



III YEAR V SEMESTER BSc MECs SYLLABUS

SRI RAMAKRISHNA DEGREE COLLEGE (AUTONOMOUS)

NANDYAL

SRI RAMAKRISHNA DEGREE COLLEGE(A) NDL
Semester-wise Revised Syllabus under CBCS, 2020-21

Domain Subject: **MATHEMATICS**

III Year B.A./B.Sc.– Semester – V

Max Marks: 100

Course-6B: Multiple integrals and applications of Vector calculus
(Skill Enhancement Course (Elective), 5 credits)

I. Learning Outcomes:

Students after successful completion of the course will be able to

1. Learn multiple integrals as a natural extension of definite integral to a function of two variables in the case of double integral / three variables in the case of triple integral.
2. Learn applications in terms of finding surface area by double integral and volume by triple integral.
3. Determine the gradient, divergence and curl of a vector and vector identities.
4. Evaluate line, surface and volume integrals.
5. understand relation between surface and volume integrals (Gauss divergence theorem), relation between line integral and volume integral (**Green's** theorem), relation between line and surface integral (Stokes theorem)

II. Syllabus: (Hours: Teaching: 75 (incl. unit tests etc.05), Training: 15)

Unit – 1: Multiple integrals-I (15h)

1. Introduction, Double integrals, Evaluation of double integrals, Properties of double integrals.
2. Region of integration, double integration in Polar Co-ordinates,
3. Change of variables in double integrals, change of order of integration.

Unit – 2: Multiple integrals-II (15h)

1. Triple integral, region of integration, change of variables.
2. Plane areas by double integrals, surface area by double integral.
3. Volume as a double integral, volume as a triple integral.

Unit – 3: Vector differentiation (15h)

1. Vector differentiation, ordinary derivatives of vectors.
2. Differentiability, Gradient, Divergence, Curl operators,
3. Formulae involving the separators.

Unit – 4: Vector integration (15h)

1. Line Integrals with examples.
2. Surface Integral with examples.
3. Volume integral with examples.

Unit – 5: Vector integration applications

(15h)

1. Gauss theorem and applications of Gauss theorem.
2. Green's theorem in plane and applications of Green's theorem.
3. Stokes's theorem and applications of Stokes theorem.

III. Reference Books:

1. Dr.M Anitha, Linear Algebra and Vector Calculus for Engineer, Spectrum University Press, SR Nagar, Hyderabad-500038, INDIA.
2. Dr.M.Babu Prasad, Dr.K.Krishna Rao, D.Srinivasulu, Y.AdiNarayana, Engineering Mathematics-II, Spectrum University Press, SR Nagar, Hyderabad-500038,INDIA.
3. V.Venkateswararao, N. Krishnamurthy, B.V.S.S.Sarma and S.Anjaneya Sastry, A text Book of B.Sc., Mathematics Volume-III, S. Chand & Company, Pvt. Ltd., Ram Nagar, NewDelhi-110055.
4. R.Gupta, Vector Calculus, Laxmi Publications.
5. P.C.Matthews, Vector Calculus, Springer Verlag publications.
6. Web resources suggested by the teacher and college librarian including reading material.

IV. Co-Curricular Activities:

A) Mandatory:

1. **For Teacher:** Teacher shall train students in the following skills for 15 hours, by taking Relevant outside data (Field/Web).

1. The methods of evaluating double integrals and triple integrals in the class room and train to evaluate These integrals of different functions over different regions.

2. Applications of line integral, surface integral and volume integral.

3. Applications of Gauss divergence theorem, Green's theorem and Stokes's theorem.

2. **For Student: Fieldwork/Project work** Each student individually shall undertake Fieldwork/Project work and submit a

report not exceeding 10 pages in the given format on the work-done in the areas like the following, by choosing any one of the following aspects.

1. Going through the web sources like Open Educational Resources to find the values of double and triple integrals of specific functions in a given region and make conclusions. (or)

2. Going through the web sources like Open Educational Resources to evaluate line integral, surface integral and volume integral and apply Gauss divergence theorem, Green's theorem and Stokes theorem and make conclusions.

3. **Max. Marks for Fieldwork/Project work Report: 05.**

4. **Suggested Format for Fieldwork/Project work Report:** Title page, Student Details, Index page, Stepwise work-done, Findings, Conclusions and Acknowledgements.

4. Unit tests (IE).

b) Suggested Co-Curricular Activities:

1. Assignments/collection of data, Seminar, Quiz, Group discussions/Debates
2. Visits to research organizations, Statistical Cells, Universities, ISI etc.

3. Invited lectures and presentations on related topics by experts in the specified are

V. Suggested Question Paper Pattern:

Max.Marks:70

Time:3 hrs

SECTION - B (Total: 5 X 4=20Marks)

(Answer any **five questions**. Each answer carries **4 Marks**)

(At least **1 question should be given from each Unit**)

1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	

SECTION - C (Total: 5 X 10 = 50 Marks)

(Answer **ALL** the questions. Each question carries **10 Marks**)

1.	(a) or (b)
2.	(a) or (b)
3.	(a) or (b)
4.	(a) or (b)
5.	(a) or (b)

SRI RAMAKRISHNA DEGREE COLLEGE(A) NDL
Semester-wise Revised Syllabus under CBCS, 2020-21

Domain Subject: **MATHEMATICS**

III Year B.A./B.Sc.– Semester – V

Max Marks: 100

Course-7B: Integral transforms with applications
(Skill Enhancement Course (Elective), 5 credits)

I. Learning Outcomes:

Students after successful completion of the course will be able to

1. Evaluate Laplace transforms of certain functions, find Laplace transforms of derivatives and of integrals.
2. Determine properties of Laplace transform which may be solved by application of special functions namely Dirac delta function, error function, Bessel function and periodic function.
3. Understand properties of inverse Laplace transforms, find inverse Laplace transforms of derivatives and of integrals.
4. Solve ordinary differential equations with constant/ variable coefficients by using Laplace transform method.
5. Comprehend the properties of Fourier transforms and solve problems related to finite Fourier transforms.

II. Syllabus :(Hours: Teaching: 75 (incl. unit tests etc.05), Training: 15)

Unit – 1: Laplace transforms- I (15h)

1. Definition of Laplace transform, linearity property-piecewise continuous function.
2. Existence of Laplace transform, functions of exponential order and of class A.
3. First shifting theorem, second shifting theorem and change of scale property.

Unit – 2: Laplace transforms- II (15h)

1. Laplace Transform of the derivatives, initial value theorem and final value theorem. Laplace transforms of integrals.
2. Laplace transform of $t^n \cdot f(t)$, division by t , evolution of integrals by Laplace transforms.
3. Laplace transform of some special functions-namely Dirac delta function, error function, Bessel function and Laplace transform of periodic function.

Unit – 3: Inverse Laplace transforms-I (15h)

1. Definition of Inverse Laplace transform, linear property, first shifting theorem, second shifting theorem, change of scale property.
2. Inverse Laplace Transforms by use of partial fractions.

Unit – 4: Inverse Laplace transforms-II (15h)

1. Inverse Laplace transforms of derivatives, inverse, Laplace transforms of integrals, multiplication by powers of 'p', division by 'p'.
2. Convolution, convolution theorem proof and applications. Heaviside Expansion formula and its applications.

Unit – 5: Applications of Laplace transforms

(15h)

1. Solutions of differential equations with constants coefficients, solutions of differential equations with variable coefficients.
2. Applications of Laplace transforms to integral equations- Abel' s integral equation

III. Reference Books:

1. Dr. S.Sreenadh, S.Ranganatham, Dr.M.V.S.S.N.Prasad, Dr. V.Ramesh Babu, Fourier series and Integral Transforms, S. Chand & Company, Pvt. Ltd., Ram Nagar, New Delhi-110055.
2. A.R. Vasistha, Dr. R.K. Gupta, Laplace Transforms, Krishna Prakashan Media Pvt. Ltd. Meerut.
3. M.D.Raisinghania, H.C. Saxsena , H.K. Dass, Integral Transforms, S. Chand & Company Pvt. Ltd., Ram Nagar, New Delhi-110055.
4. Dr. J.K. Goyal, K.P. Gupta, Laplace and Fourier Transforms, Pragathi Prakashan, Meerut.
5. Shanthi Narayana , P.K. Mittal, A Course of Mathematical Analysis, S. Chand & Company Pvt.Ltd. Ram Nagar, New Delhi-110055.
6. Web resources suggested by the teacher and college librarian including reading material.

