University, Solapur
School of Earth Sciences
Department Applied Geology
M.Sc Syllabus - Part I Sem I

AGT 101 Mineralogy and Optics (75: 25 Marks, Total Credits: 04)

UNIT 1 : 12

Concepts of light under microscope (01),Uniaxial and biaxial ellipsoids (01),Intereference figures of uniaxial and biaxial minerals (02),Determination of optic sign and pleochroism (02),Determination of optic axial angle (2V) (02),Flash figures (02) bravais lattice and point lattice (01),32 classes of symmetry (03),Twinning and their laws in feldspars (03)

Unit 2 : 10

Crystal cell structure ,chemistry diagnostic properties and stability fields of 1 olivine (01) 2. characteristic difference in opx and cpx (05), 3. alkali amphiboles and Ca-amphiboles (06)

Unit 3 : 10

Cell structure ,Chemistry,Diagnostic optical properties and paragenesis of 1. Mica-dioctahedral and Trioctahedral (03), 2. alkali and plagioclase feldspars (06) 3. Feldspathoids (04), 4. zeolites (04)

Unit 4 : 13

Structure, chemistry ,optical properties and paragenesis of 1. Clay minerals (04), 2. Alumino Silicates (01), 3. Garnets (02), 4. Epidote (02), 5. Base metals (02), 6. Spineloids (02), Sn –W-Mo (02),
7. Gemstones (02).

Note :

Internal Evaluation is for 30% in the form of 1. Home assignment ,2. Seminar and 3. Test, each of 10 marks.
External Evalution is for 70% in the form of semester end examination.
Each unit consist of 01 credit and each credit consist of 25 marks.

REFERENCE BOOKS :

1. An introduction to the Rock Forming Minerals Deer, Howie and Zutsman.
2. Rock Forming Minerals Deer, Howie and Zutsman. (Vol. 1-5)
3. A textbook of Mineralogy by Dana.
4. Elements of Mineralogy Berry Mason.
5. Principles of Geochemistry Brian Mason, C.B. Moore.
6. Optical mineralogy P.F. Keer.
7. Optical Crystallography E.E. Wahlstrom.
8. Optical Mineralogy Philips and Dana T. Griffen.
9. A practical introduction to optical mineralogy, Gribble and Hall.
10. An introduction to crystallography Phillips.
11. Minerals and rocks: exercise in crystallography, mineralogy and hand specimen Corneis Klein.
12. Mineralogy, Dexter Perkins, 3rd Edition, PHI Publication.

AGT 102 : Igneous and Metamorphic Petrology (50 +50 Marks, Total Credits :04)

Unit 1 : 13

Magma – physical and chemical properties and cooling behavior, magmatic crystallisation , differentiation and assimilation (04)

Phase equilibria studies of binary and ternary silicate systems 1. Silica – Lucite, 2.Forsterite-Silica, 3.Orthoclase – Albite, 4.Diopside –Anorth its –Albite with petrogenetic significance (04) IUGS classification of igneous rocks (02) Magmatism related to plate tectonics-tholeiitic basalts, calc – alkaline magmatism (04)

Unit 2 : 10

Petrogenetic ,Chemical, Mineralogical and field aspects of important rocks of India – Deccan flood basalts (04), Layered intrusions(02), Carbonatites (02), Granitoids and formation of perthites (04) , Kimberlites (02),Lamprophyres (02).

Unit 3 : 11

Metamorphism and metamorphic processes (02), characteristics of metamorphic reactions solid-solid, dehydration, decarbonation ,Oxidation and their significance (03) Diagrammatic representation of mineral paragenesis – ACF,AKF,AFM (03) Isograde and borrowian metamorphic zones (01), metamorphic facies differentiation (02), Retrograde metamorphism (02), metamorphism related to plate tectonics and paired metamorphic belts (03)

Unit 4 : 11

Eskolas regional metamorphic facies 2 eolite (01),Greenschist (02), Glaucophane schist (02) Amphibolite schist (02), Granulite (02) Eclogite (02) products of pelite, basic ,ultrabasic and impure calcarious rocks.

