NOTIFICATION

No. : 51/ 2015   Date: 18/06/2015

Subject   : I)   Continuation of Prospectus No.2014121 prescribed for B.Sc.Part-I for the Session 2015-16.
II) Introduction of new Syllabi for the subject Forensic Science at B.Sc. Part-I from the session 2015-16.
Referençe :   Notification No.11 of 2014, dated 23.1.2014.

I) It is notified for general information of all concerned that the Prospectus of B.Sc.Part-I (Sem-I & II) bearing No.2014121 prescribed for the Academic Session 2014-15 shall continue for the session 2015-16 along with the following substitutions/additions.

i)   The syllabi of B.Sc.Part-I Sem-I '1S Mathematics, Paper I & Paper II' printed on page Nos.13 to 16 and B.Sc.Part-I Sem-II '2S Mathematics, Paper III & Paper IV' printed page Nos. 89 to 92 be substituted by the **Appendix-A & Appendix-B** respectively appended with this Notification.

ii) The existing practical syllabi of B.Sc.Part-I Sem-I "1S Zoology" and Sem-II "2S Zoology" prescribed vide Notification No.11 of 2014 dated 23.1.2014 be substituted by the practical syllabi given in **Appendix-C** appended with this Notification.

iii) The books be added as reference books as given in the following table.

Sr. No.	Name of the Book/Publisher	Name of Author	Book be added in the list of
1	A Text Book of Botany – Diversity of Microbes and Cryaptogams (2013) published by Nabh Prakashan, Amravati	Dr.N.H.Shahare, Dr.A.U.Pachkhede, Dr.D.V.Hande, Dr.S.H.Kanherkar, Sh.R.S.Dhande Dr.D.S.Talwankar	Reference book for B.Sc.-I, Sem-I for the subject Botany on page no. 39 at sr.no. 29.
2	A Text Book of Botany – Paleobotany, Gymnosperms, Morphology and Utilization of Plants (2014) published by Nabh Prakashan, Amravati	Dr.P.W.Deotare, Dr.M.A.Shahezad, Dr.Mrs.U.G.Malode, Dr.U.S.Patil, Dr.Mrs.P.S.Kokate, Dr.Mrs.S.P.Khodke	Reference book for B.Sc.-I, Sem-II for the subject Botany on page no.120 at sr.no. 42.
3	Morphology of Angiosperms and Utilization of Plants	Dr.Shubhangi Ingole	Reference book for B.Sc.-I, Sem-II for the subject Botany on page no.120 at sr.no. 43.
4	Food & Nutrition, Himalaya Publishing House.	Nikhilesh Kulkarni, Mahendra Deshpande	Reference book for B.Sc. Sem-I & II for the subject Food Science on page no.163 at sr.no. 27.

iv) The minor changes be made in the syllabi of B.Sc.Part-I Sem-II (2S Statistics) as given in the following table.

Sr. No.	Reference in the Prospectus	Changes in the Syllabi
1	2	3
1	B.Sc.Part-I Sem-II Prospectus No.2014121 Page No.143	I) In Unit-I, i) the Sr.Nos. 1.3, 1.4, 1.5 be shifted in Unit-II as Sr.Nos.2.1, 2.2, 2.3 resp. ii) the Sr.No. 1.6 be renumbered as 1.3. iii) the Sr.No. 1.4 be added as "1.4 Intraclass correlation coefficient." II) In Unit-II, i) the present contents of Unit II, be deleted completely. ii) the title of new Unit II be read as "Regression Theory." iii) the Sr.No. 2.4 be added as "2.4 Concept of Multiple regression, equation of plane of regression of three variables." iv) the Sr.No. 2.5 be added as "2.5 Definition of Partial regression."

II) It is further notified for general information of all concerned that the authorities of the University have introduced the new subject **"Forensic Science"** at B.Sc. Part-I (Sem-I & II) from the session 2015-16 as ''1S Forensic Science (Basics of Forensic Science)'' and "2S Forensic Science (Forensic Chemistry)" as given in **Appendix-D** appended with the notification.