IV. Co-Curricular Activities:

A) Mandatory:

1. **For Teacher:** Teacher shall train students in the following skills for 15 hours, by taking Relevant outside data (Field/Web).
 1. Demonstrate on sufficient conditions for the existence of the Laplace transform of a function.
 2. Evaluation of Laplace transforms and methods of finding Laplace transforms.
 3. Evaluations of Inverse Laplace transforms and methods of finding Inverse Laplace transforms.
 4. Fourier transforms and solutions of integral equations.
2. **For Student: Fieldwork/Project work;** Each student individually shall undertake Fieldwork/Project work and submit a report not exceeding 10 pages in the given format on the work-done in the areas like the following, by choosing any one of the aspects.
 1. Going through the web sources like Open Educational Resources on Applications of Laplace transforms and Inverse Laplace transforms to find solutions of ordinary differential equations with constant /variable coefficients and make conclusions. (or)
 2. Going through the web sources like Open Educational Resources on Applications of convolution theorem to solve integral equations and make conclusions. (or)
 3. Going through the web source like Open Educational Resources on Applications of Fourier transforms to solve integral equations and make conclusions.

4. Max. Marks for Fieldwork/Project work Report: 05.

4. Suggested Format for Fieldwork/Project work Report: Title page, Student Details, Index page, Stepwise work-done, Findings, Conclusions and Acknowledgements.

5. Unit tests (IE).

b) Suggested Co-Curricular Activities:

1. Assignments/collection of data, Seminar, Quiz, Group discussions/Debates
2. Visits to research organizations, Statistical Cells, Universities, ISI etc.
3. Invited lectures and presentations on related topics by experts in the specified area.

V. Suggested Question Paper Pattern:

Max.Marks:70

Time:3 hrs

SECTION - A (Total: 5 X 4=20Marks)

(Answer any **five questions**. Each answer carries **4 Marks**)

(**At least 1 question should be given from each Unit**)

1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	

SECTION - B (Total: 5 X 10 = 50 Marks)

(Answer **ALL** the questions. Each question carries **10 Marks**)

1.	(a) or (b)
2.	(a) or (b)
3.	(a) or (b)
4.	(a) or (b)
5.	(a) or (b)

Semester-wise Revised Syllabus under CBCS, 2020-21

Four Year B.Sc.

Domain Subject: **ELECTRONICS**

IV Year B.Sc., - Semester – V

Course 6A: Industrial Electronics

(Skill Enhancement Course (Elective), 3+2 Credits)

Max. Marks: Theory:100 + Practical:50

I. Learning Outcomes: Students after successful completion of the course will be able to:

1. Identify various facilities required to set up a basic Instrumentation Laboratory.
2. Acquire a critical knowledge of various Electrical Instruments used in the Laboratory.
3. Demonstrate skills in using instruments like Rectifiers, Multimeters, Power supplies, Voltage Regulators etc. through hands-on experience.
4. Understand the Principle and operation of different Electronic Heating devices.

II. Syllabus: (Total Hours: 90 including Teaching, Lab, Field Training, Unit tests etc.)

Syllabus:

UNIT-I (20 hours)

Rectifiers and filters: Rectifiers– Half wave, full-wave and bridge rectifiers- Efficiency- Ripple factor- Regulation – Harmonic components in rectified output – Types of filters- Choke input (inductor) filter- Shunt capacitor filter- L section and π section filters.

Voltage Regulators: Transistor Series voltage regulator - Transistor Shunt voltage regulator – Three terminal regulators (78XX and 79XX).

UNIT-II (10 hours)

Power Supplies: Block diagram of regulated power supply – A simple regulated transistorized power supply (circuit and working) – Principle and working of switch mode power supply (SMPS).

UNIT-III (10 hours)

Voltage Multipliers: Half wave voltage doubler, Full wave voltage doubler, Voltage Tripler circuit diagram and working mentioning of applications of voltage multipliers.

UNIT-IV (10 hours)

Controlled rectifiers: SCR Half wave rectifier circuit, working with wave forms, mathematical analysis for resistive load - SCR Full wave rectifier circuit, working with wave forms, mathematical analysis for resistive load – SCR as inverter parallel and series circuits.

UNIT-V (10 hours)

Heat effects: Resistance, inductance and dielectric heating. Principle of operations and its applications.

Reference Books:

1. Unified Electronics Volume II by J.P Agarwal and Amit Agarwal.
2. Industrial Electronics, S.B. Biswas, Dhanapur Rai & Sons.
3. Industrial Electronics, G.K. Mithal, Khanna Publishers.
4. Electronic Devices and Circuits – G.K. Mithal.
5. Electronic Devices and Circuits-Millman and Halkias- Tata Mc Graw Hill (TMH)
6. Microelectronics- J. Millman and A. Grabel - TMH

ELECTRONICS: LAB – 6A

Industrial Electronics

(ANY SIX EXPERIMENTS SHOULD BE DONE)

1. D.C Power supply and filters.
2. Transistor series regulator
3. Transistor as a shunt regulator
4. Voltage regulator using IC-7805 and IC-7905.
5. Voltage doubler using diodes
6. Voltage Tripler using diodes
7. SCR VI characteristics.
8. SCR Series inverter
9. SCR parallel inverter.

Verified by
BOS chairman
V. Suresh
4/7/22

Model Question Paper

PAPER - 6A : Industrial Electronics
(w.e.f. 2022-23)

Time: 3 hours

Max. Marks: 75

Part A (5 X 5 = 25 Marks)

Answer any FIVE of the following:

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.
- 10

Part B (5x10=50 Marks)

Answer the following

11. (OR)
- 12.
13. (OR)
- 14.
15. (OR)
- 16.
17. (OR)
- 18.
19. (OR)
- 20.

*Verified by
Bos chairman
V. Suresh*

Semester-wise Revised Syllabus under CBCS, 2020-21

Domain Subject: **ELECTRONICS**

IV Year B.Sc. - Semester – V

Course 7A: Electronic Instrumentation (Skill Enhancement Course (Elective), 3+2 Credits) Max.

Marks: Theory:100 + Practical:50

I. Learning Outcomes: Students after successful completion of the course will be able to:1.

1. Identify various facilities required to set up a basic Instrumentation Laboratory.
2. Acquire a critical knowledge of various Electrical Instruments used in the Laboratory.
3. Demonstrate skills of using instruments like CRO, Function Generator, Multimeter etc. through hands on experience.
4. Understand the Principle and operation of different display devices used in the display systems and different transducers
5. Comprehend the applications of various biomedical instruments in daily life like B.P. meter, ECG, Pulse oxymeter etc. and know the handling procedures with safety and security.

II. Syllabus: (Total Hours: 90 including Teaching, Lab, Field Training, Unit tests etc.)

UNIT-I Introduction To Instruments (10 hrs)

Types of electronic Instruments - Analog instruments & Digital Instruments, DC Voltmeter and AC Voltmeter, Construction and working of an Analog Multimeter and Digital Multimeter (Block diagram approach), Sensitivity, $3\frac{1}{2}$ display and $4\frac{1}{2}$ display Digital multimeters, Basic ideas on Function generator.

UNIT-II Oscilloscope (10 hrs)

Cathode Ray Oscilloscope-Introduction, Block diagram of basic CRO, Cathode ray tube, Electron gun assembly, Screen for CRT, Time base operation, Vertical deflection system, Horizontal deflection system, Use of CRO for the measurement of voltage (AC and DC), frequency, phase difference, Different types of oscilloscopes and uses.

UNIT-III Transducers (10 hrs)

Classification of transducers, Selection of transducers, Resistive, capacitive & inductive transducers, Resistive and capacitive touch screen transducer used in mobiles, Displacement transducer-LVDT, Piezoelectric transducer, Photo transducer, Digital transducer, Fibre optic sensors

UNIT-IV Display Instruments (10 hrs)

Introduction to Display devices, Seven Segment Displays, LED Displays, Construction and operation (Display of numbers),Types of SSDs (Common Anode & Common Cathode type), Limitations of SSDs, Liquid Crystal Displays, Applications of LCD modules.

UNIT-V Biomedical Instruments (10 hrs)

Basic operating principles and uses of (i) Clinical thermometer (ii) Stethoscope (iii) Sphygmomanometer (iv) ECG machine (v) Radiography (vi) Ophthalmoscope (vii) Ultrasound scanning (viii) Pulse oxymeter (ix) Glucometer, Basic ideas of CT scan and MRI scan.

Reference Books:

1. Electronic Instrumentation by H.S.Kalsi , TMH Publishers
2. Electronic Instrument Hand Book by Clyde F. Coombs , McGraw Hill
3. Introduction to Biomedical Instrumentation by Mandeep Singh, PHI Learning.

