झ) “सूरज है जग का बुझा-बुझा, चंद्रमा मलिन-सा लगता है,
सबकी कोशिश बेकार हुई, आलोक न इनका जगता है,
इन मलिन ग्रहों के प्राणों में कोई नवीन आभा भर दे।
जादूगर ! अपने दर्पण पर घिसकर इनको ताजा कर दे।”

अथवा

झ) “चलो जहाँ निर्जन कानन में वन्य कुसुम मुस्काते हैं,
मलयानिल भूलता, भूलकर जिधर नहीं अलि जाते हैं।
कितने दीप बुझे झाड़ी-झुरमुट में ज्योति पसार ?
चले शून्य में सुरभि छोड़कर कितने कुसुम-कुमार ?”

प्रश्न 3)अ) निम्नलिखित अंग्रेजी संक्षिप्तियों में से किन्हीं दस के हिंदी पूर्ण पर्याय लिखिए। [10]

- | | |
|---------------|----------------|
| i) B.B.C. | ii) C-DAC. |
| iii) D.R.D.A. | iv) G.A.T.T. |
| v) I.D.A. | vi) I.T.D.C. |
| vii) M.L.A. | viii) N.A.S.A. |
| ix) R.R.B. | x) S.E.B.I. |
| xi) U.K. | xii) W.H.O. |

आ) निम्नलिखित अनुच्छेद का सारांश एक तिहाई में लिखते हुए उसे उचित शीर्षक दीजिए : [4]

ऋतुराज वसंत के सुशासन और व्यवस्था की छटा हर ओर दिखाई पड़ती है। कलियों के यौवन की अंगड़ाई भ्रमरों को आमंत्रण दे रही है। अशोक के अग्निवर्ण कोमल एवं नवीन पत्ते वायु के स्पर्श से तरंगित हो रहे हैं। शीतकाल के ठिठुरे अंगों में नई स्फूर्ति उमड़ रही है। वसंत के आगमन के साथ ही जैसे जीर्णता और पुरातन का प्रभाव तिरोहित हो गया है। प्रकृति के कण-कण में नये जीवन का संचार हो गया है। आम्र मंजरियों की भीनी गंध और कोयल का पंचम आलाप, भ्रमरों का गुंजन और कलियों की चटक, वनों और उद्यानों के अंगों में शोभा का संचार — सब ऐसा लगता है जैसे जीवन में सुख ही सत्य है, आनंद के एक क्षण का मूल्य पूरे जीवन को अर्पित करके भी नहीं चुकाया जा सकता।

□□□□

P233

[3817] - 636

S.Y.B.Sc.(Sem. - II)

BIOTECHNOLOGY (Vocational)

VOC. Biotech-221: Recombinant DNA Technology

(2004 Pattern) (Paper-I)

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:

- 1) All questions are compulsory.*
- 2) All questions carry equal marks.*
- 3) Neat diagrams must be drawn wherever necessary.*
- 4) Figures to the right indicate full marks.*

Q1) Answer each of the following in 1-2 lines.

[10]

- a) What is gene cloning?
- b) What is YAC?
- c) Give role of ethanol in DNA purification.
- d) What is electroporation?
- e) Define genomic DNA.
- f) Give two applications of gene cloning.
- g) What are bacteriophages?
- h) What are cosmids?
- i) Define gene.
- j) What is T-DNA?

Q2) Write short notes on any two of the following in 8-10 lines each. **[10]**

- a) Polymerase chain reaction.
- b) Proteomics.
- c) Isolation of DNA from plant cells.

Q3) Attempt any two of the following in 8-10 lines each. **[10]**

- a) Describe desirable properties of plasmids as cloning vectors.
- b) Explain strategies for purification of isolated DNA.
- c) Describe any one method for introducing DNA into living cells.

Q4) What is recombinant DNA technology? Enlist enzymes used in this technology and give their uses. **[10]**

OR

What are cloning vectors? Describe cloning vectors used for cloning genes in yeast cells.



P234

[3817] - 638

S.Y. B.Sc. (Vocational)

ELECTRONIC EQUIPMENT MAINTENANCE

VOC-EEM-221: Audio, Video and Office Equipments-B

(Paper-I) (Old course) (Sem. - II)

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:

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

Q1) Answer the following:

- a) Differentiate between multimedia computer and minicomputer. [1]
- b) What is computer virus? How to prevent it? [1]
- c) Differentiate between mouse and keyboard. [1]
- d) What is screensaver? [1]
- e) What is light pen? Give its one application. [2]
- f) What is EPBAX? State its features. [2]
- g) What is Fax? Which type of modulation is used in it? [2]
- h) Why is laser printer preferred over other printers? [2]

Q2) Attempt **any two** of the following:

- a) Draw a diagram of printer head of dot matrix printer. Explain its working. [4]
- b) Write a note on evolution of " Computer mouse". [4]
- c) What is OHP? with neat diagram explain its working. [4]

P.T.O.

Q3) Attempt any two of the following:

- a) Give the common faults and their remedies in data projector. [4]
- b) Give the working principle of “touch screen”. Give its application. [4]
- c) Explain the meaning of bar code. Give its applications. Also explain how it is printed. [4]

Q4) Answer the following:

- a) Draw the block diagram of motherboard of PC. Explain the function of each block. Write in brief about the memories used in PC. [6]
- b) With the sequence of events explain the working of photo copies. [6]

OR

- a) List various types of scanners. With neat diagram explain the working of flatbed scanner. [6]
- b) Give one example of large screen display. Also explain its working principle. [6]



P235

[3817] - 640

S.Y.B.Sc.(Vocational)

COMPUTER MAINTENANCE

Microprocessor Interfacing And Computer Hardware

(Sem. - II) (Paper-I) (Old Course) (28712)

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:

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

Q1) Attempt the following:

[8x2=16]

- a) Write an advantage of LCD display over CRT display.
- b) Describe what does "Protocol" mean?
- c) What do you mean by technical 'handshaking'?
- d) What does CCD stand for and where is it used?
- e) List two parameters of ADC.
- f) Write two methods of key debouncing.
- g) List commonly used terms for optical disks.
- h) What do GPIB and HPIB stand for?

