

Seat Number

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ANALYTICAL CHEMISTRY : CH-391 :
Concepts of Analytical Chemistry
(Old) (301)

P. Pages : 2

Time : Three Hours

Max. Marks : 80

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory and carry equal marks.
5. Draw neat and labelled diagrams wherever necessary.
6. Use of log table and calculator is allowed.

1. Solve any four.

20

- a) Explain the partitioning process involved in batch extraction.
- b) Discuss the use of acidic fluxes for decomposition and dissolution of inorganic samples.
- c) Explain the concept of HETP applicable in continuous contact separation process.
- d) Discuss with suitable example wet ashing method used for destruction of organic matter in samples.
- e) Explain the process of purification of metals with the zone refining technique.
- f) Explain the use of hydrofluoric and perchloric acids for opening up of refractory samples.

2. Solve any four.

20

- a) Discuss the importance and general steps for optimization of extraction conditions.
- b) Explain the use of oxidizing fluxes for decomposition of organic samples.
- c) Give a brief account of Lamp method used for the estimation of Sulphur.
- d) Discuss the role of non-oxidizing acids in dissolution of mineral and ore samples.
- e) Explain the peroxide bomb method used for decomposition of organic samples.
- f) Explain the techniques of counter current and continuous separation.

3. Solve any four.

- a) What is transformer? Explain the principles of step-down and step-up transformers.
- b) What is stabilized power supply? Why it is needed for the analytical instruments.
- c) What are semiconductors? Explain intrinsic and extrinsic type semiconductors.
- d) Discuss the application of semiconductor transistor in amplifier.
- e) Explain the inductive reactance and capacitive reactance.
- f) Write note on 'Boolean Algebra'.

4. Solve any four.

- a) Explain the principle of working of field Effect transistor.
- b) Explain the use of diode as full wave rectifier.
- c) Explain RMS current and RMS voltage.
- d) What is flip-flop? Give important applications of it.
- e) Explain in brief about use of digital computers in analytical instrumentation.
- f) Write note on 'Light Emitting Diode'

Seat Number

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ANALYTICAL CHEMISTRY : CH-391
Concepts of Analytical Chemistry
(New) (134301)

P. Pages : 2

Time : Three Hours

Max. Marks : 80

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory and carry equal marks.
5. Draw neat and labelled diagrams wherever necessary.
6. Use of log table and calculator is allowed.

1. Solve any four.

20

- a) Explain the development and future trends in analytical chemistry.
- b) Explain the classification and importance of instrumental methods of chemical analysis.
- c) Give a brief account of lamp method for Sulphur estimation.
- d) Discuss the role of oxidizing acids in dissolution of mineral and ore samples.
- e) Explain the use of non-oxidizing fluxes for decomposition of organic samples.
- f) Write note on Automated analysis.

2. Solve any four.

20

- a) Explain the essential good practices while working in the laboratory.
- b) Discuss the meaning of the terms.
 - i) Qualitative analysis, and
 - ii) Quantitative analysis.
- c) Describe the use of acidic fluxes for decomposition of organic samples.
- d) Explain alkali metal fusion technique and discuss advantages of it.
- e) Discuss with suitable example dry ashing method for disintegration of organic samples.
- f) Write note on - chemometric.

3.

Solve any four.

20

- a) What are integrated circuits? Explain its applications.
- b) What are operational amplifiers? Give its important applications.
- c) What is transformer? Explain the principles of step - down and step - up transformers.
- d) Explain the use of diode as half wave rectifier with schematic diagram.
- e) Explain the applications of digital computers in the field of analytical chemistry.
- f) Write note on Laboratory accreditation.

4.

Solve any four.

20

- a) Explain the techniques used for validation of new analytical method.
- b) What is stabilized power supply? Why it is needed for the analytical instruments?
- c) What are logic gate circuits? Give its applications.
- d) Explain the terms - capacitive inductance and capacitive reactance in an A.C. circuit.
- e) The filament resistance of an electric bulb is 660 ohm and a potential difference of 220 V is applied across it. Find the current flowing through the filament of the bulb.
- f) Write note on Electronic records and electronic signatures.