4. Biomedical Instrumentation and Measurements by Leslie Cromwell ,Prentice Hall India.
5. Electronic Measurements and Instrumentation by Kishor, K Lal, Pearson, New Delhi
6. Electrical and Electronic Measurements by Sahan, A.K., Dhanpat Rai, New Delhi
7. Electronic Instruments and Measurement Techniques by Cooper, W.D. Halfrick, A.B., PHI Learning, New Delhi
8. Web sources suggested by the teacher concerned and the college librarian including reading material.

Course 7A: Electronic Instrumentation– PRACTICAL SYLLABUS

(30 Hrs. Max Marks: 50)

III. Learning Outcomes: On successful completion of this practical course, student shall be able to:

1. List out, identify and handle various equipment in Instrumentation Laboratory or Electronic Laboratory.
2. Learn the construction, operational principles of various instruments.
3. Demonstrate skills in handling, Maintenance & troubleshooting of different instruments used in the Labs.
4. Acquire skills in observing and measuring various electrical and electronic quantities.
5. Perform some techniques related to Biomedical Instrumentation and measurement of Certain physiological parameters like body temperature, B.P. and sugar levels etc.

IV. Practical (Laboratory) Syllabus: *(30 hrs. Max marks: 50)*

- 1.. Familiarisation of digital multimeter and its usage in the measurements of (i) resistance, (ii) current, (iii) AC & DC voltages and for (i) continuity test (ii) diode test and (iii) transistor test.
2. Measure the AC and DC voltages, frequency using a CRO and compare the values Measured with other instruments like Digital Multimeter.
3. Formation of Sine, Square wave signals on the CRO using Function Generator and measure their frequencies. Compare the measured values with actual values.
4. Display the numbers from 0 to 9 on a single Seven Segment Display module by Applying voltages.
5. Display the letters **a** to **h** on a single Seven Segment Display module by applying voltages.
6. Measurement of body temperature using a digital thermometer and list out the error and corrections.
7. Measurement of Blood Pressure of a person using a B.P. meter And record the values and analyze them.
8. Get acquainted with an available ECG machine and study the ECG pattern to understand the meaning of various peaks

9. Observe and understand the operation of a Digital Pulse oxymeter and measure the pulse rate of different people and understand the working of the meter.

Lab References:

1. Electronic Measurement and Instrumentation by J.P. Navani. ,S Chand & Co Ltd
2. Principles of Electronic Instrumentation by A De Sa, Elsevier Science Publ.
3. Electronic Measurements and Instrumentation by S.P.Bihari, YogitaKumari, Dr. Vinay Kakka, Vayu Education of India.
4. Laboratory Manual For Introductory Electronics Experiments by Maheshwari, New Age
5. International (P) Ltd., Publishers.
6. Electricity-Electronics Fundamentals: A Text-lab Manual by Paul B. Zbar
7. ,Joseph Sloop, & Joseph G. Sloop, McGraw-Hill Education.
8. Web sources suggested by the teacher concerned.

Co-Curricular Activities

(a) Mandatory:*(Training of students by the teacher in field related skills: (lab:10 + field'95)*

1.For Teacher: Training of students by the teacher in the laboratory/field for not less than 15 hours on the field techniques/skills of understanding the operation, Maintenance and utility of various electrical and electronic instruments both in the Laboratory as well as in daily life.

For Student: Students shall (individually)visit a local electrical and electronics shop or small firm to familiarize themselves with the various electrical and electronic instruments available in the market and also to understand their functionality, principle of operation and applications as well as the troubleshooting of these instruments.(Or) The student shall visit a diagnostic centre and observe the ECG machine and the ECG pattern(Or) Student shall visit a diagnostic centre and observe the CT scan and MRI scan.(Or) Students shall visit a mobile smartphone repair shop and observe the different components on the PCB(Motherboard), different ICs (chips) used in the motherboard and troubleshooting of touch screens in smartphones.

Observations shall be recorded in a hand-written Fieldwork/Project work not exceeding 10 pages in the given format to be submitted to the teacher.

2. Max marks for Fieldwork/Project work: 05.

3.Suggested Format for Fieldwork/Project work: *Title page, student details, index, page, details of a place visited, observations, findings and acknowledgments.*

4.Unit tests (IE)

Suggested Co-Curricular Activities

1. Training of students by related industrial/technical experts.
2. Assignments (including technical assignments like identifying different measuring instruments and tools and their handling, operational techniques with safety and security.
3. Seminars, Group discussions, Quiz, Debates etc. (on related topics).
4. Make your own stethoscope at home.
5. Making a seven-segment display at home.
6. Preparation of videos on tools and techniques in various branches of instrumentation.

7. Collection of material/figures/photos related to products of Measuring Instruments, Display Modules and Biomedical Instruments and arrange them in a systematic way in a file.

8. Visits to Instrumentation Laboratories of local Universities or Industries like Cement, Chemical or Sugar Plants etc. or any nearby research organizations, private firms, etc.

9. Invited lectures and presentations on related topics by Technical /industrial experts

Verified by
Bas chairman
V. Sreetha



SRI RAMAKRISHNA DEGREE COLLEGE (AUTONOMOUS) NANDYAL

Revised UG Syllabus Under CBCS

(Implemented from Academic Year 2020-21)

PROGRAMME: FOUR YEAR B.Sc. (Hons)

Domain Subject: COMPUTER SCIENCE

Skill Enhancement Courses (SECs) for Semester V, from 2022-23 (Syllabus with Learning Outcomes, References, Co-curricular Activities)

Structure of SECs for Semester – V

(To choose one pair from the three alternate pairs of SECs)

Univ Code	Course Number 6 & 7	Name of Course	Hours/ Week Theo+Prac	Credits Theo+Prac	Marks	
					IA – 20 Filed Work 05	Sem End
	6A	Web Interface Designing Technologies	3 + 3	3+ 2	25	75
	7A	Web Applications Development using PHP& MYSQL	3 + 3	3 + 2	25	75
OR						
	6B	Internet of Things	3 + 3	3+ 2	25	75
	7B	Application Development using Python	3 + 3	3 + 2	25	75
OR						
	6C	Data science	3 + 3	3+ 2	25	75
	7C	Python for Data science	3 + 3	3 + 2	25	75

Note-1: For Semester–V, for the domain subject Computer Science **any one** of the **three** pairs of SECs shall be chosen as courses 6 and 7, i.e., 6A & 7A or 6B & 7B or 6C & 7C. The pair shall not be broken (ABCD allotment is random, not on any priority basis).

Note-2: One of the main objectives of Skill Enhancement Courses (SEC) is to inculcate field related skills of the domain subject in students. The syllabus of SEC will be partially skill oriented. Hence, teachers shall also impart practical training to students on the skills embedded in syllabus citing related real field situations.

Four-year B.Sc.(Hons)
Domain Subject: **Computer Science**
IV Year B. Sc.(Hons) – Semester – V

Max Marks: 100 + 50

Course 6A: Web Interface Designing Technologies
(Skill Enhancement Course (Elective), Credits: 05)

I. Learning Outcomes: Students after successful completion of the course will be able to:

1. Understand and appreciate the web architecture and services.
2. Gain knowledge about various components of a website.
3. Demonstrate skills regarding creation of a static website and an interface to dynamic website.
4. Learn how to install word press and gain the knowledge of installing various plugins to use in their websites.

II. Syllabus: (Total Hours: 90 including Teaching, Lab, and Field training, Unit tests etc.)

Unit - I (10 hours)

HTML: Introduction to web designing, difference between web applications and desktop applications, introduction to HTML, HTML structure, elements, attributes, headings, paragraphs, styles, colours, HTML formatting, Quotations, Comments, images, tables, lists, blocks and classes, HTML CSS, HTML frames, file paths, layout, symbols, HTML responsive.

Unit – II (10 hours)

HTML forms: HTML form elements, input types, input attributes, HTML5, HTML graphics, HTML media – video, audio, plug INS, you tube.

HTML API'S: Geo location, Drag/drop, local storage, HTML SSE.

CSS: CSS home, introduction, syntax, colours, back ground, borders, margins, padding, height/width, text, fonts, icons, tables, lists, position, over flow, float, CSS combinators, pseudo class, pseudo elements, opacity, tool tips, image gallery, CSS forms, CSS counters, CSS responsive.

Unit – III (10 hours)

Client side Validation: Introduction to JavaScript - What is DHTML, JavaScript, basics, variables, string manipulations, mathematical functions, statements, operators, arrays, functions. Objects in JavaScript - Data and objects in JavaScript, regular expressions, exception handling. DHTML with JavaScript - Data validation, opening a new window, messages and confirmations, the status bar, different frames, rollover buttons, moving images.