Sd/-
Registrar
Sant Gadge Baba Amravati University

Appendix A

Syllabus Prescribed for B.Sc. I (Semester-I to II) Examination to be implemented from the Academic Session 2015-16

Semester I
1S Mathematics Paper-I
(Algebra and Trigonometry)

Unit-I : **De Moi re s theorem**, roots of complex number, circular functions, hyperbolic function, inverse hyperbolic function. Relation between circular functions and hyperbolic functions. Separation of real and imaginary parts of the circular and hyperbolic functions of complex variable.

Unit-II : Trigonometric series: Gregory series, uler's series, Machin's series, Rutherford's series, summation of series, series based upon $\sin x, \cos x, \sinh x, \cosh x$, exponential series, logarithmic series and series based upon Gregory series.

Unit-III : Elements of quaternion: Definition. Equality and addition, multiplication, complex conjugate of a quaternion, norm, inverse, quaternion as a rotation operator, geometric interpretation, a special quaternion product, operator algorithm, quaternion to matrices.

Unit-IV : Theory of equations: Relations between the roots and coefficients, transformation of equations, cubic equations (Cardon method), Descarte's rule of signs, biquadratic equations.

Unit-V : **Matrices:** Rank of a matrix, row rank, column rank, eigenvalues, eigenvectors and the characteristic equation of a matrix. Cayley-Hamilton theorem and its application.

References Books:

1] K.B.Datta, Matrix and Linear Algebra, Prentice Hall of India Pvt.Ltd. New Delhi, 2000.
2] H.S.Hall and S.R.Knight, Higher Algebra, H.M.Publications, 1994.
3] Chandrika Prasad, Text Book on Algebra & Theory of Equations, Pothishala Private Ltd., Allahabad.
4] S.L.Loney, Plane Trigonometry Part-II, MacMillan & Co., London.
5] R.S.Verma & K.S.Shukla, Text Book on Trigonometry, Pothishala Pvt.Ltd. Allahabad.
6] Ayres Jr Frank : Matrices : Schaum's outline series, McGraw Hill Book Company, Singapore, 1983.
7] T M Karade, Maya S.Bendre, Lectures on Algebra and Trigonometry.
8] Hohn Franz E : Elementary Matrix Algebra, Amerind Publishing Co., Pvt.Ltd. 1964.
9] Spiegel M.R. :Comples Variables, Schaum's outline series, McGraw Hill, 1981.
10] Shanti Narayan : A Test Book of Matrices, S.Chand & Co. Delhi.
11] Jack B Kuipers: quaternion algebra of Quaternions and rotation sequences, Princeton University Press, Fifth printing, 2002.

Semester I
1S Mathematics Paper-II
(Differential and Integral Calculus)

Unit-I : Definition of the limit of a function, basic properties of limits, continuous functions and classification of discontinuities.

Unit-II : Differentiability, successive differentiation, Leibnitz theorem, indeterminate forms and 'Hospital rule.

Unit-III : Rolle's theorem, agrange's mean value theorem, Cauchy's mean value theorem, Maclaurin and Taylor series expansions.

Unit-IV : Partial derivatives and differentiation of real valued function of two variables, homogeneous functions, Euler's theorem on homogeneous functions.

Unit-V : Integration of the form $\int \dfrac{P_n(x)}{\sqrt{Q}}\,dx$, reduction formulae for $\int \sin^n x\,dx$, $\int \cos^n x\,dx$ and Walli's formula, $\int \tan^n x\,dx$, $\int \cot^n x\,dx$, $\int \sec^n x\,dx$, $\int \cos ec^n x\,dx$, $\int \sin^n x.\cos^m x\,dx$, quadrature, rectification,

References :