Q2) Attempt any **Two** of the following.

[2x4=8]

- a) Explain the features of centronics Parallel Interface for printers in detail.
- b) Describe the features of the ports available and ways to modify them in PPI-8255.
- c) Explain the principle of Magnetic storage devices listing their different types and features.

P.T.O.

Q3) Attempt any **TWO** of the following: **[2x4=8]**

- a) Explain the mechanism of interfacing a sensor or transducer to a microcomputer.
- b) What precautions need to be taken while interfacing microcomputer ports to high power devices?
- c) Explain the method of speech recognition using a computer.

Q4) Attempt any **ONE** of the following: **[1x8=8]**

- a) Explain different types of serial data transmission methods and standards in detail.
- b) Describe an Industrial Process Control System based on 8086 microprocessor. Write the procedure for developing its prototype.



P236

[3817] - 641
S.Y.B.Sc. (Vocational)
SEED TECHNOLOGY
Vegetable Seed Production
(Paper-III) (Sem. - II) (Old Course)

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:

- 1) All questions are compulsory.*
- 2) Figures to the right indicate full marks.*
- 3) Draw neat & labelled diagrams wherever necessary.*

Q1) Attempt the following:

[10x1=10]

- a) Define apomixis.
- b) What is back cross.
- c) Enlist any two pollination methods used in hybrid seed production.
- d) Give any two equipments required for hybridization technique in vegetables.
- e) Define cytoplasmic male sterility.
- f) Give any two objectives of vegetable breeding.
- g) What is clonal selection?
- h) Sketch & label flower of Asparagus.
- i) Define fertilization.
- j) Enlist any two requirements for vegetable seed production.

P.T.O.

Q2) Attempt any two of the following: [2x5=10]

- a) Explain in brief gametophytic & sporophytic self incompatibility.
- b) Explain any one method in detail for population improvement in vegetables.
- c) Give an account of vegetative propagation.

Q3) Write notes on (Any two): [2x5=10]

- a) Genetic male sterility.
- b) Pure line selection.
- c) Classification of vegetable crops.

**Q4) Describe the stepwise procedure involved in seed production of a Methi/
Palak. [10]**

OR

Describe the stepwise procedure involved in seed production of a Chilli/
Brinjal.



P237

[3817] - 643

S.Y.B.Sc. (Vocational)

BIOTECHNOLOGY

**VOC. Biotech-222:Immunology & Animal Cell Culture
(2004 Pattern) (Paper-II) (Sem. - II) (Old course)**

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:

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

Q1) Answer each of the following in 1-2 lines:

[10]

- a) Define: Anchorage dependent cells.
- b) Give the role of serum in medium.
- c) Why animal cells are incubated in presence of CO₂?
- d) Name any two commonly used media in ATC.
- e) Describe the type of microscope used for observing animal cells.
- f) What is innate immunity?
- g) Describe function of IgA.
- h) With example define agglutination in antigen and antibody.
- i) What are the two types of T cells involved in immune response?
- j) Enlist any two cytokines generated by immune cells.

P.T.O.

Q2) Write short notes on any two of the following (8-10 lines): **[10]**

- a) Organ culture.
- b) Phagocytosis.
- c) Immuno globulin structure.

Q3) Attempt any two of the following (8-10 lines): **[10]**

- a) What are the characteristics of transformed cell lines.
- b) What are serum-free media? Discuss the advantages and disadvantages of such media.
- c) Explain in detail primary lymphoid organs.

Q4) Elaborate the method of cell fusion and it's importance in monoclonal antibody production. **[10]**

OR

Differentiate between humoral and cell mediated immunity. Write the role of MHC molecules in an adaptive immunity.



P238

[3817] - 645

S.Y.B.Sc. (Vocational)

ELECTRONIC EQUIPMENT MAINTENANCE

VOC-EEM-222:Maintenance concepts and Repair-II-B

(Paper II) (Sem. - II) (Old course)

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:

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

Q1) Answer all:

- a) Name the parts. Which wear out fast in a studio tape recorder. [1]
- b) When earth connection is taken from a water pipe it should be ____ water pipe (hot, cold). [1]
- c) Voltage of a freshly and fully charged lead acid battery cell is ____ v. (1.4,1.5,2.2,2.5). [1]
- d) What is the difference between preventive maintenance and corrective maintenance. [1]
- e) What kind of preventive maintenance can be carried out for dry cells. [2]
- f) Why is the keyboard of a PC usually placed in a sliding drawer? [2]
- g) What is 'burn-in' in respect of CRT monitor screen? How is it prevented? [2]
- h) What are the prerequisites of successful installation and commissioning? [2]

P.T.O.

Q2) Answer any two:

- a) What is the importance of and what are the issues involved in layout of electric power leads and signal leads? [4]
- b) Discuss the installation plan for a typical PC. [4]
- c) Write a note on preventive maintenance of a studio tape recorder. [4]

Q3) Answer any two:

- a) What are the issues involved in installation of TV antenna? Discuss. [4]
- b) What are the advantages and disadvantages of Ni-cd cell over Lead acid battery? [4]
- c) Write a note on Plate earthing. [4]

Q4) Answer all :

- a) Write a note on installation of a computer with regard to the importance of installation manual, selection and preparation site etc. [6]
- b) What are the common faults in batteries? [6]

OR

- a) Write a note on potential hazards and safety measures needed in the handing of electronic systems. [6]
- b) Describe a typical installation manual. [6]



P239

[3817] - 647

S.Y.B.Sc. (Vocational)

COMPUTER MAINTENANCE

Troubleshooting of Computers

(Paper-II) (Sem. - II) (28722) (Old Course)

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:

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

Q1) Attempt the following:

[16]

- a) Write any two common troubles that can occur in modern PC.
- b) Write any two faults that can be identified by running diagnostic programs.
- c) List any two keyboard related problems.
- d) Write any two problems which occur frequently in printers.
- e) What are the ill-effects of dust on PC?
- f) Describe two simple precautions to be taken while handling floppies.
- g) What is corrosion?
- h) List any four electronic components found on motherboard.