Unit – IV (10 hours)

Word press: Introduction to word press, servers like wamp, bitnami e.tc, installing and configuring word press, understanding admin panel, working with posts and pages, using editor, text formatting with shortcuts, working with media-Adding, editing, deleting media elements, working with widgets, menus.

Unit – V (10 hours)

Working with themes-parent and child themes, using featured images, configuring settings, user and user roles and profiles, adding external links, extending word press with plug-ins. Customizing the site, changing the appearance of site using css , protecting word press website from hackers.

III. References

1. Chris Bates, Web Programming Building Internet Applications, Second Edition, Wiley (2007)
2. Paul S.WangSanda S. Katila, an Introduction to Web Design plus Programming, Thomson (2007).
3. Head First HTML and CSS, Elisabeth Robson, Eric Freeman, O'Reilly Media Inc.
4. An Introduction to HTML and JavaScript: for Scientists and Engineers, David R. Brooks. Springer, 2007
5. Schaum's Easy Outline HTML, David Mercer, Mcgraw Hill Professional.
6. Word press for Beginners, Dr.Andy Williams.
7. Professional word press, Brad Williams, David damstra, Hanstern.
8. Web resources:
 - a. <http://www.codecademy.com/tracks/web>
 - b. <http://www.w3schools.com>
 - c. <https://www.w3schools.in/wordpress-tutorial/>
 - d. <http://www.homeandlearn.co.uk>
9. Other web sources suggested by the teacher concerned and the college librarian including reading material.

IV. Co-Curricular Activities

a) Mandatory: (*Training of students by teacher in field related skills: (lab: 10 + field: 05) :*

1. **For Teacher:** Field related training of students by the teacher in laboratory/field for not less than 15 hours on identifying the case study to build a website, designing the format, structure, menus, submenus etc for a website and finally to build a website.
2. **For Student:** Students shall (individually) search online and visit any of the agencies like hotels, hospitals, super bazaars, organizations, etc. where there is a need for a website and identify any one case study and submit a hand-written Fieldwork/Project work/Project work/Project work/Project work Report not exceeding 10 pages. Example: Choosing a firm or business to develop a website, identifying various business entities to be included in the website, identifying menu bar and content to be placed in their websites.
3. Max marks for Fieldwork/Project work/Project work/Project work/Project work/Project work Report: 05.
4. Suggested Format for Fieldwork/Project work/Project work/Project work/Project work: *Title page, student details, index page, details of place visited, observations, findings and acknowledgements.*
5. Unit tests (IE).

b) Suggested Co-Curricular Activities

1. Build a website with 10 pages for the case study identified.
2. Training of students by related industrial experts.
3. Assignments
4. Seminars, Group discussions, Quiz, Debates etc. (on related topics).
5. Presentation by students on best websites.

Course 6A: Web Interface Designing Technologies – PRACTICAL SYLLABUS

V. Learning Outcomes:

On successful completion of this practical course, student shall be able to:

1. Create a basic website with the help of HTML and CSS.
2. Acquire the skill of installing word press and various plugins of Word press.
3. Create a static website with the help of Word press.
4. Create an interface for a dynamic website.
5. Apply various themes for their websites using Word press.

VI. Practical (Laboratory) Syllabus: (30 hrs.)

HTML and CSS:

1. Create an HTML document with the following formatting options:

(a) Bold, (b) Italics, (c) Underline, (d) Headings (Using H1 to H6 heading styles), (e) Font (Type, Size and Color), (f) Background (Colored background/Image in background), (g) Paragraph, (h) Line Break, (i) Horizontal Rule, (j) Pre tag

2. Create an HTML document which consists of:

(a) Ordered List (b) Unordered List (c) Nested List (d) Image

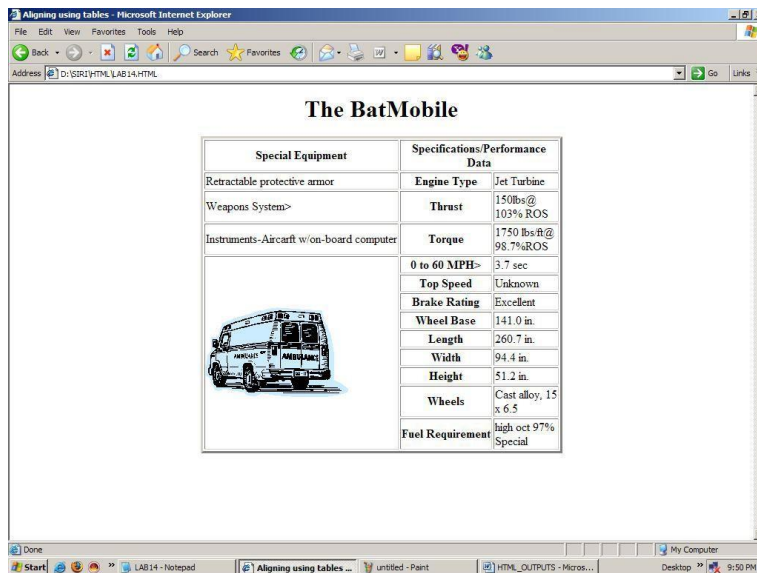
3. Create a Table with four rows and five columns. Place an image in one column.

4. Using “table” tag, align the images as follows:



5. Create a menu form using html.
6. Style the menu buttons using css.
7. Create a form using HTML which has the following types of controls:
 - (a) Text Box (b) Option/radio buttons (c) Check boxes (d) Reset and Submit buttons
8. Embed a calendar object in your web page.

9. Create an applet that accepts two numbers and perform all the arithmetic operations on them.
10. Create nested table to store your curriculum.
11. Create a form that accepts the information from the subscriber of a mailing system.
12. Design the page as follows:



13. Create a help file as follows:



14. Create a webpage containing your bio data (assume the form and fields).
15. Write a html program including style sheets.
16. Write a html program to layers of information in web page.
17. Create a static webpage.

Word press:

18. Installation and configuration of word press.
 19. Create a site and add a theme to it.
 - 20 Create a child theme
 21. Create five pages on COVID – 19 and link them to the home page. .
 22. Create a simple post with featured image.
 23. Add an external video link with size 640 X 360.
 24. Create a user and assign a role to him.
 25. Create a login page to word press using custom links
 26. Create a website for your college.
-

Semester-wise Revised Syllabus under CBCS, 2020-21

Course Code:

Four -year B.Sc.(Hons)
Domain Subject: **Computer Science**
IV Year B. Sc.(Hons) – Semester – V

Max Marks: 100 + 50

Course 7A: Web Applications Development using PHP & MYSQL
(Skill Enhancement Course (Elective), Credits: 05)

I. Learning Outcomes:

Students after successful completion of the course will be able to:

1. Write simple programs in PHP.
2. Understand how to use regular expressions, handle exceptions, and validate data using PHP.
3. Apply In-Built functions and Create User defined functions in PHP programming.
4. Write PHP scripts to handle HTML forms.
5. Write programs to create dynamic and interactive web based applications using PHP and MYSQL.
6. Know how to use PHP with a MySQL database and can write database driven web pages.

II. Syllabus: *(Total Hours: 90 including Teaching, Lab, and Field training, Unit tests etc.)*

Unit-1: (10 hours)

The Building blocks of PHP: Variables, Data Types, Operators and Expressions, Constants. Flow Control Functions in PHP: Switching Flow, Loops, Code Blocks and Browser Output. Working with Functions: What is function?, Calling functions, Defining Functions, Returning the values from User-Defined Functions, Variable Scope, Saving state between Function calls with the static statement, more about arguments.

Unit-2: (10 hours)

Working with Arrays: What are Arrays? Creating Arrays, Some Array-Related Functions. Working with Objects: Creating Objects, Object Instance Working with Strings, Dates and Time: Formatting strings with PHP, Investigating Strings with PHP, Manipulating Strings with PHP, Using Date and Time Functions in PHP.

Unit-3: (10 hours)

Working with Forms: Creating Forms, Accessing Form Input with User defined Arrays, Combining HTML and PHP code on a single Page, Using Hidden Fields to save state, Redirecting the user, Sending Mail on Form Submission, and Working with File Uploads. Working with Cookies and User Sessions: Introducing Cookies, Setting a Cookie with PHP, Session Function Overview, Starting a Session, Working with session variables, passing session IDs in the Query String, Destroying Sessions and Unsetting Variables, Using Sessions in an Environment with Registered Users.

Unit-4: (10 hours)

Working with Files and Directories: Including Files with include(), Validating Files, Creating and Deleting Files, Opening a File for Writing, Reading or Appending, Reading from Files, Writing or Appending to a File, Working with Directories, Open Pipes to and from Process Using popen(), Running Commands with exec(), Running Commands with system() or passthru().