1] Ayres F Jr. : Differential equations, Schaum's outline series, McGraw Hill, 1981.
2] Ayres F.Jr. : Calculus, Schaum's Outline series, McGRaw Hill, 1981.
3] Karade T.M., J.N.Salunke, M.S.Bendre : Graduate level Calculus, Sonu-Nilu, 5, Bandu Soni layout, Gayatri Road Parsodi, Nagpur.
4] Karade T.M., Maya S. Bendre : Integration and Differential equations, Sonu- Nilu, 5, Bandu Soni layout, Gayatri Road Parsodi, Nagpur.
5] Edwards J : Differential Calculus for Beginners, MacMillan and Co.Ltd.,1963.
6] Edwards J : Integral Calculus for Beginners, AITBS, Publishers and Distributors, 1994.
7] Forsynth A.R.: ATreatise on Differential Equations, (Sixth Edition) MacMillan and Co.1956.
8] Greenspan D. : Introduction to Calculus, Harper and Row, 1968.
9] Gorakh Prassad: Differential Calculus, Pothishala Pvt. Ltd., Allahabad.
10] Gorakh Prasad : Integral Calculus, Pothishala Pvt. Ltd., Allahabad.
11] Erwin, Kreyszig :Advanced Engineering Mathematics, John Wiley & Sons, 1999.
12] N.Piskunov : Differential and Integral Calculus, Peace Publishers, Moscow.

Appendix B

Semester II
2S Mathematics Paper-III
(Differential Equations: Ordinary and Partial)

Unit-I : Degree and order of a ordinary differential equation, linear differential equations and differential equations reducible to the linear form. Exact differential equations. Differential equations of first order and higherdegree, differential equations solvable for p and y, differential equations in Clairaut's form. rthogonal trajectories.

Unit-II : Second order linear differential equations with constant coefficients, homogeneous linear ordinary differential equations, equations reducible to homogeneous differential equations.

Unit-III : Reduction of order, transformation of the equation by changing the dependent variable and independent variable, normal form, method of variation of parameters. Ordinary simultaneous differential equations.

Unit-IV : Formation of partial differential equations, partial differential equations of the first order, total differential equation (Pfaffian). Lagrange's method, some special types of equations which can be solved easily by methods other than the general method.

Unit-V : Compatible differential equations. Charpit's general method of solution, partial differential equations of second and higher orders. Homogeneous and non-homogeneous equations with constant coefficients.

References :
1] Ayres F Jr. : Differential equations, Schaum's outline series, McGraw Hill, 1981.
2] Ayres F.Jr. : Calculus, Schaum's Outline series, McGRaw Hill, 1981.
3] Birkhoff G : Ordinary Differential equations, John Wiley and Sons,and Rota G.C.1978.
4] Coddington : An Introduction to Ordinary Differential Equations, E.A.Prentice Hall of India, 1998.
5] Karade T.M., Bendre M.S.: Lectures on Calculus and Differential and Equations, Sonu-Nilu, 5, Bandu Soni layout, Gayatri Road Parsodi, Nagpur.
6] Murray D.A.: Introductory course in Differential Equations, Orient Longman(India), 1967.
7] Erwin, Kreyszig: Advanced Engineering Mathematics, John Wiley & Sons, 1999.
8] Piaggio HTS: Differential Equations, CBS Publishers &Distributors, Delhi, 1985.
9] Siminons G.F. : Differential Equations, Tata McGraw Hill, 1972.
10] Karade T.M., Maya S. Bendre : Integration and Differential equations, Sonu- Nilu, 5, Bandu Soni layout, Gayatri Road Parsodi, Nagpur.
11] T.M.Karade, Lectures on Differential Equations, Sonu Nilu Publication, Nagpur.
12] A.R.Forsyth. A Treatise on Differential Equations. Macmillan and Co.Ltd.London.
13] Ian N., Sneddon, Elements of Partial Differential Equations. McGraw-Hill Book Company, 1988.
14] Jane Cronin. Differential equations, Marcel Dekkar, 1994.
15] Frnak Ayres. Theory and Problems of Differential Equations. McGraw Hill Book Company, 1972.
16] Richard Bronson, Theory and Problems of Differential Equations. McGraw Hill Inc, 1973.

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Semester II
2S Mathematics Paper-IV
(Vector Analysis and Solid Geometry)
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Unit-I : Scalar and vector product of three vectors, product of four vectors, vector differentiation and vector integration.