Q2) Attempt any two:

[8]

- a) What is the effect of electrostatic discharge? How to prevent it?
- b) List and explain various startup problem of PC.
- c) List and explain possible video display failures.

P.T.O.

Q3) Attempt any two: **[8]**

- a) Explain in brief how disk drive fails?
- b) How can system designer reduce the effect of electromagnetic interference and radio frequency interference?
- c) Explain preventive maintenance of keyboard and mouse.

Q4) Attempt any one: **[8]**

- a) List and explain various “repair generated failures”.
- b) Explain in brief power line problems. How will prevent your PC from power line problems?



P240

[3817] - 648
S.Y.B.Sc. (Vocational)
SEED TECHNOLOGY
Seed Quality Control
(Paper-IV) (Old Course) (Sem. - II)

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:

- 1) All questions are compulsory.*
- 2) Figures to the right indicate full marks.*
- 3) Draw neat and labelled diagrams wherever necessary.*

Q1) Attempt the following:

[10x1=10]

- a) Enlist the classes of seed.
- b) Define sealing.
- c) Give any two functions of central seed committee.
- d) Define Labelling.
- e) Enlist any two precautions taken during the time of threshing.
- f) What is land requirement?
- g) Define germination.
- h) Sketch any two walking patterns in field inspection.
- i) Give any two roles of field inspector.
- j) What is interstate seed certification.

P.T.O.

Q2) Attempt any two of the following: **[2x5=10]**

- a) Describe different phases of seed certification.
- b) Explain seed quality with reference to physical purity and germination.
- c) Describe in detail different specifications of various certificates.

Q3) Write notes on any two of the following: **[2x5=10]**

- a) Seed certification Agency.
- b) Seed quality evaluation.
- c) Qualifications & Duties of seed inspector.

Q4) What is seed quality? Explain its concept with respect to physical purity, germination, health and genetic purity. **[10]**

OR

What is seed Legislation? Describe in detail the objectives of seed Legislation.



P426

[3817]-635

S.Y. B.Sc. (Vocational Course)

INDUSTRIAL CHEMISTRY

221 : Unit Processes in Organic Industries

(Paper - I) (Semester - II) (Old Course)

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:

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

Q1) Give balanced equations with conditions for the following reactions/synthesis: **[16]**

- a) Synthesis of methanol.
- b) Benzene → Toluene.
- c) Chloro benzene → Aniline.
- d) Commercial manufacture of acetic acid.
- e) Acetic acid → Iodo acetic acid.
- f) Acetanilide → p-Nitro acetanilide.
- g) Hydrogenation of acid to alcohols.
- h) Nitrobenzene → Aniline.

Q2) Attempt **any two** of the following : **[8]**

- a) How is ethyl acetate prepared?
- b) Discuss the mechanism of nitration of benzene.
- c) Manufacture to benzoic acid from toluene.

- Q3)** Write short notes on **any two** of the following : **[8]**
- a) Manufacture of phenyl ethyl alcohol.
 - b) Dichromate as oxidizing agent.
 - c) Friedel Crafts reaction.

- Q4)** Describe the manufacture of Chloral from ethyl alcohol. **[8]**

OR

Describe briefly commercial sulphonation of benzene.



Total No. of Questions : 4]

[Total No. of Pages : 2

P427

[3817]-611

S.Y. B.Sc.

ZOOLOGY

ZO-222 : Applied Zoology

Apiculture, Sericulture and Vermiculture

(Paper - II) (Semester - II) (Old Course)

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Neat labelled diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*

Q1) Attempt the following :

[10]

- a) Define the term Apiculture.
- b) What is the biological name of European honeybee?
- c) What are non-hibernating eggs?
- d) Give the use of honey extractor.
- e) Define the term multivoltine.
- f) Mention the name of fungus which causes stonebrood disease.
- g) What is bed cleaning?
- h) Define supersedure.
- i) Enlist any two useful species of earthworms.
- j) Mention any two factors affecting vermiculture.

Q2) Write short notes on (**any two**) :

[10]

- a) Economic importance of bees wax.
- b) Vermicompost as biofertilizer.
- c) Any two harvesting methods of mulberry leaves.

P.T.O.

- Q3)** Attempt the following (**any two**) : **[10]**
- a) Rainy and Spring management of bee colonies.
 - b) White and green muscardine disease of Silkworms.
 - c) Sketch and label Hoffman type Langstroth frame.

- Q4)** Describe any four bee keeping equipments. **[10]**

OR

What is bed cleaning? Describe different methods of bed cleaning of silkworm rearing.



Total No. of Questions : 4]

[Total No. of Pages : 2

P428

[3817]-610

S.Y. B.Sc.

ZOOLOGY

**ZO-221 : Animal Systematics and Diversity
(Semester - II) (Old Course)**

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Neat labelled diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*

Q1) Attempt the following :

[10]

- a) Enlist any two affinities of Cyclostomata.
- b) What is the significance of patagium?
- c) Define the term agnatha.
- d) What is homocercal fin?
- e) Give any one use of scales of fishes.
- f) What is synapsid skull?
- g) What are claspers?
- h) Mention the biological name of Indian cobra.
- i) Write any two characters of Varanus.
- j) Mention the name of Xth cranial nerve.

Q2) Write short notes on **(any two)** :

[10]

- a) Structure of eye of scoliodon.
- b) Accessory respiratory organs in clarias.
- c) Snake Venom.

P.T.O.

Q3) Attempt the following (**any two**) : **[10]**

- a) Parental care in Hyla and Alytes.
- b) Sketch and label membranous labyrinth of Scoliodon.
- c) Male reproductive system of Scoliodon.

Q4) With neat labelled diagram describe the structure of heart of Scoliodon. Add a note on working of heart. **[10]**

OR

What is migration? With suitable examples describe migration in fishes.



Total No. of Questions : 4]

[Total No. of Pages : 2

P429

[3817]-617

S.Y. B.Sc. (Sem. - II)

GEOGRAPHY

**Gg - 222 : Zoogeography
(Paper - II) (Old)**

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Figures to the right indicate full marks.*
- 3) *Draw neat diagrams and sketches wherever necessary.*
- 4) *Use of map stencil is allowed.*

Q1) Answer the following questions in two or three sentences. **[10]**

- a) Define Zoogeography.
- b) What is evolution?
- c) What is metazoa?
- d) The struggle for existence.
- e) State the difference between vertebrates and invertebrates.
- f) What is camouflaging?
- g) Define Holarctic Region.
- h) Name any two countries of the oriental region.
- i) Mention any two barriers of animal dispersion.
- j) What are the causes of animal extinction?