{Thermal metamorphic facies sanidinite (02), Hornfels (04)}

Note :

Internal Evaluation is for 30% in the form of 1. Home assignment ,2. Seminar and 3. Test, each of 10 marks.External Evalution is for 70% in the form of semester end examination.

Each unit consist of 01 credit and each credit consist of 25 marks.

Reference Book:

1) Metamorphism and metamorphic belts Miyashiro A.
2) Metamorphic petrology Turner F.J.
3) Metamorphic petrology Turner and Verhoogen.
4) Igneous and metamorphic petrology by Turner and Verhoogen.
5) Metamorphic Petrology by Winkler.
6) The Dynamic Earth System, A.M.Patwardhan, PHI Publication
7) Deccan Volcanism, K.V.Subbarao and R.N. Sukheswala, Geological Society of India,Memoir.No:3
8) Principles of Igneous and Metamorphic Petrology, John D Winter, PHI Publication
9) Petrology : Igneous and metamorphic best.
10) Metamorphic petrology, Harker.
11) Petrology : Igneous, metamorphic, sedimentary, Elher / Blatt .
12) Evolution of Igneous rocks, Bowen N.L.

AGT 103 : Sedimentology and Palaeontology 50 + 50 Marks, Total Credits : 04

Unit 1 : 12

Introduction and principles of sedimentology (01),Sedimentary cycle and diastrophic cycle (02) Sedimentary processes : Weathering –Mechanical ,Chemical and Biological (01),Transport mechanism saltation,traction and suspension (01), Deposition by fluids (01), Reynold number and Froude number (01) their application. Sedimentary textures of clastic and non clastic rocks, concept of size and shape (02), Shape aspects – sphericity and roundness (01) surface textures fractals (01),Fabric measurements. (01)

Unit 2 : 12

Classification of sedimentary environments : continental, marine and transition. Structures in alluvial ,fluvial,deltaic,lacustrine,coastal,marine,glacial and aeolian conditions (02), classification of clastic and non clastic rocks (02), classification of sandstone (01), classification of sedimentary basin and their tectonic setting, products of various basins (02) heavy minerals and their significance in province studies (03).Dolomitisation and dedolomitisation (01), Lithification and types of diagenesis (02)

Unit 3 : 11

Concepts of fossil records its significance in mineral exploration stratigraphy and paleo-environmental studies (04).Morphology and classification of forminifera and their applications (04), morphology and classification of trilobites and their significance (04)

Unit 4 : 10

Evolution of 1. Devonian fishes (03), 2. Mesozoic reptiles (03), Siwalik mammals (05) and their paleogeology (02), Gondwana flora (02) evolution of man (04).

Note :

Internal evaluation is for 30 marks in the form of 1. Home assignment ,2. Seminar and 3. Test each of 10 marks. External evaluation is for 70% in the form semester end examination .

Each Unit consist of 1 credit and each credit of 25 marks.

REFERENCE BOOKS

1. An introduction to sedimentology, Selley R.C., Academic press.
2. Sedimentary rocks 3rd edition, Pettijohn F.J., CBS Publication stratigraphyand sedimentation 2nd edition, W.H.Freeman and Co.
3. Principles of sedimentology,Friedman and Sanders J.m., John Wiley.
4. Origin of sedimentary rocks., Blatt H., Middleton G and Murry R, Pentile Hall.
5. Petrology of sedimentary rocks., Folk R.L.,Hemphill publication Co.
6. Sedimentary petrology : An introduction., Tucker M.E., ELBS., Blackwell Scientific Publication.
7. Applied sdimentology – Suthtankar R.K.CBS Publishers.
8. Invertebrate palaeontology and evolution (2nd ed.) By Clarkson E.N.K.
9. Elements of Palaeontology Babin C.
10. Principles of Invertebrate Paleontology Shock & Twenhofel.
11. Paleontology of Vertebrates Jean Chaline.
12. Macropaleontology Bignot.
13. Paleontology Invertebrate Wood .Henry.