Working with Images: Understanding the Image-Creation Process, Necessary Modifications to PHP, Drawing a New Image, Getting Fancy with Pie Charts, Modifying Existing Images, Image Creation from User Input.

Unit-5: (10 hours)

Interacting with MySQL using PHP: MySQL Versus MySQLi Functions, Connecting to MySQL with PHP, Working with MySQL Data. Creating an Online Address Book: Planning and Creating Database Tables, Creating Menu, Creating Record Addition Mechanism, Viewing Records, Creating the Record Deletion Mechanism, Adding Sub-entities to a Record.

III. References

1. Julie C. Meloni, SAMS Teach yourself PHP MySQL and Apache, Pearson Education (2007).
2. Steven Holzner , PHP: The Complete Reference, McGraw-Hill
3. Robin Nixon, Learning PHP, MySQL, JavaScript, CSS & HTML5, Third Edition O'reilly, 2014
4. Xue Bai Michael Ekedahl, The web warrior guide to Web Programming, Thomson (2006).
5. Web resources:
 - e. <http://www.codecademy.com/tracks/php>
 - f. <http://www.w3schools.com/PHP>
 - g. <http://www.tutorialpoint.com>
6. Other web sources suggested by the teacher concerned and the college librarian including reading material.

IV. Co-Curricular Activities:

a) Mandatory: (*Training of students by teacher in field related skills: (lab: 10 + field: 05) :*

1. **For Teacher:** Field related training of students by the teacher in laboratory/field for not less than 15 hours on demonstrating various **interactive and dynamic websites** available online, addressing the students on identifying the case study to build an interactive and database driven website, forms to be used in website, database to be maintained, reports to be produced, etc.
2. **For Student:** Students shall (individually) search online and visit any of the agencies like malls, hotels, super bazaars, etc. where there is a need for an interactive and database driven website and submit a hand-written Fieldwork/Project work/Project work/Project work/Project work Report not exceeding 10 pages. Example: Choosing a firm or business to develop a website, identifying forms to be placed in the websites, back end databases to be maintained and reports to be generated and placed in the websites.
3. Max marks for Fieldwork/Project work/Project work/Project work/Project work/Project work Report: 05.

4. Suggested Format for Fieldwork/Project work/Project work/Project work/Project work:
Title page, student details, index page, details of place or websites visited, structure of the website and acknowledgements.

5. Unit tests (IE).

b) Suggested Co-Curricular Activities

1. Arrange expert lectures by IT experts working professionally in the area of web content development
2. Assignments (in writing or implementing contents related to syllabus or outside the syllabus. Shall be individual and challenging)
3. Seminars, Group discussions, Quiz, Debates etc. (on related topics).
4. Preparation by students on best websites.
5. Arrange a webpage development competition among small groups of students.

Course 7A: Web Applications Development using PHP & MYSQL– PRACTICAL SYLLABUS

V. Learning Outcomes:

On successful completion of this practical course, student shall be able to:

1. Write, debug and implement the Programs by applying concepts and error handling techniques of PHP.
2. Create an interactive and dynamic website.
3. Create a website with reports generated from a database.
4. Write programs to create an interactive website for e-commerce sites like online shopping, etc.

VI. Practical (Laboratory) Syllabus: (30 hrs.)

1. Write a PHP program to Display “Hello”
2. Write a PHP Program to display the today’s date.
3. Write a PHP program to display Fibonacci series.
4. Write a PHP Program to read the employee details.
5. Write a PHP program to prepare the student marks list.
6. Write a PHP program to generate the multiplication of two matrices.
7. Create student registration form using text box, check box, radio button, select, submit button. And display user inserted value in new PHP page.
8. Create Website Registration Form using text box, check box, radio button, select, submit button. And display user inserted value in new PHP page.
9. Write PHP script to demonstrate passing variables with cookies.
10. Write a program to keep track of how many times a visitor has loaded the page.
11. Write a PHP application to add new Rows in a Table.
12. Write a PHP application to modify the Rows in a Table.
13. Write a PHP application to delete the Rows from a Table.
14. Write a PHP application to fetch the Rows in a Table.
15. Develop an PHP application to implement the following Operations

- i. Registration of Users.
 - ii. Insert the details of the Users.
 - iii. Modify the Details.
 - iv. Transaction Maintenance.
 - a) No of times Logged in
 - b) Time Spent on each login.
 - c) Restrict the user for three trials only.
 - d) Delete the user if he spent more than 100 Hrs of transaction.
-
16. Write a PHP script to connect MySQL server from your website.
 17. Write a program to read customer information like cust-no, cust-name, item-purchased, and mob-no, from customer table and display all these information in table format on output screen.
 18. Write a program to edit name of customer to “Kiran” with cust-no =1, and to delete record with cust-no=3.
 19. Write a program to read employee information like emp-no, emp-name, designation and salary from EMP table and display all this information using table format in your website.
 20. Create a dynamic web site using PHP and MySQL.
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Four -year B.Sc.(Hons)
Domain Subject: **Computer Science**
IV Year B. Sc.(Hons) – Semester – V

Max Marks: 100 + 50

Course 6B: INTERNET OF THINGS
(Skill Enhancement Course (Elective), Credits: 05)

I. Learning Outcomes: Students after successful completion of the course will be able to:

1. Appreciate the technology for IoT
2. Understand various concepts, terminologies and architecture of IoT systems.
3. Understand various applications of IoT
4. Learn how to use various sensors and actuators for design of IoT.
5. Learn how to connect various things to Internet.
6. Learn the skills to develop simple IOT Devices.

II. Syllabus: *(Total Hours: 90 including Teaching, Lab, Field training, Unit tests etc.)*

Unit - I (10 hours)

Fundamentals of IoT: Introduction, Definitions & Characteristics of IoT, IoT Architectures, Physical & Logical Design of IoT, Enabling Technologies in IoT, History of IoT, About Things in IoT, The Identifiers in IoT, About the Internet in IoT, IoT frameworks, IoT and M2M.

Applications of IoT: Home Automation, Smart Cities, Energy, Retail Management, Logistics, Agriculture, Health and Lifestyle, Industrial IoT, Legal challenges, IoT design Ethics, IoT in Environmental Protection.

Unit - II (10 hours)

Sensors Networks : Definition, Types of Sensors, Types of Actuators, Examples and Working, IoT Development Boards: Arduino IDE and Board Types, RaspberriPi Development Kit, RFID Principles and components, Wireless Sensor Networks: History and Context, The node, Connecting nodes, Networking Nodes, WSN and IoT.

Unit - III (10 hours)

Wireless Technologies for IoT: WPAN Technologies for IoT: IEEE 802.15.4, Zigbee, HART, NFC, Z-Wave, BLE, Bacnet And Modbus.
IP Based Protocols for IoT IPv6, 6LowPAN, LoRA, RPL, REST, AMPQ, CoAP, MQTT.
Edge connectivity and protocols.

Unit - IV (10 hours)

Arduino Simulation Environment: Arduino Uno Architecture, Setting up the IDE, Writing Arduino Software, Arduino Libraries, Basics of Embedded C programming for Arduino, Interfacing LED, push button and buzzer with Arduino, Interfacing Arduino with LCD.

Sensor & Actuators with Arduino: Overview of Sensors working, Analog and Digital Sensors, Interfacing of Temperature, Humidity, Motion, Light and Gas Sensors with Arduino, Interfacing of Actuators with Arduino, Interfacing of Relay Switch and Servo Motor with Arduino.

Unit - V (10 hours)

Developing IOT's: Implementation of IoT with Arduino, Connecting and using various IoT Cloud Based Platforms such as Blynk, Thingspeak, AWS IoT, Google Cloud IoT Core etc. Cloud Computing, Fog Computing, Privacy and Security Issues in IoT.

III. References

9. Internet of Things - A Hands-on Approach, ArshdeepBahga and Vijay Madiseti, Universities Press, 2015, ISBN: 9788173719547
10. Vijay Madiseti and ArshdeepBahga, "Internet of Things (A Hands-onApproach)", 1st Edition, VPT, 2014
11. Daniel Minoli, — "Building the Internet of Things with IPv6 and MIPv6: The Evolving World of M2M Communications", ISBN: 978-1-118-47347-4, Willy Publications
12. Pethuru Raj and Anupama C. Raman, "The Internet of Things: Enabling Technologies, Platforms, and Use Cases", CRC Press
13. Open source software / learning websites
 - a. <https://github.com/connectIOT/iottoolkit>
 - b. <https://www.arduino.cc/>
 - c. https://onlinecourses.nptel.ac.in/noc17_cs22/course
 - d. http://www.cse.wustl.edu/~jain/cse570-15/ftp/iot_prot/index.html
 - e. Contiki (Open source IoT operating system)
 - f. Ardudroid (open source IoT project)
 - g. <https://blynk.io> (Mobile app)
 - h. IoT Toolkit (smart object API gateway service reference implementation)
6. Other web sources suggested by the teacher concerned and the college librarian including reading material.