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

- a) Importance of Zoogeography.
- b) What is mutation?
- c) What are the economic importance of animals?

Q3) Answer the following (any two) : **[10]**

- a) Type of fish migrations.
- b) What is need of animal conservation?
- c) What are the main causes of bird migration?

P.T.O.

Q4) Explain the major Zoogeographic Regions of India.

[10]

OR

Write the taxonomic classification of animals in detail.



P430

[3817]-639

S.Y. B.Sc. (Vocational)

INDUSTRIAL MICROBIOLOGY

**VOC - IND - MIC - 221 : Microbial Fermentations and Downstream
Processing
(Sem.-II) (Paper - I) (Old Course)**

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *All questions carry equal marks.*
- 3) *Draw neat labelled diagrams wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of log tables, calculator is allowed.*

Q1) Answer the following :

[10]

- a) List two advantages of solid substrate fermentation for production of amylase.
- b) The role of penicillin in regulation of excretion of amino acid during fermentation is :
 - i) Penicillin inhibits contaminants and results in complete nutrient availability to the producing strain.
 - ii) Penicillin acts as a growth promoter in the small quantity it is added in.
 - iii) Penicillin kills newly replicated cells, which thus reduce competition for the substrate.
 - iv) Penicillin increases the cell membrane permeability.
- c) State Darcy's equation (basis for calculation of filtration efficiency).
- d) Extracellular ethanol concentration in the broth at the end of a typical batch fermentation for production of ethanol is :
 - i) 5%
 - ii) 10%
 - iii) 20%
 - iv) 30%
- e) The enzymes whose presence is critical in glutamic acid overproduction are :
 - i) Glutamate dehydrogenase, Succinate decarboxylase.
 - ii) Oxoglutarate dehydrogenase, Succinate decarboxylase.
 - iii) Glutamate dehydrogenase, Oxoglutarate dehydrogenase.
 - iv) Glutamate dehydrogenase, Isocitrate dehydrogenase.

P.T.O.

- f) Give the names of any two semisynthetic penicillins.
- g) State the difference between an antifoam agent and a defoaming agent.
- h) Name the salt form of streptomycin that is commonly used as an injectible.
- i) Define the term 'yield of a fermentation product'.
- j) Name two genera methanogenic organisms.

Q2) Answer any two of the following : **[10]**

- a) Give a comparative account of the methods used for solids-liquids separation in downstream processing.
- b) List the methods of cell-disruption. Explain any one of them in detail.
- c) Describe the different phases of microbial activity during the production of streptomycin.

Q3) Answer any two of the following : **[10]**

- a) Justify why vinegar production using microorganisms is not a typical 'fermentation' process.
- b) Explain the pros and cons of using a Fring's generator and acetator for vinegar production by fermentation.
- c) Explain the biochemical reactions involved in the production of methane.

Q4) Answer any one of the following : **[10]**

- a) With the help of a flow chart, describe the production of amylase using solid substrate.
- b) Describe in detail the process of downstream processing for recovery of penicillin.



Total No. of Questions : 4]

[Total No. of Pages : 2

P431

[3817]-616

S.Y. B.Sc. (Sem. - II)

GEOGRAPHY

**Gg - 221 : Agricultural Regions and Issues
(Paper - I) (Old)**

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Figures to the right indicate full marks.*
- 3) *Draw neat diagrams and sketches wherever necessary.*
- 4) *Use of map stencil is allowed.*

Q1) Answer the following questions in two or three sentences. **[10]**

- a) What is crop diversification?
- b) What is nursery?
- c) What is Green Revolution?
- d) What is biotechnology?
- e) What is vermiculture?
- f) What is tissue culture?
- g) What is dairy farming?
- h) What is full form of WTO?
- i) What is bio-pesticide?
- j) What is apiculture?

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

- a) Role of capital in agricultural development.
- b) Von Thünen's concentric zones of land-use around an isolated state.
- c) Show major agro-climatic regions on the map of India.

Q3) Answer the following (any two) : **[10]**

- a) What is mushroom cultivation?
- b) How would you explain Weaver's Method of Crop Combination?
- c) What is organic farming?

P.T.O.

Q4) What are the natural problems of Indian Agriculture?

[10]

OR

What are the problems and solutions for marketing of non-perishable agricultural products?

XXXX

P433

[3817] - 148

S.Y. B.Sc. (Vocational)

SEED TECHNOLOGY

Seed Testing

(Paper-IV) (Semester-I) (2008 Pattern)

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:

- 1) All questions are compulsory.*
- 2) Figures to the right indicate full marks.*
- 3) Draw neat labelled diagrams wherever necessary.*

Q1) Attempt the following:

[10 x 1 = 10]

- a) Give any one importance of seed testing.
- b) Write any one objective of State Seed Testing Laboratory.
- c) Enlist seed dividing equipments.
- d) What is working sample?
- e) Define certification sample.
- f) Give fullform of ODV.
- g) Enlist methods of moisture testing.
- h) Give different methods of germination testing.
- i) What is seed vigour?
- j) Define hard seed.

P.T.O.

Q2) Attempt any two of the following : **[2 x 5 = 10]**

- a) Explain in detail layout and staffing in seed testing laboratory.
- b) Describe procedure of seed sampling.
- c) Describe physical purity components.

Q3) Write short notes on any two of the following : **[2 x 5 = 10]**

- a) Central seed testing laboratory.
- b) Reporting of results in seed testing laboratory.
- c) Air oven method.

Q4) What is seed germination? Describe general principles and requirements for germination testing. **[10]**

OR

Describe in detail heterogeneity test.