AGT 104: Structural Geology and Morphotectonics (50 + 50 Marks,Total credits : 04)

Unit 1 : 12

Concept of primary and secondary structures (02)

Types of stress and strain analysis using deformed objects homogeneous and heterogeneous deformations (04)

Mohr circle ,strain indicators , strain ellipse and reciprocal strain ellipse (04) behavior of rocks with respect to stress and strain .Determination of finite strains from originally spherical and ellipsoidac markers (04)

Unit 2 : 12

Geometric classification of folds ,mechanics of folding ,folding in shear zones ,buckling-states of strain within and outside buckled layers and field evidences of buckling (06)

Faults and joints classification and significance (04), Mechanics of faulting with reference to stress and types of shear zones (04)

Geometry of thurst sheets, brittle and ductile structures in shear zones (02). Lineation and foliations morphology and classification (02), significance of minor structures to determine major structures (02) Classification of unconformities and significance (02)

Unit 3 : 11

Concept of uniformitarianism morphological concepts of Davis Peenck,King (04)

Geomorphic processes, Erosional and depositional forms of 1. Fluvial (02), Aeolian (02), Karst (02),Glacial (02) and marine (02) various controls and scale of landforms and drainage network (04)

Unit 4 : 10

Coastal geomorphology (04), Classification of coasts (02) erosional and depositional features (02), Lineament analysis (02), Neotectonic evidences (02), Climate and landforms (04).

Note :

Internal evaluation is for 30 marks in the form of 1. Home assignment ,2. Seminar and 3. Test each of 10 marks. External evaluation is for 70% in the form semester end examination .

Each Unit consist of 1 credit and each credit of 25 marks.

REFERENCE BOOKS

1. Fundamentals of Geomorphology R.J. Rice
2. Geomorphology Richard J. Chorley, Stanley A. Schumm, David E.Sugden.
3.Principles of Geomorphology Willam D. Thornbury.
4.Geomorphology Majeed Husain.
5.Indian Geomorphology H.S. Sharma.
6.Experimental fluvial Geomorphology Stanley A. Schumm, M. Paull Mosaley, William E. Weaver.
7.Geomorphology and Remote Sensing in Environmental management S.Singh
8.The Evolving Continents Windley.
9.The Geology of continental Margins Burke and Drake.
10.The Breakup of Pangaea R.S. Dietz and J. C. Holden.

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AGT201 ECONOMIC GEOLOGY (100 Marks Total Credit 04)

Unit I – 10

Significance of minerals in national economy.(01)

Tenor,grade and specification for minerals .Indias status in mineral production.(02)

Strategic,critical and essential minerals. National minerals policy. Principles and concepts of mineral economics (04).

Mineral processing technology, gravity concentration method, magnetic separation, heavy mineral separation, froth flotation method(04), United Nations Framework of Classification of ore deposits (04)

Unit II - 13

Ore bearing fluids: magma & magmatic fluids, hydrothermal fluids, meteotric waters, sea & connate water, metamorphic fluids, thermal springs & mine waters.(03)Classification of ore deposits – Lindgren and Bateman classifications.(04)

Controls of ore localization magmatic epochs and metallogenic provinces of India.(04)

Micro texture of Ore, Paragenesis and Zoning . Fluid inclusion, Geo thermometry, wall rock alterations and their applications.(03)

Ore microscope polishing and mounting of ores. Physical and Optical properties of important ore minerals.(02)

Unit III - 11

Processes of formation of mineral deposits: magmatic concentration, metamorphism, contact metasomatism,(04)Hydrothermal, submarine exhalatives, volcanogenic deposits, residual.(04)

Mechanical concentration, oxidation & supergene enrichment and skarn deposits.(04)

Ores in igneous rocks , Ores deposits of metamorphic affiliations. Strata bound and stratiform ore deposits.(04) Mineralization associated with convergent and divergent plate boundaries.(02)

Unit IV – 11

Overview of mineral deposits viz : Iron, manganese, chromium, basemetals, precious metals, Industrial and refractory minerals with special reference to distribution in India. Their geology, stratigraphy & depositional environments.(12)

Use of micro hardness tester and reflectivity, XRD studies in determinative mineralogy.(04)

References: -

Economic mineral deposits, M.L. Jensen & A.M. Batman, John Wiley & Sons

The Geology of Ore deposits, J.M. Gulbert & C.F. Park (JR), SWH Freeman & Co.

Mineral processing technology, B.A. Wills, Peragamon Press.