IV. Co-Curricular Activities:

a) Mandatory: (*Training of students by teacher in field related skills: (lab: 10 + field: 05) :*

1. **For Teacher:** Field related training of students by the teacher in laboratory/field for not less than 15 hours on identifying the case study for the IoT, design an IoT solution, build physical IoT device, connect it to a mobile app and deploy the IoT device.
2. **For Student:** Students shall (individually) search online and visit any of the places like aquaculture farms, agencies using IOT devices, etc to identify problems for IoT solution and submit a hand-written Fieldwork/Project work/Project work/Project work/Project work Report not exceeding 10 pages. Example: Choosing a Problem for IoT solution (agriculture, aquaculture, smart home appliances, testing moisture levels, oxygen levels, etc), reasons why IoT solution is feasible for the said problem, material required, Design and architecture for the proposed IoT device, method of implementation and how to connect the device to mobile.
3. Max marks for Fieldwork/Project work/Project work/Project work/Project work/Project work Report: 05.
4. Suggested Format for Fieldwork/Project work/Project work/Project work/Project work: *Title page, student details, index page, details of websites searched, place visited, observations, findings, proposed IOT problem, and design of the IOT device, implementation and acknowledgements.*
5. Unit tests (IE).

b) Suggested Co-Curricular Activities

1. Training of students by related industrial experts.
2. Assignments
3. Preparation and presentation of power-point slides, which include videos, animations, pictures, graphics, etc by the students.
4. Seminars, Group discussions, Quiz, Debates etc. (on related topics).
5. Field visits to identify the problems for IoT solutions.

Course 6B: Internet of Things – PRACTICAL SYLLABUS

V. Learning Outcomes:

On successful completion of this practical course, student shall be able to:

1. Acquire the skills to design a small IoT device.
2. Connect various sensors, actuators, etc to Arduino board.
3. Connect the things to Internet
4. Design a small mobile app to control the sensors.
5. Deploy a simple IoT device.

VI. Practical (Laboratory) Syllabus: (30 hrs)

1. Understanding Arduino UNO Board and Components
2. Installing and work with Arduino IDE
3. Blinking LED sketch with Arduino
4. Simulation of 4-Way Traffic Light with Arduino
5. Using Pulse Width Modulation
6. LED Fade Sketch and Button Sketch
7. Analog Input Sketch (Bar Graph with LEDs and Potentiometre)
8. Digital Read Serial Sketch (Working with DHT/IR/Gas or Any other Sensor)
9. Working with Adafruit Libraries in Arduino
10. Spinning a DC Motor and Motor Speed Control Sketch
11. Working with Shields
12. Design APP using Blink App or Things peak API and connect it LED bulb.
13. Design APP Using Blynk App and Connect to Temperature, magnetic Sensors.

Four-year B.Sc.(Hons)
Domain Subject: **Computer Science**
IV Year B. Sc.(Hons) – Semester – V

Max Marks: 100 + 50

Course 7B: APPLICATION DEVELOPMENT USING PYTHON

(Skill Enhancement Course (Elective), Credits: 05)

I. Learning Outcomes: Students after successful completion of the course will be able to:

1. Understand and appreciate the web architecture and services.
2. Examine Python syntax and semantics and be fluent in the use of Python flow control and functions.
3. Demonstrate proficiency in handling Strings and File Systems.
4. Create, run and manipulate Python Programs using core data structures like Lists, Dictionaries and use Regular Expressions.
5. Interpret the concepts of Object-Oriented Programming as used in Python.
6. Apply concepts of Python programming in various fields related to IOT, Web Services and Databases in Python.

II. Syllabus: *(Total Hours: 90 including Teaching, Lab, Field training, Unit tests etc.)*

Unit - I (10 hours)

Python basics, Objects- Python Objects, Standard Types, Other Built-in Types, Internal Types, Standard Type Operators, Standard Type Built-in Functions, Categorizing the Standard Types, Unsupported Types

Numbers - Introduction to Numbers, Integers, Floating Point Real Numbers, Complex Numbers, Operators, Built-in Functions, Related Modules

Sequences - Strings, Lists, and Tuples, Mapping and Set Types

Unit – II (10 hours)

Files: File Objects, File Built-in Function [open()], File Built-in Methods, File Built-in Attributes, Standard Files, Command-line Arguments, File System, File Execution, Persistent Storage Modules, Related Modules

Exceptions: Exceptions in Python, Detecting and Handling Exceptions, Context Management, Exceptions as Strings, Raising Exceptions, Assertions, Standard Exceptions, Creating Exceptions, Why Exceptions (Now)?, Why Exceptions at All?, Exceptions and the sys Module, Related Modules

Modules: Modules and Files, Namespaces, Importing Modules, Importing Module Attributes, Module Built-in Functions, Packages, Other Features of Modules

Unit – III (10 hours)

Regular Expressions: Introduction, Special Symbols and Characters, Res and Python Multithreaded Programming: Introduction, Threads and Processes, Python, Threads, and the Global Interpreter Lock, Thread Module, Threading Module, Related Modules

Unit – IV (10 hours)

GUI Programming: Introduction, Tkinter and Python Programming, Brief Tour of Other GUIs, Related Modules and Other GUIs

Web Programming: Introduction, Web Surfing with Python, Creating Simple Web Clients, Advanced Web Clients, CGI-Helping Servers Process Client Data, Building CGI Application, Advanced CGI, Web (HTTP) Servers

Unit – V (10 hours)

Database Programming: Introduction, Python Database Application Programmer's Interface (DBAPI), Object Relational Managers (ORMs), Related Modules

III. References

1. Core Python Programming, Wesley J. Chun, Second Edition, Pearson.
2. Think Python, Allen Downey, Green Tea Press.
3. Introduction to Python, Kenneth A. Lambert, Cengage.
4. Python Programming: A Modern Approach, Vamsi Kurama, Pearson.
5. Learning Python, Mark Lutz, O' Reilly.
6. Web sources suggested by the teacher concerned and the college librarian including reading material.

IV. Co-Curricular Activities:

a) Mandatory: (*Training of students by teacher in field related skills: (lab: 10 + field: 05)*)

1. **For Teacher:** Training of students by the teacher in laboratory/field for not less than 15 hours on field related skills like building an IOT device with the help of Python.

2. **For Student:** Students shall (individually) identify the method to link their IOT project done in Paper 7A with Python and submit a hand-written Fieldwork/Project work/Project work/Project work Report not exceeding 10 pages. It should include a brief report on the selected case study of IOT device, algorithm and Python program to operate the IOT device.

3. Max marks for Fieldwork/Project work/Project work/Project work/Project work/Project work Report: 05.

4. Suggested Format for Fieldwork/Project work/Project work/Project work/Project work: *Title page, student details, index page, design of the IOT device, implementation of Python program to connect the IOT device, findings and acknowledgements.*

5. Unit tests (IE).

b) Suggested Co-Curricular Activities

1. Training of students by related industrial experts.
2. Assignments
3. Seminars, Group discussions, Quiz, Debates etc. (on related topics).
4. Presentation by students on best websites.

Course 7B: Application Development Using Python– PRACTICAL SYLLABUS

V. Learning Outcomes:

On successful completion of this practical course, student shall be able to:

1. Implement simple programs in Python
2. Implement programs related to various data structures like lists, dictionaries, etc.
3. Implement programs related to files.