P434

[3817] - 141

S.Y. B.Sc. (Vocational)

SEED TECHNOLOGY

Hybrid Seed Production

(Paper-III) (Semester-I) (2008 Pattern)

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:

- 1) All questions are compulsory.*
- 2) Figures to the right indicate full marks.*
- 3) Draw neat labelled diagrams wherever necessary.*

Q1) Attempt the following:

[10 x 1 = 10]

- a) What is inbreeding depression?
- b) Give any one significance of apomixis.
- c) Enlist different types of male sterility.
- d) Define self incompatibility.
- e) What is emasculation?
- f) What are pollen shedders?
- g) Define planting ratio.
- h) What is pollen viability?
- i) Give the requirement of isolation distance in Bajara.
- j) Enlist different sowing methods.

P.T.O.

Q2) Attempt any two of the following : **[2 x 5 = 10]**

- a) Comment on genetic basis of heterosis.
- b) What is cytoplasmic male sterility? Add a note on their use in hybrid seed production.
- c) Explain the use of gametocides in hybrid seed production.

Q3) Write short notes on any two of the following : **[2 x 5 = 10]**

- a) Roguing.
- b) Planting ratio.
- c) Stigma receptivity.

Q4) Describe procedure for hybrid seed production in Jowar with respect to source of seed, land requirements, isolation, sowing, cultural practices, roguing, harvesting and threshing. **[10]**

OR

Give stepwise procedure for hybrid seed production in Groundnut.



Total No. of Questions : 4]

[Total No. of Pages : 1

P436

[3817]-135

S.Y. B.Sc.

URDU GENERAL - II

(2008 Pattern) (Sem. - I)

Time : 2 Hours]

[Total Marks : 40

Instructions :

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

[10] سوال نمبر ۱:- اقبال کے علمی و ادبی کارناموں پر روشنی ڈالیے۔

یا
اقبال کی حیات و شخصیت پر تبصرہ کیجئے۔

[10] سوال نمبر ۲:- بانگِ درا کی حصہ اول کی نظموں کا اجمالی جائزہ پیش کیجئے۔

یا
اقبال کے اسلوب پر اظہارِ خیال کیجئے۔

[10] سوال نمبر ۳:- ذیل میں سے کسی ایک نظم کا تنقیدی جائزہ لیجئے۔

۱۔ جلنو ۲۔ ایک آرزو ۳۔ نیا سوال

[10] سوال نمبر ۴:- ذیل میں سے کسی پانچ اشعار کی تشریح کیجئے۔

۱۔ کچھ بتاؤں سیدھی سادی زندگی کا ماجرا دارغ جس پر غارہ رنگِ لطف کا نہ تھا

۲۔ دنیا کی محفلوں سے اٹا گیا ہوں یارب! کیا لطف انجن کا جب دل میں مجھ لیا ہر

۳۔ سارے جہاں سے اچھا بندہ سنا ہمارا ہم بلبلیں ہیں اس کی یہ مِلتاں ہمارا

۴۔ ہر چیز کو جہاں میں قدرت نے دلبری دی پروانے کو تیش دی، جلنو کو روشنی دی

۵۔ سچ کہہ دوں لے برہمن! اُتر تو برا نہ مانے تیرے صنم کدوں کے بت ہر گئے یران

۶۔ گودی میں کھیلتی ہے اس کی ہزاروں ندیاں گلشن ہے جن کے دم سے رشکِ جناب ہمارا

۷۔ لیلیٰ شب کھولتی ہے آگے جب زلفِ رسا دامنِ دل کھینچتی ہے آبشاروں کی صدا

□□□□

Total No. of Questions : 4]

[Total No. of Pages : 2

P437

[3817]-137

S.Y. B.Sc. (Vocational)

BIOTECHNOLOGY

Voc-Biotech. - 211 : Cell and Molecular Biology

(Paper - I) (Sem. - I) (2008 Pattern)

Time : 2 Hours]

[Max. Marks :40

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *All questions carry equal marks.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*

Q1) Answer each of the following in 1-2 lines.

[10]

- a) What is Chromatin?
- b) Enlist the types of cell junction.
- c) What are integral proteins?
- d) Define passive transport.
- e) What is the function of peroxisomes?
- f) Define symport.
- g) What are carrier proteins?
- h) Give function of sigma factor.
- i) What are the components of ER?
- j) What is translation?

Q2) Write short notes on any two of the following:

[10]

- a) Semi conservative replication.
- b) Process of cell signalling.
- c) Cell junctions.

P.T.O.

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

- a) Give a brief account of photoreactivation method DNA repair.
- b) Why are lysosomes known as ‘the cleaners’ of the cell waste?
- c) Explain processing of mRNA in eukaryotes.

Q4) What is DNA replication? Describe any one model of DNA replication in prokaryotes. **[10]**

OR

Give structural organization of a typical plant cell.



P438

[3817]-144

S.Y. B.Sc.

BIOTECHNOLOGY

**Voc. Biotech - 212 : Recombinant DNA Technology and
Bioinformatics**

(Paper - II) (Sem. -I) (2008 Pattern) (Vocational)

Time : 2 Hours]

[Max. Marks :40

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *All questions carry equal marks.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*

Q1) Answer each of the following in 1-2 lines.

[10]

- a) Define: Gene Cloning.
- b) What is Southern blotting?
- c) Enlist any two DNA modifying enzymes.
- d) Give the different properties of vector molecule.
- e) What is biotin? How it is useful in hybridisation process.
- f) Which radio isotope will you use for N and H in probes?
- g) What is the capacity of BAC vector to carry foreign DNA?
- h) Justify: Mutagenic agents can not be used in site directed mutagenesis to carry out mutations.
- i) Why mineral oil overlay is essential in PCR reaction.
- j) Give two examples of products obtained by using gene cloning.

Q2) Write short notes on any two of the following in 8-10 lines each.

[10]

- a) PCR technique.
- b) P^{vc}18 plasmid.
- c) Sanger's DNA sequencing method.

P.T.O.

Q3) Attempt any two of the following in 8-10 lines each. **[10]**

- a) What is transformation? Explain any one method of transformation.
- b) Explain with suitable diagram the action of ECORI and Hind III enzymes on given DNA.
- c) What is genomics? Write it's applications.

Q4) Elaborate the applications of rDNA technology. **[10]**

OR

Explain in detail the gene cloning method with Ti plasmid.