Metal deposit in relation to plate tectonics, F.J. Sawkins, Springer – Verlag Press.

Ore deposits, Evans, --

Ore Genesis: A Holistic Approach, Asoke Moodherjee, Allied Publishers Ltd.

Ore Petrography & Microscopy, J.R. Craig & D.T. Vaughan, John Wiley & Sons.

Mineral Economics, R.K. Sinha, --

Mineral Resources of India, R.K. Sinha & Krishnaswamy, Oxford & IBH Publishing Co. Pvt. Ltd.

An introduction to Ore Geology, Anthony,M.Evans, Blackwell Scientific publication, 1980.

Ore Genesis, Ashok Mukherji, A holistic approach, Prentice Hall ,Culcutta.

A.K. Indias mineral wealth, Brown J.C. and Dey, Oxford 1936.

Ore Microscopy, Cameron E.N., Wiley 1966.

Economic Geology, Umeshwar Rao , -----

AGT 202 Indian Stratigraphy (100 Marks Total Credits: 04)

Unit I : **10**

Precambrian Stratigraphy of Peninsular India.(04)
Classification, Structure and Tectonics of Archaean Provinces of Peninsular India.(04)
Correlation of Archean stratigraphy in India (04).
Archaeans of the Extra-Peninsular region.(04)

Unit II : **12**

Archaean - Proterozoic boundary problem (02)
Stratigraphy, classification and evolution of the following proterozoic basins of Peninsular India.
Cuddapah Basin(02)
Vindhyan Basin(02)
Delhi Super Group(02)
Pranhita - Godavari Basin(02)
Indravati Basin(02)
Bhima - Kaladgi Basin(02)

Unit III : **13**

Stratigraphy ,tectonic and classification of Gondwana formations (03)
Stratigraphy,tectonic and classification of Deccan volcanics (03)
Stratigraphy and classification of marine transgression in South India (02)
Stratigraphy and classification of jurassic formation in Kutch (02)
Correlation of Paleozoic – Mesozoic and Cenozoic stratigraphic succession in Extra Peninsular India (04)

Unit IV: **10**

K.T. boundary problem (04)
Fossils of Sawaliks(04)
Rise of Himalaya (04)
Glacial periods in Indian stratigraphic (04)

Reference Books:

1. Historical Geology and Stratigraphy of India Ravindrakumar
2. Geology of India & Burma D.N. Wadia
3. A Manual of Geology of India and Burma Pascoe volume 1,2,3,4
4. Geology of Maharashtra,G,G,Deshpande,Geological Society of India,Banglore.
5. Geology of India Vol.1. and Vol 2. Ramakrishnan and Vidynathan, Geological Society of India,Bangalore.

AGT 203 – Hydrogeology (100 Marks, Total Credits: 04)

Unit I : 11

Introduction ,Scope of Hydrogeology . (01), Hydrologic cycle : Types of Precipitation (02), Evapotranspiration (01), Initialization, Run off, Age of groundwater and classification of groundwater (01), Darcy law and its range of validity (02), Hydraulic conductivity methods of determination of hydraulic conductivity, Hydrostrigraphic units (03),Hydraulic conductivity for an anistropic aquifer (01), Groundwater movement and tracer technique (01),Groundwater equations for steady and unsteady flow. (02)

Unit 2 : 12

Occurence of groundwater : Types of openings in the rocks (01)

Groundwater in Granitic ,Basaltic,Metamorphic,Lime stones, Alluvium (unconsolidated sedimentary), Sandstones and Shale (03)

Porocity,permeability,specific yield,specific retention, transmitivity storage coefficient (definations and methods of determination) (03)

Hydrographs, Watertable and piezometric level contour maps construction and interpretation (04)

Well hydraulics : Determination of aquifer characteristics from pump tests (Thies,Thesis,Chow's Cooper Jacobs, Ruston and Singh, Recovery method etc.) (05)

Unit III : 12

Fresh and saltwater relationship in coastal area and islands (01),Ghyben – Hergberg principal and its modification,prevention and control of sea water intrusion (02), Groundwater provinces of India (01)
Introduction to various methods of prospecting and exploration of groundwater Geological (01)
Geophysical (02), Remote sensing (01), Consumptive and Conjuctive use of surface and groundwater (02),Types of confining layers (01),Types of Aquifers (02),Basic ideas of groundwater development and management (03)