Unit-II : Space curve t, n, b vectors, fundamental planes, curvature, torsion, Frenet-Serret formulae.

Unit-III : Gradient, divergence and Curl, directional derivative, line integral (existence and evaluation), work done, Greens theorem.

Unit-IV : Sphere: Different forms of sphere, section of a sphere by a plane, sphere through a given circle, intersection of sphere and a line, orthogonal sphere and condition of orthogonality.

Unit-V : Cone : The equation of a cone with a guiding curve, cone with vertex and origin, right circular cone. Cylinder: equation of right circular cylinder.

References :
1] Murray R. Spiegel, Theory and problems on Advanced Calculus, Schaum Publishing Company, New York.
2] Murray R. Spiegel, Vector Analysis, Schaum Publishing Company, New York.
3] N.Saran and S.N.Nigam , Introduction to vector Analysis Pothishala Pvt.Ltd.Allahabad.
4] Erwin Kreyszig Advanced Engineering Mathematics, John Wiley& sons, 1999.
5] Shanti Narayan, A Text Book of Vector Calculus, S.Chand & Co. New Delhi.
6] S.L.Loney, The elements of Co-ordinate Geometry Macmillan and Company, London.
7] Gorakh Prasad and H.C.Gupta, Text Book on Co-ordinate Geometry, Pothishala Pvt.Ltd.Allahabad.
8] T.M.Karade, Maya S. Bendre, Lectures on Vector analysis and geometry, Sonu Neelu Publication, Nagpur.
9] R.J.T.Bell, Elementary Treatise on Co-ordinate Geometry of Three Dimensions, Macmillan India Ltd., 1994.
10] P.K.Jain and Khalil Ahmad, A Text Book of Analytical Geometry of Two Dimensions, Wiley Eastern Ltd., 1994.
11] P.K.Jain and Khalil Ahmad, A Text Book of Analytical Geometry of Three Dimensions, Wiley Eastern Ltd, 1999.
12] N.Saran and R.S.Gupta, Analytical Geometry of three dimensions, Pothishala Pvt.Ltd.Allahabad.

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Appendix-C
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B.Sc. Part-I (Sem-I & II) (Zoology) to be implemented from Academic Session 2015-16.
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A) **The existing Practical course of 1S Zoology of Semester-I (Prospectus No.2014121) be substituted by the following :-**

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LIFE AND DIVERSITY OF NON-CHORDATA
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Practical : Two practical per week each of 3 period's duration. The   xamination shall be of 4 hrs duration and of 50 marks.

I-Life and diversity of non-chordata
   1. Observation, Classification up to classes and sketching of the following animals, (Specimens or Models):
       Phylum Protozoa: *Plasmodium* trophozoite*, Euglena, Entamoeba histolytica.*
       Phylum Porifera: Sycon, Bath sponge, *Euplectella.*
       Phylum Coelenterata: *Obelia, Aurelia, Tubipora.*
       Phylum Helminthes: *Taenia, Ascaris* (male & female).
       Phylum Annelida: Nereis,   arthworm,   eech,
       Phylum Arthropoda: Prawn, *Limulus, Aranea, Scolopendra, Julus,* Moth, Mosquito.
       Phylum Mollusca: Chiton, Pila, Dentalium, Unio,   ctopus.
       Phylum Echinodermata: *Antedon, Holothuria, , Echinus,* Sea star, Brittle star
       Phylum Hemichordata: *Balanoglossus*

2. Study of Permanent slides:
   L.S.Sycon, nematocyst, Ascaris egg, T.S. Ascaris through gonads, T.S.Leech through crop, Compound eye of insect, Radula, Gill lamila and Osphradium of *Pila*, Scolex and Gravid Proglottid of *Taenia*.
3. Anatomical Study through Computer Aided Techniques, Video Clipping Models, Photographs and other available resources :
   a) Leech/Earthworm: Alimentary canal, Reproductive system, Nervous system,
   b) Grasshopper/Cockroach: digestive system, Nervous system, Reproductive system
   c) Culture of *Paramoecium and Volvox* (To be given to all students)
4. Mountings :
   a) Mosquito (Aedes, Culex and Anopheles) : wings, legs, mouth parts
   b) Housefly: Mouth parts, legs, wings
   c) *Paramoecium and Volvox*