Seat Number

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ANALYTICAL CHEMISTRY : CH-491
Spectroscopic Methods of Analysis
(New) (134401)

P. Pages : 2

Time : Three Hours

Max. Marks : 80

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory and carry equal marks.
5. Use of log table and calculator is allowed.

1. Answer **any four** of the following.

20

- a) Discuss the detectors used in IR spectrometry. Explain any one in brief.
- b) Discuss the principle and analytical applications of NMR spectroscopy.
- c) Draw the diagram of mass spectrometer & give its significance.
- d) Write short note on-LASERS.
- e) Discuss the principle and analytical applications of HPLC-MS.
- f) Discuss the principle and instrumentation of ESCA technique.

2. Solve **any four** of the following.

20

- a) Discuss the principle working and instrumentation of dual wavelength spectrophotometer.
- b) Write a short note on-chemical shift in NMR
- c) Discuss about spectroscopic interferences in AMS. (Atomic mass spectroscopy)
- d) Draw the diagram of AFS and give its significance.
- e) Discuss the principle and applications of GC-MS.
- f) Discuss the principle and Analytical applications of Mossbauer spectroscopy.

3. Solve any four of the following.

20

- a) Convert the IR wavelength 6.0, 12.5 and 2.7 μ (Microns) in wavenumbers.
- b) Write a note on-NMR spectrophotometer.
- c) Draw the schematic diagram of an ICPMS system and give its significance.
- d) Discuss the LASER-Enhanced Ionization spectroscopy with neat labelled diagram.
- e) Explain the GC-FTIR coupled techniques.
- f) Explain the detectors used in ESCA. Give the applications of ESCA.

4. Solve any four of the following.

20

- a) Write a note on Relaxation process in NMR spectroscopy.
- b) Give the qualitative and quantitative applications of ICPMS.
- c) Discuss about quadrupole mass analyzer with diagram.
- d) How analysis with AFS is done? Explain interferences with AFS.
- e) Give the principle of resonant ionization. Spectroscopy with diagram.
- f) Give the advantages of coupled techniques.

Seat-Number

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ANALYTICAL CHEMISTRY : CH-491
Spectroscopic Methods of Analysis
(Old) (401)

P. Pages : 2

Time : Three Hours

Max. Marks : 80

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory and carry equal marks.
5. Neat labelled diagrams should be drawn wherever necessary.
6. Use of logarithmic table or calculator is allowed.

1. Answer any four of the following.

20

- a) Explain role of various components of UV spectrometer.
- b) Explain accuracy and precision in photometry.
- c) Explain principle of ESCA.
- d) Give analytical applications of visible spectroscopy with suitable example.
- e) Describe instrumentation of ESCA.
- f) Find the concentration of solution which transmits 30% light when placed in 1cm at certain wavelength. The substance has absorptivity $2.5 \text{ Lg}^{-1} \text{ Cm}^{-1}$.

2. Answer any four of the following.

20

- a) Write a note on ESCA satellite peaks.
- b) Discuss quantitative and qualitative analytical application of IR spectrometry.
- c) Describe radiation sources in instrumentation of IR spectroscopy.
- d) Describe the preparation of sample in IR spectrophotometry.
- e) Write a note on chemical shift in ESCA.
- f) Explain Hadamard transform spectroscopy.

3. Answer any four of the following.

- a) Give principle of NMR spectroscopy. Explain in detail its applications.
- b) Explain theory and principle of X-ray fluorescence.
- c) Describe the nuclear magnetic resonance spectroscopy with reference to Relaxation and chemical shift.
- d) Give classification of detectors used for X-ray absorption, emission and fluorescence.
- e) Write a note on ESR mass spectrometry.
- f) Explain principle and theory of fluorescence.