Unit IV : 10

Artificial recharge methods and structures (03)
Water logging problems (02)
Problems of over exploitation (02)
Groundwater legislation (01)
Assessment of groundwater quality (02)
Geochemistry of groundwater (03)
Computer application in Hydro geological studies (03)

Reference Books:

1. Groundwater, Todd, D.K., John Wiley.
2. Hydrogeology, Davies, S.N. & Dewiest, R.J.M. John Wiley.
3. Groundwater, Freeze, R.A. & Cherry, J.A., Prentice Hall.
4. Applied Hydrogeology, Fetter,C.W. , Merill publishing.
5. Groundwater, Raghunath, N.M. Wiley Eastern.
6. Groundwater assessment-development and management. Karanth, K.R. Tata McGraw Hill.
7. Regional Groundwater quality, Alley, W.M., VNR, New York.
8. Water. Subramaniam. V, Kingston Publ. London.
9. Groundwater and Tubewells, S.P. Garg, CBS Publication.
10. F. M. Introduction to Groundwater Hydrology,
11. Theory of Aquifer tests USGS, Wisler, C.P and Brater E. F.
12. Chow V. T. (edi) Hand book of Applied Geology.
13. Ground water Resource and Evaluation, Walton, W. C.
14. David k. Todd and larry W. Mays , Ground water hydrology, 3rd edition, Wiley India.

AGT 204 Geochemistry **(100 Marks Total Credits: 04)**

Unit I : **11**

Introduction to the principles of geochemistry. Historical geochemistry. Origin and cosmic abundance of elements(04)

Goldschmidt's geochemical classification of elements. Primary differentiation of earth (04)

Brief classification and composition of meteorites (03)

Distribution of elements in igneous,metamorphic and sedimentary rocks.(05)

Unit II : **12**

Comparative planetology : composition of crust,mantle and core of earth (04)

Aspects of equilibrium thermodynamics-enthalpy and entropy, free energies,chemical potentials,fugacity and activity.Few problems related to thermodynamics (04)

Mineral stability – Pauling rules, speciation of elements during magmatic crystallization. Major and minor elemental substitution ,laws of Goldschmidt, Ahren rules and Ringwood rules (04)

Secondary environmental geochemistry,causes and products of chemical weathering,physico- chemical factors in sedimentation,fench diagrams, their signification and limits(04)

Unit III : **11**

Composition of hydrosphere,Differences between the seawaters and fresh water composition,gains and losses of the Oceans (05)

Composition and stratification of atmosphere, evolution of atmosphere through geological time.Gains and losses to atmosphere, aspects of air pollution (05)

Climate changes during geological history and evolution of atmosphere in last 10000 years (04),
aspects of Palaeoclimatology (01)

Unit IV : **11**

Use of trace and rare earth elements in geological problems (02)

Isotope geochemistry,types of isotopes,natural and artificial radioactivity. Basic concepts in dating techniques : decay clocks and accumulation clocks (02)

Dating techniques using Rb-Sr,U-Th-Pb,K-Ar,S,C and O methods (04)

Quality controls of data generation (02)

Wet and Dry chemical analysis,Partial and total analysis (04)

Reference Books:

1. Geochemistry pathways and processes 2nd edition, Harry y. mcsween Jr, Steven M. Richardson and Maria E Uhle. Overseas Press
2. Radioactive minerals, Dhanaraju, geological society of India,Banglore.
3. Principles of Geochemistry, Mason and Moore; John Wiley & Sons
4. Introduction to geochemisty. K. B. Krauskopf; Mcgraw-Hill Publication
5. Geochemistry in Mineral Exploration. A. W. Rose, H.E.Hawkes & J.S.Webb; Applied Publication
6. Handbook of Geochemistry Wadephol.
7. Statistical Methods in Exploration Geochemistry. Govett. J. G. S. Elsevier Publication
8. Nuclear Methods in mineralogy & geology techniques & applications., Attila Vertes, Sandor Nagy & Karoly Suvegh. Plenum Press
9. Stable Isotope Geochemistry, J. Hoefs, Springer-Verlag
10. Mining and Environment, Bharat. B. Dhar,A.P.H. Pub. Cor.,New Delhi.