P899 [3817] - 140

S.Y. B.Sc. (Vocational)

COMPUTER HARDWARE AND NETWORK ADMINISTRATION

Microprocessor and Interface Techniques - I

(Sem. -I) (Paper - I) (2008 Pattern) (58711)

Time : 2 Hours]

[Max. Marks :40

Instructions to the candidates:

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

Q1) a) Attempt the followings: **[4×1 = 4]**

- i) What is DMA?
- ii) Define the term interrupt.
- iii) What is cache memory?
- iv) List any two non-intel microprocessors.

b) Attempt the followings: **[4×2 = 8]**

- i) State difference between Hardware and Software Interrupts.
- ii) Explain characteristics of a transducer.
- iii) With timing diagram, explain key bounce and debounce of a switch.
- iv) What are the different parameters of DAC?

Q2) Attempt any two of the followings: **[2 × 4 = 8]**

- a) Explain, how a keyboard can be interfaced to the main computer.
- b) Write a short note on Computer base design and development tools.
- c) Elaborate non-interlaced and interlaced scanning.

Q3) Attempt any two of the following: **[2 × 4 = 8]**

- a) Explain the principle and working of a thermocouple.
- b) Explain DOS INT21H.
- c) Explain in brief EISA and VESA.

Q4) Attempt the following: **[2 × 6 = 12]**

- a) Explain with neat diagram the mode of identifying a key press in a matrix key-board.
- b)
 - i) What do you mean by unidirectional and bidirectional bus.
 - ii) Write a comparative note on different intel microprocessors.



Total No. of Questions : 4]

[Total No. of Pages : 1

[3817] - 147

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S.Y. B.Sc. (Vocational)

COMPUTER HARDWARE AND NETWORK ADMINISTRATION

Computer System Management - I

(Paper - II) (Sem. -I) (2008 Pattern) (58721)

Time : 2 Hours]

[Max. Marks :40

Instructions to the candidates:

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

Q1) a) Attempt the following: [4×1 = 4]

- i) What first step would you take when UPS beeps?
- ii) Which storage device is normally not affected by virus attacks?
- iii) Maintenance of which storage device must be given priority?
- iv) Which diagnostic software detects the primary start-up problems?

b) Attempt the following: [4×2 = 8]

- i) What are the two indicators of mother board or RAM failure?
- ii) Maintenance of which device ensures error-free power supply to the computer system?
- iii) Describe any two causes for incidents and disasters in a computer system.
- iv) Write any two run problems that can cause immense trouble.

Q2) Attempt any TWO of the following: [2 × 4 = 8]

- a) Write a note on the personal attitudes which should be adopted during troubleshooting.
- b) Explain two types of access control mechanisms for preventing disasters.
- c) Explain the importance of disaster recovery plan.

Q3) Attempt any TWO of the following: [2 × 4 = 8]

- a) Explain any two environmental contributors to system failures.
- b) What are the indicators of port failures? Suggest possible procedure for its recovery.
- c) Describe two safety precautions to be undertaken during troubleshooting and repairs.

Q4) Attempt any TWO of the following: [2 × 6 = 12]

- a) Explain an efficient schedule for implementing preventive maintenance.
- b) Explain the preventive maintenance of printer in detail.
- c) Describe specific troubleshooting and repairs for the commonly encountered display problems.



P926

[3817] - 31

F.Y. B.Sc. (Vocational)

PHOTOGRAPHY AND AUDIO-VISUAL PRODUCTION

Basic Photography and Appreciation of Media

(Paper - I)

Time : 3 Hours]

[Max. Marks :80

Instructions to the candidates:

- 1) All questions are compulsory.
- 2) Figures to the right indicate full marks.
- 3) Draw neat and labeled diagrams wherever necessary.

Q1) Answer the following in short. **[16]**

- a) What is the difference between the infra red light and the ultra violet light?
- b) Write two equivalent exposures for: f 5.6 @ 1/60 sec.
- c) Mention at least four technical qualities of a photographic image.
- d) Explain the difference between diffraction and dispersion of light.
- e) What is the function of the focusing screen used in a SLR camera?
- f) Mention the shortest and the longest wavelength of the visible spectrum.
- g) Explain what you mean by an unsharp image.
- h) Draw a diagram to show chromatic aberration.

Q2) Answer **ANY FOUR** of the following: **[16]**

- a) Discuss the advantages and disadvantages of a focal plane shutter.
- b) Draw a diagram and explain what you mean by spherical aberration. How is it reduced?
- c) What do you mean by f number? Write down the f number scale and differentiate between small and large f number.
- d) Draw a diagram and show how an unsharp image looks with the different focusing aids.
- e) What do you mean by shutter speed? What is the use of slow shutter speed?

P.T.O.

Q3) Answer ANY FOUR of the following: [16]

- a) Draw a diagram and differentiate between diffuse and specular reflection of light.
- b) What is the use of the pentaprism in a SLR camera?
- c) Discuss the advantages and disadvantages of a box camera.
- d) Discuss the features of a pinhole image.
- e) What are the features of a camera lens?

Q4) Answer the following: [16]

- a) Discuss the importance of photography in various fields.

OR

Discuss the role of photography as a medium of mass communication. Give suitable examples.

- b) Differentiate between a 'news' and a 'photo news'. Give suitable examples.

OR

Discuss the importance of photography in the print media.

Q5) Answer ANY ONE of the following: [16]

- a) You are asked to shoot a Sun set at a beach. Draw a sketch and explain how you would "compose" your picture. Which elements of composition will you consider as the most important? Justify your composition.
- b) Draw a neat and labeled diagram and describe a SLR camera.



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F.Y. B.Sc. (Vocational)
PHOTOGRAPHY AND AUDIO-VISUAL PRODUCTION
Introduction to Mass Communication and Media Scene in
India
(Paper - II)

Time : 3 Hours]

[Max. Marks :80

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Figures to the right indicate full marks.*
- 3) *Draw neat and labeled diagrams wherever necessary.*

Q1) Attempt **ANY TWO** of the following. **[16]**

- a) "A blind man should clearly imagine Sound Picture while listening to any radio programme". Illustrate with examples.
- b) Discuss news paper as an organization and describe the role of different people involved in it.
- c) What do you understand by 'News Value' and what are the various news values?