4. Answer any four of the following.

- a) Explain the factor that affects photoluminescence.
- b) Describe instrumentation and analytical applications of phosphorescence.
- c) Distinguish between fluorescence and phosphorescence.
- d) Write a note on GC-MS.
- e) Describe instrumentation and analytical application of fluorescence.
- f) Describe instrumentation of GC-FTIR.

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ANALYTICAL CHEMISTRY : CH-492
Special Analytical Methods & Analysis of Complex Materials
(New) (134402)

P. Pages : 2

Time : Three Hours

Max. Marks : 80

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory and carry equal marks.
5. Use of logarithm and calculators allowed.

1. Attempt any four of the following.

20

- a) Explain in detail the gas analysis by Orsat apparatus.
- b) Mention major and minor constituents of Monazite.
- c) Explain solubility parameter for analysis of solvents.
- d) Write the sample preparation and mounting of radioactive sample.
- e) Elaborate on complete analysis of chrome steel.
- f) Write short note on slow combustion.

2. Answer any four of the following.

20

- a) Give the scheme of complete analysis of bauxite ore.
- b) Write short note on flash point in solvent analysis.
- c) Describe manipulation of Hempel's apparatus.
- d) Out line analytical procedure for determination of copper and zinc from brass alloy.
- e) Explain the principle of neutron activation analysis.
- f) Calculate the weight of Mn-55 Present in the 1gram of steel sample when the activity measured after irradiation of neutron flux is 845 CPS. and that of 25 mg pure Manganese powder is 2910 CPS.

3. Answer any four of the following.

20

- Give the application of neutron activation analysis.
- Discuss various absorbents used for various gas analysis.
- Write short note on water borne coatings.
- Give in brief the procedure for determination of titanium from sample of ilmenite.
- Describe in short various types of scintillation counter.
- Explain the method for estimation of aluminum from bauxite.

4. Attempt any four of the following.

20

- Describe autoignition temperature insolvent analysis.
- Write short note on fractional combustion.
- Explain isotope dilution analysis. Give its application.
- Describe the manipulation of Bunt's apparatus.
- Give the analysis of hematite ore.
- Give the procedure for estimation of vanadium and titanium from steel Spectrophotometrically.

3. Answer **any four** of the following.

- a) Describe the instrumentation for ORD.
- b) Write note on automatic titrator.
- c) Describe cyclic voltammetry.
- d) Give the application of controlled potential coulometry.
- e) How polarimetry is used to distinguish between a pair of enantiomorphs.
- f) Give advantages and disadvantages of High frequency method.

4. Attempt **any four** of the following.

- a) Describe discrete sample analyzer with suitable diagram.
- b) Write note on overpotential in electrogravimetry.
- c) Give the use of Robot in automated analysis.
- d) Explain -
 - i) Polarization of light.
 - ii) Plane of polarization.
- e) Describe the constant - current coulometry.
- f) Explain centrifugal force analyzer.

3

केंद्रीय - 009

Seat Number

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ANALYTICAL CHEMISTRY : CH-393
Instrumental Methods of Analysis
(New) (134303)

P. Pages : 2

Time : Three Hours

Max. Marks : 80

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory and carry equal marks.
5. Neat labelled Diagrams should be drawn wherever necessary.
6. Use of logarithm tables and calculators is allowed.

1. Answer **any four** of the following. 20
- a) Describe stripping voltammetry.
 - b) Give in brief process control analyzer.
 - c) Give the application of ORD.
 - d) Write short note on computerization.
 - e) What is the principle and theory underlying high frequency titrimetry.
 - f) Explain cotton effect.
2. Attempt **any four** of the following. 20
- a) What are the equipment's used for electrolytic separation.
 - b) Give the applications of polarimetry.
 - c) Explain briefly about flow injection analysis.
 - d) Explain the ORD and CD curves.
 - e) Write note on electrography.
 - f) Describe pulse polarography.