PRACTICAL COURSE AGP 105 (MINERALOGY & OPTICS + IGNEOUS AND METAMORPHIC PETROLOGY)

(100 Marks Total Credits: 04)

MINEROLOGY AND OPTICS : -

Sample preparation and obtaining XRD pattern.
Indexing an XRD pattern. Calculation of 2 Ø and d spacing values.
Calculation of mineral formula of the following;

a) Olivine, b) Pyroxene, c) Amphibole, d) Garnet.

Determination of anorthite content of plagioclase by optical properties.
Megascopic and Microscopic identificcation of major rock forming minerals with emphasis on distinguishing features.

OPTICS:-

Study of optic figures, optic axis, optic sign and flash figures of uniaxial and biaxial minerals.
Determination of refractive index of uniaxial and biaxial minerals using various minerals.
Determination of birefringence with the help of Michael Levy chart, quartz wedge and by using berek compensator.
Determination of 2V by 4 axes universal stage.
Scheme of Pleochroism.

IGNEOUS PETROLOGY:-

Study of the mineralogy and textures of igneous rocks in thin sections.
Calculation of CIPW norms and Niggli calculations for all types of saturated and unsaturated rocks.
Megascopic and microscopic study of representative rocks.
Quantitative mineralogical studies on thin section and rock classification.
Classification of igneous rocks under IUGS scheme
Classification of volcanic rocks under TAS scheme.

METAMORPHIC PETROLOGY:-

Study of representative metamorphic rocks megascopically and microscopically.
Study of mineralogy and structures of metamorphic rocks in thin sections, paragenetic (Chronological) interpretations.
Model analysis and calculations of ACF, AFM, AKF diagrams.
Geothemobarometric calculations.

Note :

Internal evalution for 30 marks are carried out in the form of regular journal completion,viva- voce,field work and report and laboratory tests.

70 marks practical examination shall be held at the end of the semester.

PRACTICAL COURSE AGP106 (SEDIMENTOLOGY AND PALAEONTOLOGY + GEOMORPHOLOGY AND MORPHOTECTONICS)

(100 Marks Total Credits: 04)

SEDIMENTOLOGY AND PALAEONTOLOGY

Megascopic and Microscopic characters of Clastic rocks, Limestone and heavy minerals.
Study of Sedimentary structures and their attributes, study of sedimentary textures-size analysis by sieving and other techniques.
Determination of sphericity and roundness of grains, graphical presentation of data and determination of statistical parameters; insoluble residue analysis and preparation of acetate peels of limestone.

Identification and study of Invertebrate fossils, illustration functional morphology and classification.
Identification of Micro-fossils- foraminifera and ostracoda.
Identification of plant fossils- Gondwana and intertrappean.
Sample preparation in micropalaeontological studies

GEOMORPHOLOGY AND MORPHOTECTONICS

Drainage basin and morphometry.
Basin demarcation
Ordering of streams – Strahler's and Horton methods
Relief and slope analysis – profiles and maps.
Identification of landforms on toposheets (aerial photographs and satellite imageries)
Soils : textural characteristics, study of representative soil profiles.
Morphometric analysis: bifurcation ratio, Drainage density, stream frequency, constant of channel maintenance.

Note :
Internal evalution for 30 marks are carried out in the form of regular journal completion,viva- voce,field work and report and laboratory tests.
70 marks practical examination shall be held at the end of the semester.

PRACTICAL AGP 205 (Economic Geology + Indian Stratigraphy) Total Credits: 04 Marks- 100

Economic Geology

Study of Ore Microscope.
Study of Typical Megascopic Ores.
Study of Ores under Microscope.
Optical Parameters.
Determinative Mineralogy.
Study of Ore Textures.
Preparation of Paragenetic Sequence.
Ore reserve calculation.
Microchemical techniques.