Q2) Attempt **ANY FOUR** of the following. **[16]**

- a) Explain why are gate keepers necessary in mass communication.
- b) Discuss the internet as a medium of mass communication.
- c) Write a short note on 'inverted pyramid'.
- d) Write a short note on Lass well's model.
- e) An interviewer should be "Jack of All". Explain with examples.

Q3) Attempt **ANY FOUR** of the following: **[16]**

- a) Describe in brief the Editorial department and the role of an Editor.
- b) Write a short note on proxemics.
- c) Write a script of 15 minutes programme on one of the following themes with appropriate three songs:
 - i) Wedding ceremony
 - ii) Duet songs.
- d) What is a tabloid and a daily? Discuss with suitable examples.
- e) Explain, with suitable example, the difference between interpersonal and intra personal communication.

P.T.O.

Q4) Attempt **ANY TWO** of the following. **[16]**

- a) Discuss the role of media reach in mass communication.
- b) What are different research methods? Discuss any one with suitable examples.
- c) Draw a block diagram and discuss Communication as a process by taking suitable examples.

Q5) Attempt **ANY ONE** of the following. **[16]**

- a) What is the role of a Producer in a news channel? How does it compare with the role of the editor of a Newspaper?
- b) Discuss the different 'shots' used in a video production.
- c) Describe various stages in a video production.



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S.Y. B.Sc. (Vocational)

PHOTOGRAPHY AND AUDIO-VISUAL PRODUCTION

Still Photography, Processing & Printing

(2008 Pattern) (Paper - III) (Sem. - I)

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:

- 1) All questions are compulsory.*
- 2) Draw neat and labeled diagrams wherever necessary.*
- 3) Figures to the right indicate full marks.*

Q1) Answer the following in short :

[16]

- a) Draw a diagram to show the angle of view of a normal lens.
- b) Mention all the factors that affect the 'depth of field'.
- c) Define the circle of least confusion.
- d) State the law of 'Transmission and Absorption'.
- e) What is the drawback of an 'average' metering pattern?
- f) Explain two points of difference between the hard and soft light.
- g) A macro lens has a specification of 1:4 and 105mm. What does it mean?
- h) What does 'daylight' mean for a photographer?

Q2) Attempt any two of the following :

[8]

- a) Explain what you mean by the term 'Hyper focal distance'. How is it useful in Photography?
- b) Discuss the features of a zoom lens.
- c) Draw a flash curve and explain the information it provides.

P.T.O.

Q3) Attempt any two of the following : **[8]**

- a) What are the different artificial light sources used in photography?
- b) Discuss the effect of over and under exposure on a photographic image.
- c) What is a polarizing filter? Discuss its use in photography.

Q4) Attempt any one of the following : **[8]**

- a) Draw suitable diagrams and discuss the effect of aperture on the depth of focus. What other factors effect the depth of focus? How?
- b) Draw a diagram and show the construction of an electronic flash. Explain the function of each component.



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S.Y. B.Sc. (Vocational)

PHOTOGRAPHY AND AUDIO-VISUAL PRODUCTION

Principles of Acoustics and Sound for Media

(Paper - IV) (Sem. - I) (2008 Pattern)

Time : 2 Hours]

[Max. Marks :40

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Draw neat and labeled diagrams wherever necessary.*
- 3) *Figures to the right indicate full marks.*

Q1) Answer the following.

[16]

- a) Explain any 4 characteristics of a loudspeaker.
- b) Draw a neat labeled diagram of a ribbon microphone.
- c) Explain the principle of magnetic sound recording system.
- d) Define:
 - i) Reverberation time.
 - ii) Decibel.
- e) Draw a neat labeled diagram of electrodynamic loudspeaker.
- f) Calculate the SPL for an effective pressure of 4 N / m^2 and the reference pressure of 1 N / m^2 .
- g) Give the characteristics of the Hi-Fi system.
- h) Give any four requirements of a good auditorium.

Q2) Attempt **ANY TWO** of the following.

[8]

- a) With the help of a neat labeled block diagram explain the working of a PA system.
- b) For a room of $20\text{ft} \times 40\text{ft} \times 60\text{ft}$ having a sound absorption coefficient of 0.24, calculate the total sound absorption and the reverberation time of the room.
- c) Explain the principle, construction and working of a carbon microphone with the help of a neat block diagram.

P.T.O.

Q3) Attempt **ANY TWO** of the following: [8]

- a) Show that doubling the sound intensities and the pressures gives an increase of 3dB and 6dB of sound respectively.
- b) Explain with the help of a neat block diagram the principle, construction and working of a moving coil (cone) type of loudspeaker.
- c) Explain with the help of a neat block diagram the functions of each part of a disc reproduction system.

Q4) Attempt **ANY ONE** of the following. [8]

- a) Write a note on:
 - i) 3 - way crossover network.
 - ii) Stereophonic sound reproduction system.
- b) Explain:
 - i) Anechoic chamber.
 - ii) Synthetic reverberation.



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P930 S.Y. B.Sc. (Vocational)
PHOTOGRAPHY AND AUDIO-VISUAL PRODUCTION
Colour Photography
(Paper - III) (Sem. - II)(New Course)

Time : 2 Hours]

[Max. Marks :40

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Draw neat and labeled diagrams wherever necessary.*
- 3) *Figures to the right indicate full marks.*

Q1) Answer in short. **[16]**

- a) What is the use of a colour conversion filter in colour photography?
- b) What is the difference between the rods and the cones on the retina?
- c) Explain what will happen if a daylight film is exposed to tungsten light.
- d) Convert the colour temperature of 10000 K into mired.
- e) State the difference between a colour positive and a colour negative image.
- f) What is the use of the yellow filter in the colour film?
- g) A filter is designated as CC 20 M. Which colours it will transmit and absorb?
- h) Explain what you mean by the colour temperature of a light source.