Distribution of Marks during Practical Examination: Time : 4 hrs.

i)	Identification and comments on spots (1-8) - 4 specimens, 4 slides ...	12 Marks
ii)	Labelling of Anatomical diagrams provided (Two) .	10 Marks
iii)	Permanent stained micro preparation. -	08 Marks
iv)	Study tour diary - .	04 Marks
v)	Permanent stained micro preparation Submitted by examinee . .	04 Marks
vi)	Certified class record -	05 Marks
vii)	Check list of 20 locally available invertebrate fauna ..	02 Marks
viii)	Viva- voce - ..	05 Marks

Total: - . 50 Marks

Note:
1] One or two short excursion / study tours are compulsory for observation of animals in their natural habitat.
2] Candidates shall be required to produce at the practical examination the following.
   Practical record book duly signed by the teacher in charge and Certified by the Head of the department as bonafide work of the Candidate.
   Five permanent stained micro preparations.
   Study tour report and field diary duly signed by the teacher.

B) The existing Practical course of 2S Zoology of Semester-II (Prospectus No.2014121) be substituted by the following :-

CELL AND DEVELOPMENTAL BIOLOGY

I) Cell Biology:-
1. Use, care and maintenance of microscope.
2. Bacterial Culture, Gram staining.
3. Permeability tests using erythrocytes.
4. Preparation of Polytene chromosome in Chirnomous or Drosophila larva.
5. Preparation of various stages of mitosis in Onion root tip.
6. Preparation of various stages of meiosis in insect's testis.

II) Developmental Biology.
1. Study of stages of Gametogenesis in rat/frog, (Permanent Stained Slides)
2. Study of different of types animal eggs
3. Study of developmental stages (Life Cycle) of Cockroach, Housefly, mosquito, Butterfly, Moth, Frog (Any Four).
4. Sperm in physiological saline using phase contrast optics.
5. Demonstration of developing chick through available resources.
6. Developmental stages of frog: Cleavage, blastula, gastrula, neurula, and tadpoles through available resources.
7. Permanent slides of chick embryos at 24, 36, 48, 72 hrs of incubation.
8. Study of different types of placenta with suitable histological slides or visual diagrams.

Distribution of Marks during Practical Examination: Time : 4 hrs.

i)	Identification and comments on spots (1-8) – 4 Cytological, 4 mbryological	16 Marks
ii)	Cytological Preparation	10 Marks
iii)	Comments on given Life Cycle	10 Marks
iv)	Certified class record - .	... 05 Marks
v)	Submission of photographs of any three crop pests ..	04 Marks
viii)	Viva- voce	.. 05 Marks

Total: - 50 Marks
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Syllabus of B.Sc. Part- I (Semester- I & II) (Forensic Science) (Effective from session 2015-16)

1S Forensic Science (Basics of Forensic Science)

The examination in Forensic Science of First semester shall comprise of one theory paper, internal assessment and practical examination. Theory paper will be of 3 Hrs. duration and carry 80 marks. The internal assessment will carry 20 marks. The practical examination will be of 4 to 6 hours duration and carry 50 marks.

The following syllabus is prescribed on the basis of six lectures per week and 6 practical periods per batch per week. Each theory paper has been divided into 6 units. There shall be one question in every unit with internal choice for each of 12 marks & one compulsory question covering all the syllabus of Semester-I (8 marks).

B.Sc. Part- I (Semester- I)
1S Forensic Science (Basics of Forensic Science)

Total Lectures: 84   *Marks: 80*
Note: Figures to the right hand side indicate number of lectures.

Unit I   :   **Developmental Growth of Forensic Science**   **14L**
               Introduction to Forensic science – nature, need and function. Laws and Principles, basics of Forensic Science. Historical development and scope of Forensic Science in India. Investigating officers and their assigned role and duties. Global perspective in the field of forensic science: history, development, education and training. Organizational setup of forensic science lab and other national & international agencies. Ethical issues in Forensic Science.