Indian Stratigraphy

Preparation of Indian stratigraphy column
Identification of Precambrian stratigraphy of South India.
Preparation of Dharwar distribution map.
Identification of purana basins of India.
Preparation of tectonic evolution map of cuddapah basin.
Map showing evolution of vindhyan stratigraphy.
Distribution of Aravali super group and Delhi group.
Preparation of map showing Gondwana super group and succession from type area.
Map showing marine transgression of South India.
Tectonic evolution of Himalayas.

Note : Internal evalution for 30 marks are carried out in the form of regular journal completion,viva-voce,field work and report and laboratory tests. 70 marks practical examination shall be held at the end of the semester.

PRACTICAL AGP 206 (Hydrogeology + Geochemistry) Total Credits: 04 Marks- 100

Hydrogeology

Preparation and interpretation of Hydrogeological maps.
Computation of Hydraulic Gradient.
Groundwater flow maps and flow net analysis, problem related to Darcy's law .
Analysis of well inventory data, pump test analysis, field techniques and computation of aquifer parameters by different methods.
Use of well logging techniques.
Application of computer programs in solving groundwater problems.

Geochemistry

Brief outlines of analytical methods and instrumentation.
Analysis of water quality for various purposes-agricultural, industrial and domestic; $_{P}H$, Conductivity, carbonate, Bicarbonate, Total Hardness, Chlorides, Sulfate and nitrates by titration. Estimation of Ca, Na, K by flame photometer and F, Br, I by Ion analyzer.
Silicate analysis; Preparation of Solution 'A', Estimation of SiO_2 and Al_2O_3 preparation of solution B; Estimation of Total Fe, Na_2O and K_2O.
Calorimetric Methods- Estimation of Cu, Zn, Mo.
Determination of total heavy metals (bloom test) in water and soils.

Note : Internal evalution for 30 marks are carried out in the form of regular journal completion,viva-voce,field work and report and laboratory tests. 70 marks practical examination shall be held at the end of the semester.

Soft skills ICT,Scientific English, Report writing (Marks 25 : Credit 01)

Unit I : ICT and its necessity, Computer software and hardware, operating System software, Software applications, Computer network – types, LAN, Internet WWB, Web servers, browsers and their use, email , ICT soft tools-MS word, Ms-Excel , MS Power point. (06)

Reporting the tour/field work, Introduction, Abstract, Aim of the field work, Methodology, Results and conclusions, References (02)

Note:
The evaluation of AGP 107 is at the end of the semester. There shall not be internal evaluation for this.

References:
Computer fundamental (P.K.Sinha), Microsoft office access 2007: The complete reference books, Virginia Anderson, McGraw Hill publication.

Soft skill ICT, Scientific English, Report writing (Marks: 25, Credit: 1)

Unit 1 : ICT programmes and their implementation, ICT and poverty alleviation, Government of India programme for district level and taluka level computerization, Types of ICT application for rural natural and human resources. Technological challenges of the disaster management plan for the state of Maharashtra and India.

Note :
The evaluation of AGP 207 is at the end of the semester. There shall not be internal evaluation for this.

References :
Information and communication technology : V.C. pandey. Isha books, Delhi.
Information and communication technology in development. Cases from India, Subhash Bhatnagar and Robert Schware.

SOLAPUR UNIVERSITY
SCHOOL OF EARTH SCIENCES
M.SC APPLIED GEOLOGY
2014-2015 ONWARDS
PART I
SEMESTER I

STRUCTURE OF THE COURSE

SUBJECT	PAPER CODE	TITLE OF THE PAPER	LOAD /WEEK	TOTAL LOAD	CREDITS	MARKS
APPLIED GEOLOGY	AGT 101	MINERALOGY AND OPTICS (3:1)	04	64	04	100
APPLIED GEOLOGY	AGT 102	IGNEOUS AND METAMORPHIC PETROLOGY(2:2)	04	64	04	100
APPLIED GEOLOGY	AGT 103	SEDIMENTOLOGY AND PALAEONTOLOGY(2:2)	04	64	04	100
APPLIED GEOLOGY	AGT 104	STRUCTURAL GEOLOGY AND MORPHOTECTONICS(2:2)	04	64	04	100
APPLIED GEOLOGY	AGP 105	PRACTICAL RELATED TO AGT 101 & AGT 102(2:2)	04	64	04	100
APPLIED GEOLOGY	AGP 106	PRACTICAL RELATED TO AGT 103 & AGT 104(2:2)	04	64	04	100
APPLIED GEOLOGY		SOFT SKILL ICT, SCIENTIFIC ENGLISH	01	08	0.50	13
		TOUR & TOUR REPORT			0.25	06
		SEMINAR	01	08	0.25	06
TOTAL				400	25	625