2

केंद्रीय - 012

Seat Number

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ANALYTICAL CHEMISTRY : CH-481
Bio Analysis & Analysis of Food
(New) (134404)

P. Pages : 2

Time : Three Hours

Max. Marks : 80

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory and carry equal marks.
5. Draw neat labelled diagrams wherever necessary.

1. Answers any four of the followings. 20
- a) Write note on biological value of food.
 - b) What is milk? Explain about chemistry and composition of milk constituents.
 - c) Explain about determination and legislation of boric acid in food.
 - d) What is urine? Give the physical characteristics and preservation of urine.
 - e) Explain about determination of ketone bodies in urine.
 - f) Write note on -Southern blotting technique.
2. Attempt any four of the followings. 20
- a) Explain the estimation of protein in food by Biuret method.
 - b) Discuss the method for estimation of lactose from milk.
 - c) Define sweeteners. Give the method of identification and determination of saccharine in food.
 - d) Write a note on-oral Glucose tolerance test.
 - e) Describe the method for estimation of serum creatinine.
 - f) Explain the necessity and functioning of forensic laboratory.

3. Answers any four of the followings-

20

- a) Discuss the method for estimation of crude fiber of foods.
- b) Describe the method of estimation for pesticide residue in food by gas chromatography.
- c) Give the Tanners method for determination of SO₂ in food.
- d) Explain about Benzoic acid legislation and determination in food.
- e) Discuss about collection, storage and preservation of Blood specimens.
- f) Write a note on-Forensic toxicology.

4. Attempt any four of the followings.

20

- a) Give the principles of various methods for estimation of amino acids.
- b) Explain the analysis of honey for moisture and ash content.
- c) Explain about estimation of calcium in flour.
- d) Write a note on-Identification of colours in food material
- e) Give the method for estimation of serum cholesterol.
- f) What is DNA fingerprinting? What are its applications?

Seat Number

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ANALYTICAL CHEMISTRY : CH-381 :
Analysis of Organics & Medicinal
(Old) (342)

P. Pages : 2

Time : Three Hours

Max. Marks : 80

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory and carry equal marks.
5. Draw neat diagram whenever necessary.
6. Use of log table and calculator is allowed.

1. Attempt any four of the followings. 20

- a) What are syndets? Give various tests for syndets.
- b) Explain Mercaptans by silver sulphate method for estimation of Sulphur.
- c) Determination of Sulphur in petroleum by colour indicator method.
- d) Illustrate the conduct of pharmacist in relation to his trade.
- e) Explain kjeldahl method for estimation of nitrogen.
- f) Write a note on - ELISA.

2. Attempt any four of the followings. 20

- a) Give the analysis scheme for rubber and rubber products.
- b) Discuss the estimation of aspirin in analgesic tablet.
- c) Write a short essay on - 'Doctor test for petroleum'.
- d) Discuss the analysis of plastic polymer by IR and GC methods.
- e) Explain the dissolution test for capsules and tablets.
- f) Describe the assay of Sulpha drugs.

3. Attempt any four of the followings.

20

- a) Discuss estimation of organic builders in synthetic detergents.
- b) Discuss the estimation of Organophosphate pesticide.
- c) Discuss the Dumo's method for estimation of nitrogen.
- d) Discuss the estimation of lead antiknock compounds in gasoline by AAS method.
- e) Give a brief account of Drug Act - 1940 with schedules.
- f) Give the Bio-assay technique used for antibiotics.

4. Attempt any four of the followings.

20

- a) Write the estimation of Vitamin A by car- price method.
- b) Discuss the estimation of Organochloro pesticide.
- c) Discuss the isopropane polymers and their application.
- d) Give the types of drugs and monograms and any two popular drugs.
- e) Discuss reduction method for estimation of azo compounds.
- f) Discuss the 2,4-DNP colorimetric method for estimation of carbonyl compounds.