Unit II   :   **14L**
               A) Forensic Science Laboratories and Facilities   **[5L]**
               Growth of Forensic Science Laboratories in India – Central and State level Laboratories. Services and functionalities provided by various FSLs. Various divisions in the FSL.
               B) Recognition of Bloodstain Patterns   **[9L]**
               History of Bloodstain Pattern interpretation, properties of human blood, target surface considerations, Size, Shape and Directionality of bloodstains, Spattered blood, other Bloodstain Patterns, interpretation of Bloodstain on clothing and footwear, Documentation and Photography for Bloodstain Pattern Analysis.

Unit III   :   **Crime and Crime Scene management**   **14L**
               Criminals, criminal behavior, Crime Scene survey, physical evidence, collection preservation types and importance of criminal investigations. Components of Crime Scene Management – Information management, manpower, technology & logistics management, role of crime scene managers and first responding officers. Crime Scene Reconstruction: defining crime scene reconstruction, nature & stages of crime scene reconstruction.

Unit IV   :   **Impressions and Prints**   **14L**
               Finger prints: Nature, Location, collection and evaluation, taking control samples, Forensic Significance.
               Footprints: Importance, Gait Pattern, Casting of footprints in Different medium, Taking Control samples.
               Tire Marks/prints and Skid marks, taking control samples, Forensic Significance.
               Lip Prints: Nature, Location, collection and evaluation, taking control samples, Forensic Significance.
               Bite Marks: Nature, Location, collection and evaluation, taking control samples, Forensic Significance.
               Ear Prints: Nature, Location, collection and evaluation, taking control samples, Forensic Significance.

UNIT V   :   **Forensic Documents**   **14L**
               Various types of forensic documents: genuine and forged documents, classification of forensic documents: Specimen writings, admitted writings, Handling, preservation and marking of documents, natural variation and disguise in writing, Principle of Handwriting Identification, general and individual characteristics, Basic Tools needed for forensic documents examination and their use. Functions of a Forensic Document Examiner.

Unit VI   :   **Forensic Medicine**   **14L**
               Global Medical Jurisprudence, Legal Procedure in India, Documentary evidence: Medical certificates, medical reports, dying declaration. Determination of time since death, including by histopathological methods. Medico legal investigation of sexual offences, including examination of victims and suspects. Medico legal aspects of death: causes of death such as asphyxia, electrocution, thermal trauma, heat burns, starvation, natural death, sudden death, death by accident. Medico legal aspects of wounds: medical and legal definition of wounds, types of mechanical and regional injuries, aging of wounds.

Semester- I
1S Forensic Science (Basics of Forensic Science)

Total Laboratory sessions: 21   *Marks: 50*
List of Practicals
    1.   Collection and Handling of Petroleum samples.
    2.   Collection and Handling of murder case samples.
    3.   Collection and Handling of fire crime scene samples.
    4.   Sketching and Photography of various type of crime scene.
    5.   Document and Fingerprint Photography.
    6.   To take Plain and Rolled inked fingerprints and to identify the patterns.

7. To develop Latent fingerprints with Powder method.
8. Lifting of Fingerprints.
9. Detection of forgeries including traced and stimulated forgery and built up documents.
10. Examination of security features of Currency Notes and Indian Passports.
11. Report writing and interpretation.
12. Scientific Report Writing.
13. Blood Spatter Analysis.
14. Identification of Handwriting General and individual characteristics.
15. Detection of various type of forgery.
16. Identification of Indented and Invisible writing.
17. Identification of typescripts and printing matter.

Distribution of Marks for Practical Examination.