4. Implement applications related to databases, Web services and IOT.

VI. Practical (Laboratory) Syllabus: (30 hrs.)

1. Write a menu driven program to convert the given temperature from Fahrenheit to Celsius and vice versa depending upon user's choice.
2. Write a python program to calculate total marks, percentage and grade of a student. Marks obtained in each of the three subjects are to be input by the user. Assign grades according to the following criteria :
 - Grade A: Percentage ≥ 80
 - Grade B: Percentage ≥ 70 and < 80
 - Grade C: Percentage ≥ 60 and < 70
 - Grade D: Percentage ≥ 40 and < 60
 - Grade E: Percentage < 40
3. Write a python program to display the first n terms of Fibonacci series.
4. Write a python program to calculate the sum and product of two compatible matrices.
5. Write a function that takes a character and returns True if it is a vowel and False otherwise.
6. Write a menu-driven program to create mathematical 3D objects
 - I. curve
 - II. sphere
 - III. cone
 - IV. arrow
 - V. ring
 - VI. Cylinder.
7. Write a python program to read n integers and display them as a histogram.
8. Write a python program to display sine, cosine, polynomial and exponential curves.
9. Write a python program to plot a graph of people with pulse rate p vs. height h. The values of P and H are to be entered by the user.
10. Write a python program to calculate the mass m in a chemical reaction. The mass m (in gms) disintegrates according to the formula $m=60/(t+2)$, where t is the time in hours. Sketch a graph for t vs. m, where $t \geq 0$.
11. A population of 1000 bacteria is introduced into a nutrient medium. The population p grows as follows:
$$P(t) = (15000(1+t)) / (15 + e)$$
12. Where the time t is measured in hours. WAP to determine the size of the population at given time t and plot a graph for P vs t for the specified time interval.
13. Input initial velocity and acceleration, and plot the following graphs depicting equations of motion:
 - I. velocity wrt time ($v=u+at$)
 - II. distance wrt time ($s=u*t+0.5*a*t*t$)

III. distance wrt velocity ($s=(v*v-u*u)/2*a$)

14. Write a program that takes two lists and returns True if they have at least one common member.
15. Write a Python program to print a specified list after removing the 0th, 2nd, 4th and 5th elements.
16. Write a program to implement exception handling.
17. Try to configure the widget with various options like: `bg="green"`, `family="times"`, `size=20`.
18. Write a Python program to read last 5 lines of a file.
19. Design a simple database application that stores the records and retrieve the same
20. Design a database application to search the specified record from the database.
21. Design a database application to that allows the user to add, delete and modify the records.

Four-year B.Sc.(Hons)
Domain Subject: **Computer Science**
IV Year B. Sc.(Hons) – Semester – V

Max Marks: 100 + 50

Course 6C: DATA SCIENCE
(Skill Enhancement Course (Elective), Credits: 05)

I. Learning Outcomes: Students after successful completion of the course will be able to:

1. Develop relevant programming abilities.
2. Demonstrate proficiency with statistical analysis of data.
3. Develop the ability to build and assess data-based models.
4. Demonstrate skill in data management
5. Apply data science concepts and methods to solve problems in real-world contexts and will communicate these solutions effectively

II. Syllabus: ((Total Hours: 90 including Teaching, Lab, Field training, Unit tests etc.)

UNIT I (10 hours)

Introduction: The Ascendance of Data, What is Data Science? , Finding key Connectors, Data Scientists You May Know, Salaries and Experience, Paid Accounts, Topics of Interest, Onward.

Python: Getting Python, The Zen of Python, Whitespace Formatting, Modules, Arithmetic, Functions, Strings, Exceptions, Lists, Tuples, Dictionaries, Sets, Control Flow, Truthiness, Sorting, List Comprehensions, Generators and Iterators, Randomness, Object – Orienting Programming, Functional Tools, enumerate, zip and Argument Unpacking, args and kwargs, Welcome to Data Science!

Visualizing Data: matplotlib, Bar charts, Line charts, Scatterplots.

Linear Algebra: Vectors, Matrices

UNIT II (10 hours)

Statistics: Describing a Single Set of Data, Correlation, Simpson’s Paradox, some Other Correlation Caveats, Correlation and Causation.

Probability: Dependence and Independence, Conditional Probability, Bayes’s Theorem, Random Variables, Continuous Distributions, The Normal Distribution, The Central Limit Theorem.

Hypothesis and Inference: Statistical Hypothesis Testing, Example: Flipping a Coin, Confidence Intervals, P-hacking, Example: Running an A/B Test, Bayesian Inference.

Gradient Descent: The Idea behind Gradient Descent, Estimating the Gradient, Using the Gradient, Choosing the Right Step Size, Putting It All Together, Stochastic Gradient Descent.

UNIT III (10 hours)

Getting Data: stdin and stdout, Reading Files – The Basics of Text Files, Delimited Files, Scraping the Web - HTML and the parsing Thereof, Example: O’Reilly Books About Data, Using APIs – JSON (and XML), Using an Unauthenticated API, Finding APIs.

Working with Data: Exploring Your Data, Exploring One-Dimensional Data, Two Dimensions Many Dimensions, Cleaning and Munging, Manipulating Data, Rescaling, Dimensionality Reduction.

Machine Learning: Modeling, What Is Machine Learning? Over fitting and under fitting, Correctness, The Bias-Variance Trade-off, Feature Extraction and Selection

UNIT IV (10 hours)

K-Nearest Neighbors: The Model, Example: Favorite Languages, The Curse of Dimensionality.

Naive Bayes: A Really Dumb Spam Filter, A More Sophisticated Spam Filter, Implementation, Testing Our Model.

Simple Linear Regression: The Model, Using Gradient Descent, Maximum Likelihood Estimation.

Multiple Regression: The Model, Further Assumptions of the Least Squares Model, Fitting the Model, Interpreting the Model, Goodness of Fit.

UNIT V (10 hours)

Logistic Regression: The Problem, The Logistic Function, Applying the Model, Goodness of Fit Support Vector Machines.

Decision Trees: What Is a Decision Tree? Entropy, The Entropy of a Partition, Creating a Decision Tree, Putting It All Together, Random Forests.

Neural Networks: Perceptron, Feed-Forward Neural Networks And Back propagation, Example: Defeating a CAPTCHA.

Clustering: The Idea, The Model, Example: Meetups , Choosing k, Example: Clustering Colors, Bottom-up Hierarchical Clustering.

III. References

1. Data Science from Scratch by Joel Grus O'Reilly Media
2. Wes McKinney, "Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython", O'Reilly, 2nd Edition, 2018.
3. Jake VanderPlas, "Python Data Science Handbook: Essential Tools for Working with Data", O'Reilly, 2017.
4. Web resources:
 - a. <https://www.edx.org/course/analyzing-data-with-python>
 - b. [http://math.ecnu.edu.cn/~lfzhou/seminar/\[Joel Grus\] Data Science from Scratch First Princ.pdf](http://math.ecnu.edu.cn/~lfzhou/seminar/[Joel Grus] Data Science from Scratch First Princ.pdf)
5. 9. Other web sources suggested by the teacher concerned and the college librarian including reading material.

IV. Co-Curricular Activities:

a) Mandatory: (*Training of students by teacher in field related skills: (lab:10 + field: 05):*)

1. **For Teacher:** Field related training of students by the teacher in laboratory/field for not less than 15 hours on identifying, analyzing and presenting the data and then to predict the future instances.

2. **For Student:** Students shall (individually) search online and visit any of the agencies like Statistical cell, weather forecasting centers, pollution control boards, manufacturing industries, agriculture departments, etc. to observe the manual process going on to collect the data, maintain the data, present the data and to predict the data for future instances and submit a hand-written Fieldwork/Project work/Project work/Project work/Project work Report not exceeding 10 pages.

3. Max marks for Fieldwork/Project work/Project work/Project work/Project work/Project work Report: 05.
4. Suggested Format for Fieldwork/Project work/Project work/Project work/Project work: *Title page, student details, index page, details of place visited, observations, findings and acknowledgements.*
5. Unit tests (IE).

b) Suggested Co-Curricular Activities

1. Training of students by related industrial experts.
2. Assignments
3. Seminars, Group discussions, Quiz, Debates etc. (on related topics).
4. Presentation by students in related topics.

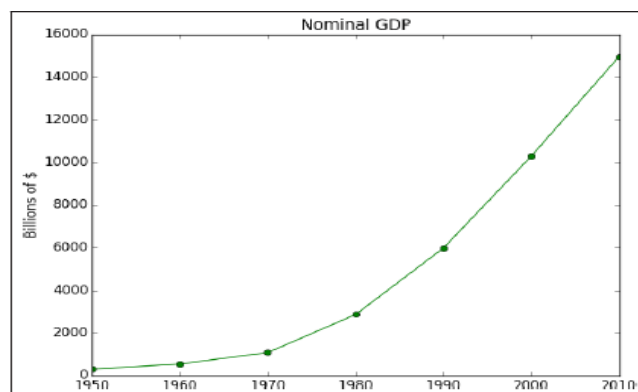
Course 6C: Data Science – PRACTICAL SYLLABUS

V. Learning Outcomes: On successful completion of this practical course, student shall be able to:

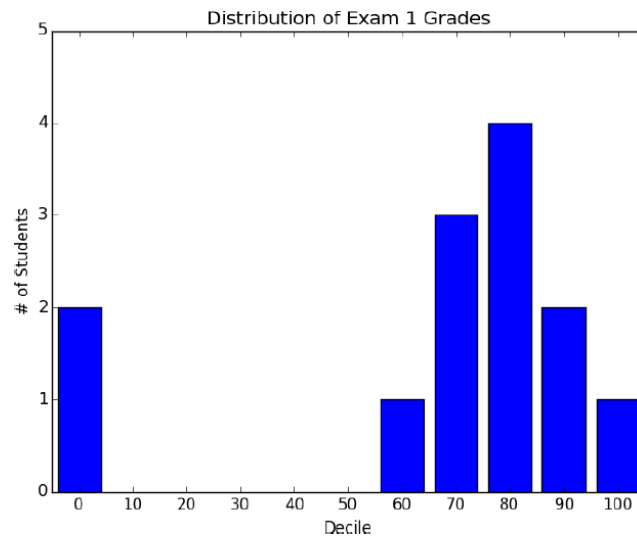
1. Apply data science solutions to real world problems.
2. Implement the programs to get the required data, process it and present the outputs using Python language.
3. Execute statistical analyses with Open source Python software.