Seat Number

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ANALYTICAL CHEMISTRY : CH-391 :
Concepts of Analytical Chemistry
(134311)

P. Pages : 2

Time : Three Hours

Max. Marks 60

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory and carry equal marks.
5. Use of log tables and calculators is allowed.

1. Answer **any three** of the followings. 15
 - a) Give the importance of classical and instrumental methods in chemical analysis.
 - b) Write the procedure for validation of analytical method.
 - c) What are potential measuring devices? Explain any one with neat diagram.
 - d) What is logic gate? Explain any two with diagrams.
 - e) Explain how you will use chlorine and bromine at high temperature for decomposition and dissolution of inorganic samples.

2. Answer **any three** of the followings. 15
 - a) Define error. Give its types and explain in brief each type.
 - b) Write note on - 'Laboratory Accreditation'.
 - c) Define - i) Resistance ii) Conductance iii) Current iv) EMF v) Power
 - d) Describe the block diagram of Central Processing Unit (CPU) of digital computer.
 - e) Explain various alkaline fluxes used for decomposition of inorganic samples.

3. Answer **any three** of the followings.

15

- Discuss the future trends in chemical analysis.
- Explain electronic records and electronic signatures.
- What is the conductance of an electric component through which a current of 3.47×10^{-3} A flows when a potential difference of 10 V applied across it.
- Write a note on - Digital uses of operational amplifiers.

4. Answer **any three** of the followings.

15

- What are good laboratory practices? Explain in brief.
- What is transformer? Explain step - up and step - down types transformers.
- Discuss with suitable example wet ashing method used for disintegration of organic matter in the sample.
- Give a brief account of lamp method for estimation of Sulphur in samples.

Seat Number

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ANALYTICAL CHEMISTRY : CH-392
Modern Separation Science
(134312)

P. Pages : 2

Time : Three Hours

Max. Marks 60

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory and carry equal marks.
5. Draw neat labelled diagram wherever necessary.

1. Answer any three of the following.

15

- a) Explain the term resolution used in chromatography.
- b) Explain the terms retention time and retention volume in chromatography.
- c) Describe applications of exclusion HPLC.
- d) Write note on Donnan membrane equilibrium.
- e) Calculate the resolution between two adjacent peaks if the retention times are 3.65 and 4.20 minutes and the widths are 0.32 and 0.44mm.

2. Attempt any three of the following.

15

- a) Explain the fluorometric detector used in liquid column chromatography.
- b) Write a note on supercritical fluid chromatography.
- c) Explain the terms - Eddy's diffusion and longitudinal diffusion.
- d) Give the application of ion exchange HPLC.
- e) Explain the terms sedimentation, sedimentation equilibrium and sedimentation velocity.

3. Attempt any three of the following.

15

- a) Explain the behavior of solutes in chromatography.
- b) Discuss the applications of zone refining.
- c) Explain the stationary phases used in adsorption HPLC.
- d) Explain the sample injection process in liquid column chromatography.

4. Attempt any three of the following.

15

- a) Discuss the column processes and band broadening.
- b) Explain the types of column used in gas chromatography.
- c) Write a note on electro dialysis cells.
- d) Explain Helium detector used in gas chromatography.

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Seat-Number

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ANALYTICAL CHEMISTRY : CH-393 :
Instrumental Methods of Analysis
(134313)

P. Pages : 1

Time : Three Hours

Max. Marks : 60

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory and carry equal marks.
5. Draw neat labelled diagrams wherever necessary.

1. Answers any three of the followings. 15
 - a) Write note on Electrography.
 - b) Write the various applications of controlled - potential coulometry.
 - c) What is the principle of high Frequency titrimetry?
 - d) Explain block diagram of control loop and Feed back control loop in automated process control.
 - e) Give difference between saccharimetry and polarimetry.

2. Answers any three of the followings. 15
 - a) Explain about basic principle of Electro separations.
 - b) Explain instrument used in controlled - potential coulometry with suitable diagram.
 - c) Describe instrumentation used in High Frequency Titration (HFT).
 - d) Write a note on - Automatic vibrator.
 - e) Describe in detail about the factors affecting angle of rotation.