SEMESTER II
STRUCTURE OF THE COURSE

SUBJECT	PAPER CODE	TITLE OF THE PAPER	LOAD /WEEK	TOTAL LOAD	CREDITS	MARKS
APPLIED GEOLOGY	AGT 201	ECONOMIC GEOLOGY	04	64	04	100
APPLIED GEOLOGY	AGT 202	INDIAN STRATIGRAPHY	04	64	04	100
APPLIED GEOLOGY	AGT 203	HYDROGEOLOGY	04	64	04	100
APPLIED GEOLOGY	AGT 204	GEOCHEMISTRY	04	64	04	100
APPLIED GEOLOGY	AGP 205	PRACTICAL RELATED TO AGT 201 & AGT 202	04	64	04	100
APPLIED GEOLOGY	AGP 206	PRACTICAL RELATED TO AGT 203 & AGT 204	04	64	04	100
APPLIED GEOLOGY		SOFT SKILL ICT, SCIENTIFIC ENGLISH	01	08	0.50	13
		TOUR & TOUR REPORT	01	08	0.25	06
		SEMINAR			0.25	06
TOTAL				400	25	625

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PART II
SEMESTER III

STRUCTURE OF THE COURSE

SR.NO	SUBJECT	PAPER CODE	TITLE OF THE PAPER	LOAD /WEEK	TOTAL LOAD	CREDITS	MARKS
1	APPLIED GEOLOGY	AGT 301	GEOTECTONICS AND PHYSICAL OCEANOGRAPHY(2:2)	04	64	04	100
2	APPLIED GEOLOGY	AGT 302	MINERAL EXPLORATION	04	64	04	100
3	APPLIED GEOLOGY	AGT 303	ENGINEERING GEOLOGY AND MINING GEOLOGY(2:2)	04	64	04	100
4	APPLIED GEOLOGY	AGT 304	REMOTE SENSING AND GIS	04	64	04	100
5	APPLIED GEOLOGY	AGP 305	PRACTICAL RELATED TO AGT 301 & AGT 302(2:2)	04	64	04	100
6	APPLIED GEOLOGY	AGP 306	PRACTICAL RELATED TO AGT 303 & AGT 304(2:2)	04	64	04	100
7	APPLIED GEOLOGY	AGP 307	SUMMER TRAINING	0.50	08	0.50	12
			SEMINARS	0.50	08	0.50	13
	TOTAL				400	25	625

SEMESTER IV

STRUCTURE OF THE COURSE

SR.NO	SUBJECT	PAPER CODE	TITLE OF THE PAPER	LOAD /WEEK	TOTAL LOAD	CREDITS	MARKS
1	APPLIED GEOLOGY	AGT 401	ENVIRONMENTAL GEOLOGY AND DISASTER MANAGEMENT (2:2)	04	64	04	100
2	APPLIED GEOLOGY	AGT 402	FUEL GEOLOGY AND RESOURCES MANAGEMENT(2:2)	04	64	04	100
3	APPLIED GEOLOGY	AGT 403	CLIMATE CHANGE AND PLANETORY GEOLOGY (2:2)	04	64	04	100
4	APPLIED GEOLOGY	AGT 404	RESEARCH METHODOLOGY	04	64	04	100
5	APPLIED GEOLOGY	AGP 405	PRACTICAL RELATED TO AGT 401 AND AGT 402(2:2)	04	64	04	100
6	APPLIED GEOLOGY	AGP 406	PRACTICAL RELATED TO AGT 403 AND AGT 404(2:2)	04	64	04	100
7	APPLIED GEOLOGY	AGP 407	GEOLOGICAL REPORT WRITING	01	08	0.25	06
			PUBLICATIONS			0.50	13
			TOUR REPORT	01	08	0.25	06
	TOTAL				400	25	625