Q2) Attempt **ANY TWO** of the following. **[8]**

- a) Explain why orange mask is provided in a colour negative film.
- b) Discuss the reasons for using filters in a colour enlarger.
- c) What do you mean by a Mired shift? What is positive and negative Mired shift? How are these corrected?

Q3) Write short notes on **ANY TWO** of the following. **[8]**

- a) Use of filters in a colour enlarger.
- b) Colour vision.
- c) Removal of excess colour from a colour print.

Q4) Attempt **ANY ONE** of the following. **[8]**

- a) Discuss the various stages involved in the processing of a colour negative film.
- b) Draw a labeled diagram and describe the construction of a colour enlarger.



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S.Y. B.Sc.

PHOTOGRAPHY AND AUDIO-VISUAL PRODUCTION

Principles and Applications of Analog and Digital Communications

(New Course) (Paper - IV) (Sem. - II) (Vocational)

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Draw neat and labeled diagrams wherever necessary.*
- 3) *Figures to the right indicate full marks.*

Q1) Answer following questions in brief : **[12]**

- a) Explain principle of antenna? Give its type.
- b) What are vestigial side bands?
- c) How mixing of signals are avoided in modulations?
- d) Why FM is not used for picture transmission?
- e) Explain importance of Nyquist criteria and Give formula.
- f) Give power relations of SSB and DSB.

Q2) Explain the following (any two) : **[8]**

- a) Draw frequency spectrums of DSBFC and DSBSC.
- b) Write a short note on PCM.
- c) What is Data transmission and explain any one method in short?

Q3) Explain the following (any two) : **[8]**

- a) Draw basic block diagram of digital communication system and explain.
- b) Explain Filter method for SSB generator.
- c) Explain TDM with the help of block diagram.

P.T.O.

Q4) Solve following numericals (any two) : **[12]**

- a) The Output voltage of transmitter is given by $500 (1 + 0.4 \sin 3140t) \sin 6.28 \times 10^7 t$ this voltage is fed to a load of 600Ω . Determine Carrier frequency, Modulating frequency, Carrier power and Mean power output.
- b) Draw block diagram of Analog communication system and explain in details.
- c) A modulating signal $10 \sin(2\pi \times 10^3 t)$ is used to modulate a carrier signal $20 \sin (2\pi \times 10^4 t)$. Find percentage of modulation, side band frequencies, bandwidth and amplitudes of sidebands.



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S.Y.B.Sc.
MATHEMATICS
MT-211: Linear Algebra - I
(Sem. - I) (Old Course) (Paper-I)

*Time : 2 Hours]**[Max. Marks : 40**Instructions to the candidates:*

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

Q1) Answer the following questions.**[10]**

- a) Determine whether $\bar{u}=(6,1,4)$ and $\bar{v}=(2,0,-3)$ make an acute angle, obtuse angle or orthogonal using Euclidean inner product.
- b) If $\bar{u}=(1,0,0)$ and $\bar{a}=(4,3,8)$ then find the orthogonal projection of \bar{u} on \bar{a} .
- c) Define skew-symmetric matrix.
- d) State true or false : If for matrices A and B, AB is defined then BA is also defined. Justify.
- e) Let $V = \mathbb{R}^3$ be the vector space of ordered triples of real numbers with usual addition and scalar multiplication. Determine whether $W = \{(x,y,z) / x+y+z = 1\}$ is subspace of V.
- f) Express (2,3) as a linear combination of (1,1) and (2,1).
- g) Find nullity of the matrix A, if A is 3x5 and rank (A) = 3.
- h) Let $T: \mathbb{R}^3 \rightarrow \mathbb{R}^3$ be the linear transformation defined by $T(x,y,z) = (x+y-z, x-2y+z, -2x-2y+2z)$. Is the vector (1,2,3) in ker (T)?
- i) Find the norm of \bar{u} where $\bar{u}=(1,-3,4,2)$.
- j) If matrix A is symmetric then show that $(A+A^t)$ is also symmetric.

P.T.O.

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

- a) For any vectors \bar{u} and \bar{v} in \mathbb{R}^n show that $\|\bar{u} + \bar{v}\|^2 + \|\bar{u} - \bar{v}\|^2 = 2\|\bar{u}\|^2 + 2\|\bar{v}\|^2$
- b) If A is invertible matrix and suppose that the inverse of 7A is $\begin{bmatrix} 3 & -7 \\ -1 & 2 \end{bmatrix}$ then find the matrix A.
- c) Solve the following system of equations by Gaussian elimination method.
- $$\begin{aligned} 3x + 6y - 5z &= 0 \\ 2x + 4y - 3z &= 1 \\ x + y + 2z &= 9 \end{aligned}$$

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

- a) If V is n -dimensional vector space then show that any set with n linearly independent vectors in V is a basis for V.
- b) If $T_1: \mathbb{R}^2 \rightarrow \mathbb{R}^3$ and $T_2: \mathbb{R}^3 \rightarrow \mathbb{R}^2$ are linear transformations. Find formula for $T_1 \circ T_2$ and $T_2 \circ T_1$ where $T_1(x,y) = (x+y, 3x, 2y)$, $T_2(x,y,z) = (x+z, y-z)$.
- c) Determine whether B is in the column space of A and if so, express B as linear combination of the column vectors of A.

$$\text{Where } A = \begin{bmatrix} -1 & 3 & 2 \\ 1 & 2 & -3 \\ 2 & 1 & -2 \end{bmatrix} \quad B = \begin{bmatrix} 1 \\ -9 \\ -3 \end{bmatrix}.$$

Q4) Attempt any one of the following. **[10]**

- a) Let V and W be the vector spaces and T be a linear transformation from V into W. Suppose V is finite dimensional vector space. Prove that $\text{rank}(T) + \text{nullity}(T) = \dim V$.
- b) i) If A and B are invertible matrices of same order then show that AB is invertible and $(AB)^{-1} = B^{-1}A^{-1}$.
- ii) Determine the basis and dimension of the system of equations.

$$x_1 + 2x_2 - 2x_3 + 2x_4 + x_5 = 0$$

$$x_1 + 2x_2 - 4x_3 + 3x_4 - x_5 = 0$$

$$2x_1 + 4x_2 - 2x_3 + 3x_4 + 4x_5 = 0.$$