Time: 4 6 hours   Marks: 50

Exercise- I   ..   12
Exercise- II   ..   12
Exercise- III   ..   12
Viva-Voce   .   .   07
Record   .   .   07

                                  Total: 50

Books Recommended:
1. Introduction to Forensic Science in Crime Investigation By Dr.(Mrs.) Rukmani Krishnamurthy.
2. Forensic Biology by Shrikant H. Lade.
3. Crime Scene Processing and Laboratory Work Book by Patric Jones.
4. Forensic Science: An Introduction to Scientific and Investigative Techniques 3rd ed. by Stuart H. James.
5. Crime Scene Management with Special Emphasis on National level Crime Cases by Dr. Rukmani Krishnamurthy under publishing.
6. Forensic Science: An Indroduction to Scientific and Investigative Techniqes By S.H James, J J Nordby.
7. Advanced Crime Scene Photography by C.D. Duncan.
8. Scientific Examination of Questioned Documents by Ordway Hilton.
9. Questioned Documents by Albert S. Osborn.
10. Suspect Documents their scientific examination By Wilson R. Harrison.
11. Speculation in Fingerprint Identification By Chatterjee S. K.
12. Criminal Investigation, Practical Fingerprinting by Briges B. C.
13. Forensic Science in India: A vision for the twenty first century Nanda, B.B. & Tewari,R.K.(2001)New Delhi.
14. Forensic Science: An introduction to scientific and investigative techniques, James, S. H. and Nordby, J. J. (2003) CRC Press, USA.

B. Sc. Part I (Semester II) Forensic Science
2S Forensic Science (Forensic Chemistry)

The examination in Forensic Science of Second semester shall comprise of one theory paper, internal assessment and practical examination. Theory paper will be of 3 Hrs. duration and carry 80 marks. The internal assessment will carry 20 marks. The practical examination will be of 4 to 6 hours duration and carry 50 marks.

The following syllabus is prescribed on the basis of six lectures per week and 6 practical periods per batch per week. Each theory paper has been divided into 6 units. There shall be one question in every unit with internal choice for each of 12 marks & one compulsory question covering all the syllabus of Semester-I (8 marks).

Total Lectures: 84   *Marks: 80*
Note: Figures to the right hand side indicate number of lectures.
Unit I   14L
   A) Qualitative-Quantative Analysis   [5L]
      Organic - inorganic products - oils,paints, petroleum products, cement.
   B) Forensic Chemistry   [5L]
      Screening, sampling-methods type (collection), statistical method, different standard methods, Inorganic analysis, Micro-chemical methods for forensic analysis.
   C) Miscellaneous   [4L]
      Characteristics/examination/act/organic-inorganic products-Gold, silver, tobacco, milk, coffee, tea, sugar, salts, fertilizers, dyes, drugs, paints, fats, various acts (legal aspects).
Unit II   :   Separation and detection technique   14L
      Gas chromatography: Theoretical principles, instrumentations and technique, columns, stationary phases, detectors, Forensic applications. **HPLC:** Review of theory, Instrumentation, Technique, column, detectors, LC-MS, Forensic applications. *Atomic Absorption Spectroscopy and* **Flame spectrometry** - Theory and Forensic applications.
Unit III   :   Forensic Toxicology   14L
      Introduction and concept of forensic toxicological examination and its significance. **Poisons:** (Plant Poison, Animal Poison, Metallic Poison) classification of poisons, types of poisoning, collection and preservation of toxicological exhibits in fatal and survival cases, signs and symptoms of poisoning, mode of action and its effect on vital functions, medico-legal and post mortem examination report/finding studies, specific analysis plan/approach to toxicological examination of poisoning samples, excretion of poisons, detection of poisons on the basis of their metabolic studies, interpretation of analytical data and forming of opinion.

Unit IV : Narcotic Drugs and Psychotropic Substances   **14L**

Analysis of Narcotic Drugs and Psychotropic Substances, Drug effects, drug Hazards, Tolerance and dependence of drugs, Problems of drug addiction, Identification of drug addict, Drug addicts and crimes, Classification of Narcotics and other drugs, Analytical techniques for identification of drugs. Types of Pharma drugs, Steroids, Forensic Pharmacological studies, Ingestion of drugs, absorption, distribution, metabolism, pathways of drug metabolism, drug metabolism and drug toxicity, excretion of drugs.