3. Answers any three of the followings. 15
 - a) Write a note on - Equipments for electrolytic separation.
 - b) Describe coulometric methods of analysis.
 - c) Write a short note on automated laboratory analyzer.
 - d) Describe instrumentation for measurements of rotatory power.

4. Answer any three of the followings. 15
 - a) Write a note on mercury cathode used in electrogravimetry.
 - b) Describe about Anodic stripping Voltmetry.
 - c) Explain about flow injection analyzer.
 - d) What are the applications of Optical Rotatory Dispersion (ORD)

Seat Number

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ANALYTICAL CHEMISTRY : CH-381 :
Analysis of Organics & Medicinal
(134315)

P. Pages : 1

Time : Three Hours

Max. Marks : 60

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory and carry equal marks.
5. Draw neat diagram whenever necessary.

1. Answer **any three** of the following. 15
 - a) Explain kjeldahl method for estimation of nitrogen.
 - b) How will you synthesis the copper oxychloride?
 - c) Discuss the estimation of lead antiknock compounds in gasoline by AAS method.
 - d) Give the IR and GC methods for estimation of vinyl chloride plastic.
 - e) Give a fluorometric method for estimation of vitamin B₂.
2. Answer **any three** of the following. 15
 - a) How will you synthesis the malathion?
 - b) Estimation of spectrophotometric assay of vitamin B₁₂.
 - c) Explain UV spectrometric determination of styrene monomer.
 - d) Determination of Sulphur in petroleum by the Bomb method.
 - e) Discuss the combustion method for estimation of carbon and hydrogen.
3. Answer **any three** of the following. 15
 - a) Write short notes on
 - i) Octane number
 - ii) Cetane number.
 - b) Give estimation of vitamin 'C' by iodine titration method.
 - c) Discuss different type of agrochemicals.
 - d) Discuss the 2,4 DNP colorimetric method for estimation of carbonyl compounds.
4. Answer **any three** of the following. 15
 - a) Discuss reduction method for estimation of azo compound.
 - b) Give method for estimation of aspirin in analgesic tablets.
 - c) Give the analysis scheme for rubber and rubber product.
 - d) How will you synthesis the Bordeaux mixture.

Seat Number

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ANALYTICAL CHEMISTRY : CH-381 :
Analysis of Organics & Medicinal
(134315)

P. Pages : 1

Time : Three Hours

Max. Marks : 60

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory and carry equal marks.
5. Draw neat diagram whenever necessary.

1. Answer any three of the following. 15
 - a) Explain kjeldahl method for estimation of nitrogen.
 - b) How will you synthesis the copper oxychloride?
 - c) Discuss the estimation of lead antiknock compounds in gasoline by AAS method.
 - d) Give the IR and GC methods for estimation of vinyl chloride plastic.
 - e) Give a fluorometric method for estimation of vitamin B₂.

2. Answer any three of the following. 15
 - a) How will you synthesis the malathion?
 - b) Estimation of spectrophotometric assay of vitamin B₁₂.
 - c) Explain UV spectrometric determination of styrene monomer.
 - d) Determination of Sulphur in petroleum by the Bomb method.
 - e) Discuss the combustion method for estimation of carbon and hydrogen.

3. Answer any three of the following. 15
 - a) Write short notes on
 - i) Octane number.
 - ii) Cetane number.
 - b) Give estimation of vitamin 'C' by iodine titration method.
 - c) Discuss different type of agrochemicals.
 - d) Discuss the 2,4 DNP colorimetric method for estimation of carbonyl compounds.

4. Answer any three of the following. 15
 - a) Discuss reduction method for estimation of azo compound.
 - b) Give method for estimation of aspirin in analgesic tablets.
 - c) Give the analysis scheme for rubber and rubber product.
 - d) How will you synthesis the Bordeaux mixture.