VI. Practical (Laboratory) Syllabus: (30 hrs.)

1. Write a Python program to create a line chart for values of year and GDP as given below



2. Write a Python program to create a bar chart to display number of students secured different grading as given below



3. Write a Python program to create a time series chart by taking one year month wise stock data in a CSV file
 4. Write a Python program to plot distribution curve
 5. Import a CSV file and perform various Statistical and Comparison operations on rows/columns. Write a python program to plot a graph of people with pulse rate p vs. height h . The values of P and H are to be entered by the user.
 6. Import rainfall data of some location with the help of packages available in R Studio and plot a chart of your choice.
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Semester-wise Revised Syllabus under CBCS, 2020-21

Course Code:

Four -year B.Sc.(Hons)
Domain Subject: **Computer Science**
IV Year B. Sc.(Hons) – Semester – V

Max Marks: 100 + 50

Course 7C: Python for Data Science
(Skill Enhancement Course (Elective), Credits: 05)

I. Learning Outcomes: Students after successful completion of the course will be able to:

1. Identify the need for data science and solve basic problems using Python built-in data types and their methods.
2. Design an application with user-defined modules and packages using OOP concept
3. Employ efficient storage and data operations using NumPy arrays.
4. Apply powerful data manipulations using Pandas.
5. Do data pre-processing and visualization using Pandas

II. Syllabus: (*Total Hours: 90 including Teaching, Lab, Field training, Unit tests etc.*)

Unit - I (10 hours)

Introduction to Data Science - Why Python? - Essential Python libraries - Python Introduction- Features, Identifiers, Reserved words, Indentation, Comments, Built-in Data types and their Methods: Strings, List, Tuples, Dictionary, Set - Type Conversion- Operators. Decision Making- Looping- Loop Control statement- Math and Random number functions. User defined functions - function arguments & its types.

UNIT –II (10 hours)

User defined Modules and Packages in Python- Files: File manipulations, File and Directory related methods - Python Exception Handling.
OOPs Concepts -Class and Objects, Constructors – Data hiding- Data Abstraction- Inheritance.

UNIT –III (10 hours)

NumPy Basics: Arrays and Vectorized Computation- The NumPy ndarray- Creating ndarrays- Data Types for ndarrays- Arithmetic with NumPy Arrays- Basic Indexing and Slicing - Boolean Indexing-Transposing Arrays and Swapping Axes.
Universal Functions: Fast Element-Wise Array Functions- Mathematical and Statistical Methods-Sorting- Unique and Other Set Logic.

UNIT –IV (10 hours)

Introduction to pandas Data Structures: Series, Data Frame and Essential Functionality: Dropping Entries- Indexing, Selection, and Filtering- Function Application and Mapping- Sorting and Ranking.
Summarizing and Computing Descriptive Statistics- Unique Values, Value Counts, and Membership. Reading and Writing Data in Text Format

UNIT –V (10 hours)

Data Cleaning and Preparation: Handling Missing Data - Data Transformation: Removing Duplicates, Transforming Data Using a Function or Mapping, Replacing Values, Detecting and Filtering Outliers- String Manipulation: Vectorized String Functions in pandas.

Plotting with pandas: Line Plots, Bar Plots, Histograms and Density Plots, Scatter or Point Plots.

III. References

1. Y. Daniel Liang, “Introduction to Programming using Python”, Pearson, 2012.
2. Wes McKinney, “Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython”, O’Reilly, 2nd Edition, 2018.
3. Jake VanderPlas, “Python Data Science Handbook: Essential Tools for Working with Data”, O’Reilly, 2017.
4. Wesley J. Chun, “Core Python Programming”, Prentice Hall, 2006.
5. Mark Lutz, “Learning Python”, O’Reilly, 4th Edition, 2009.
6. Web resources:
 - a. <https://www.edx.org/course/python-basics-for-data-science>
 - b. <https://www.edx.org/course/analyzing-data-with-python>
 - c. <https://www.coursera.org/learn/python-plotting?specialization=data-science-python>
 - d. <https://www.programmer-books.com/introducing-data-science-pdf/>
 - e. <https://www.cs.uky.edu/~keen/115/Haltermanpythonbook.pdf>
7. Other web sources suggested by the teacher concerned and the college librarian including reading material.

IV. Co-Curricular Activities:

a) Mandatory: (*Training of students by teacher in field related skills: (lab:10 + field: 05):*

1. **For Teacher:** Field related training of students by the teacher in laboratory/field for not less than 15 hours on collecting the data, analyzing the data and presenting the data using Python language with some real time data.

2. **For Student:** Students shall (individually) visit any of the agencies like Agriculture dept, statistical cell, irrigation department, Ground water department, CPO office, Rural Water Supply and Sanitation department etc or search online to get real time data like Aids database, weather forecasting database, social networking data, etc and identify any one database, implement and present the necessary charts in Python language and submit a hand-written Fieldwork/Project work/Project work/Project work/Project work Report not exceeding 10 pages. Example: Identifying a database, get the data, present the data in required charts and to predict the future instances if possible.

3. Max marks for Fieldwork/Project work/Project work/Project work/Project work Report: 05.

4. Suggested Format for Fieldwork/Project work/Project work/Project work/Project work: *Title page, student details, index page, and details of place visited, observations, method of data collection, database identified, and implementation in Python language, other findings and acknowledgements.*

5. Unit tests (IE).

b) Suggested Co-Curricular Activities

2. Training of students by related industrial experts.
3. Assignments
4. Seminars, Group discussions, Quiz, Debates etc. (on related topics).
5. Presentation by students on the topics within and outside the syllabus.

Course 7C: Python for Data Science – PRACTICAL SYLLABUS

V. Learning Outcomes: On successful completion of this practical course, student shall be able to:

1. Implement simple programs in Python.
2. Implement programs related to various structures like arrays, lists, Data frames, etc.
3. Implement programs related to files.
4. Implement applications related to data science.

VI. Practical (Laboratory) Syllabus: (30 hrs.)

1. Perform Creation, indexing, slicing, concatenation and repetition operations on Python built-in data types: Strings, List, Tuples, Dictionary, Set
2. Apply Python built-in data types: Strings, List, Tuples, Dictionary, Set and their methods to solve any given problem.
3. Handle numerical operations using math and random number functions
4. Create user-defined functions with different types of function arguments.
5. Create packages and import modules from packages.
6. Perform File manipulations- open, close, read, write, append and copy from one file to another.
7. Write a program for Handle Exceptions using Python Built-in Exceptions
8. Write a program to implement OOP concepts like Data hiding and Data Abstraction.
9. Create NumPy arrays from Python Data Structures, Intrinsic NumPy objects and Random Functions.
10. Manipulation of NumPy arrays- Indexing, Slicing, Reshaping, Joining and Splitting.
11. Computation on NumPy arrays using Universal Functions and Mathematical methods.
12. Load an image file and do crop and flip operation using NumPy Indexing.
13. Create Pandas Series and Data Frame from various inputs.
14. Import any CSV file to Pandas Data Frame and perform the following:
 - (a) Visualize the first and last 10 records
 - (b) Get the shape, index and column details
 - (c) Select/Delete the records (rows)/columns based on conditions.
 - (d) Perform ranking and sorting operations.
 - (e) Do required statistical operations on the given columns.

- (f) Find the count and uniqueness of the given categorical values.
- (g) Rename single/multiple columns

15. Import any CSV file to Pandas Data Frame and perform the following:
- (a) Handle missing data by detecting and dropping/ filling missing values.
 - (b) Transform data using apply () and map() method.
 - (c) Detect and filter outliers.
 - (d) Perform Vectorized String operations on Pandas Series.
 - (e) Visualize data using Line Plots, Bar Plots, Histograms, Density Plots and Scatter Plots.

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Draft Syllabus prepared by:

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