Unit V : Study of Analysis of Beverages   **14L**

Introduction, Definition of alcohol and illicit liquor, Alcoholic and non-alcoholic beverages and their composition, Proof spirit, absorption, de-toxication and excretions of alcohol, problems in alcohol cases and difficulties in diagnosis, Alcohol and prohibition, Consequences of drunken driving, Analytical techniques in the analysis of alcohol and other articles. Case study.

UNIT VI : Miscellaneous Topics   **14L**

Arson: chemistry of fire, investigation and evaluation of clue material, analysis of arson exhibits by instrumental methods: Management of Arson cases. **Food adulteration:** Introduction, Prevention of food adulteration, Analytical techniques for analysis of exhibits involved in food and other material cases. **Relevant provision of:** 1. Prevention of Food Adulteration Act 1954 (Definition, Power of Food Inspector, Offences and Penalties), 2. Narcotic Drugs & Psychotropic Substances Act 1985 (Definition, Licit Opium Cultivation, Minimum and Commercial Quantity in Narcotic Drugs, Offences and Penalties), 3. Prevention of Illicit Trafficking in NDPS Act 1985 (Detention of a Person Under the Act), 4. Drugs Control Act 1940 (Definition, Power of Chief Commissioner Under the Act), 5. Drugs & Cosmetics Act 1945 (Definition, Adulterated, Misbranded, Spurious Drugs and Cosmetics, Offenses and Penalties).

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Semester- II
2S Forensic Science (Forensic Chemistry)
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Total Laboratory sessions: 21   **Marks: 50**
List of Practicals :

1. Identification of food adulteration - vegetable oil, Cold drinks etc. (2 nos).
2. Quantitative or qualitative study of drug opiates. (2 nos).
3. Examination of fire arson cases by GC, TLC. (1 nos).
4. Detection and determination of various adulterants in alcohol, by colour tests.(Qualitative analysis) (2 nos.).
5. Analysis of Jaggery samples.
6. Qualitative Test for Examination of Ethyl Alcohol in Human Blood.
7. Detection of Inorganic Poison As, Hg, Cu, Ba, PO_4^{--} etc.
8. Colour Tests for identification of poisons, drugs. (2 nos).
9. Plant, animal, Metallic poison analysis. (2 nos.).
10. Quantitative Estimation of Zinc Phophite.
11. Separation of Sampling Material by TLC (drugs, poison etc.) (2 nos).
12. Study of Steroids (separation by TLC).
13. Examination of chemicals used in Trap cases by UV-visible spectroscopy. (2 nos)
14. Analysis of Molasses Samples.
15. Analysis of Medicinal and Toilet preparation samples.
16. Analysis of French Polish.
17. Analysis of Ammonium Chloride and Sodium Chloride Mixture Samples.
18. Analysis of Soft Drinks.
19. Analysis of Diesel.

Distribution of Marks for Practical Examination :
Time: 4 6 hours   **Marks: 50**

Exercise- I	..	12
Exercise- II	..	12
Exercise- III	..	12
Viva-Voce	. .	07
Record	. .	07
	Total:	**50**

Books Recommended:
1. Instrumental Analysis by Skoog, Holler and Crouch.
2. Instrumental Method of Chemical Analysis. Chatwal & Anand, Himalya Publication.
3. Advance in Chromatography by Brown P. R.
4. Introduction of Forensic Science in Crime Investigation by Dr. (Mrs.) R. Krishnamurthy.
5. Howard: Forensics Analysis by Gas Chromatography.
6. Methods in Toxicology Anmol Publication, New Delhi (1998) by Prakash M. et.al.
7. The basic Science of Poisons Casarett & Doll Toxicology,
8. Instrumental Methods of Analysis, Willard H. H. et. al : 1974.
9. Hand book of drug and alcohol abuse by Holfmann, F. G.
10. Bare Acts with short notes on the following : Narcotic Drugs & Psychotropic Substances Act, Drugs & Cosmetics Act, Explosive Substances Act, Dowry Prohibition Act, Prevention of Food Adulteration Act, Prevention of Corruption Act, Arms Act, Wild Life Protection Act
11. Practical Books : Physical Chemistry Practicals by J.B. Yadav.
12. Qualitative Analysis by Vogel.

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