# Rama University Uttar Pradesh, Kanpur
## Faculty of Engineering & Technology

## Study & Evaluation Scheme

# Bachelor of Technology
# (Computer Science & Engineering)

**[Applicable w.e.f. Academic Session 2014-15 till Revised]**

## FACULTY OF ENGINEERING & TECHNOLOGY

## RAMA UNIVERSITY, UTTAR PRADESH, KANPUR

## Website: www.ramauniversity.ac.in

| | | | |
|---|---|---|---|
| | | | every Even Semester. .<br>2. The provision of Open Elective in VI Semester<br>3. The provision of Mini Project, Seminar, Seminar Departmental, Industrial Training and Major Project for better exposure and employability.<br>The BOS committee recommended Evaluation Scheme and Syllabus considering all the suggestions made in the meeting with their course code and subject codes. |

3. Question Paper Format

4. Any other issue with the permission of the Chair: ----

The meeting concluded with a vote of thanks to the chair.

**Date of the Next Meeting: to be decided and conveyed later**

**Chairperson**
Signature: .....
Name : Dr. Vivek Srivastava
Date :

**Internal Members**

Signature: 1..... 2.....
Name: Mr. Sarvesh Kumar Mr. Somendra Tripathi
Date:

Signature: 3.....
Name: Ms. Neelu Kushwaha
Date:

**External Members**

Signature: 1..... 2.....
Name: Dr. Amod Tiwari Mr. Vishal Nagar
Date:

***Encl.: Recommended Curricula attached for consideration and approval.***

CC:

1. Dean
2. Registrar Office

# Rama University Uttar Pradesh, Kanpur
## Faculty of Engineering & Technology

**Ref: RU/FET/CSE/BOS/2014/001** **Dated: 17-May-2014**

Faculty of Engineering & Technology
Department of Computer Science & Engineering
Minutes of Meeting
Boards of Studies

A meeting of Boards of Studies of Computer Science & Engineering (B. Tech) held on 17-May-2014 in Director Office. The following members were present:

1. Dr. Vivek Srivastava - Chairperson
2. Mr. Sarvesh Kumar - Member
3. Mr. Somendra Tripathi - Member
4. Ms. Neelu Kushwaha - Member
5. Ms. Rati Bajpay - Member (Invited)
6. Ms.Tanima Hajra - Member (Invited)
7. Dr. Vivek Gupta - Member (Invited)

The following members agreed to review the minutes in Delhi.

1. Dr. Amod Tiwari - External Member
2. Mr. Vishal Nagar - External Member

**Agenda:**

**1. Action Taken Report (ATR) on the basis of feedback from Stack holder/External member.**

The BOS committee confirmed the minutes of the BOS meeting held on 17-May-2014
The members of Computer Science and Engineering department have been working on the evaluation scheme, curricula and syllabus and consider their feedback and suggestions of stake holders/External members. They suggested that the focus must be on fundamentals and practical courses having emphasis on research and development contributing to the welfare of the society

2 To consider and approve the Evaluation Scheme and Syllabus

| S. No. | Item No. | Existing | Recommendation /Action Taken |
|---|---|---|---|
| 1 | RU/FET/CSE/BOS/2014/001 | .... | The BOS considered the Evaluation Scheme and Syllabus and discussed the credit of each course should be reflected in detailed syllabus of every subject.<br>The BOS committee suggested following :<br>1. The provision of Departmental Electives in |

## Program Educational Objectives

At Rama University Computer Science and Engineering program will prepare its graduates to:

**PEO 1:** Work productively as successful Computer professionals in diverse career paths including supportive and leadership roles on multidisciplinary teams or be active in higher studies,

**PEO 2:** Communicate effectively, recognize and incorporate societal needs and constraints in their professional endeavors, and practice their profession with high regard to ethical responsibilities,

**PEO 3:** Engage in life-long learning and to remain current in their profession to foster personal and organizational growth.

## Program Specific Outcomes

- Apply standard Software Engineering practices and strategies in real-time software project development using open-source programming environment or commercial environment to deliver a quality product for the organization success
- Design and develop computer programs/computer-based systems in the areas related to algorithms, networking, web design, cloud computing, IoT, AI and data analytics of varying complexity
- Acquaint with the contemporary trends in industrial/research settings and thereby innovate novel solutions to existing problems

## Program Outcomes:

**PO1** - Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

**PO2** - Problem analysis: Identity, formulates, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

**PO3** - Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

**PO4** - Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis, and interpretation of data, and synthesis of the information to provide valid conclusions.

**PO5** - Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

**PO6** - The engineer and society: Apply to reason informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

**PO7** - Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**PO8** - Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

**PO9** - Individual and teamwork: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

**PO10** - Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

**PO11** - Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

**PO12** - Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

# ORDINANCE, RULES, REGULATIONS

for

# Bachelor of Technology Programmes

**1. Title**

This ordinance shall be called as "The Rama University Uttar Pradesh, Faculty of Engineering &Technology Ordinance Governing Four years B.Tech. Degree Course"

**2. Duration of the Course**

i. The Course shall consist of regular study for a minimum period of 8 semesters in four academic years, after +2 and 6 semesters in three academic years, after Diploma.

ii. The course of study shall be by regularly attending the requisite number of lectures, tutorials and practical training.

iii. The 3rd, 5th, and 7th semesters shall ordinarily be from 1st July to 31stDecember; however, the First semester shall ordinarily begin from 1st August. The remaining semesters shall be from 1st January to till 30th June subject to change, if any notified by the Vice Chancellor and other competent authorities; from time to time. The periods are inclusive of the time for examinations.

iv. Total duration of the B.Tech. Course shall be 4 years, each year comprising of two semesters. Each semester shall normally have teaching for the 90 working days or as prescribed by UGC from time to time.

v. A candidate, who has failed twice in first year due to any reason (either due to his/her non-appearance or he/she being not permitted to appear in semester examinations) shall not be allowed to continue his/her studies further subject to clause 9.

vi. The maximum time allowed for a candidate admitted in Ist /IIIrd semester (for diploma holders) for completing the B.Tech. Course shall be 7 (seven) / 5 (five) years respectively, failing which he/she shall not be allowed to continue for his/her B.Tech. degree.

**3. Medium of Instruction**

The medium of instruction and examination shall be in English only.

**4. Number of seats**

Number of students to be admitted each year and the number of batches shall be decided and notified by the University from time to time; based upon the Rules, instructions and Notifications issued by UGC.

**5. Admission**

5.1. Admission to B.Tech. First year in I[st] semester and lateral admission in B.Tech. Second year in III[rd] semester (for diploma holder candidates only) will be made as per the rules prescribed by the Academic Council of the Rama University, Kanpur.

5.2. Admission on migration of a candidate from any other University to the University is permitted.

**6. Eligibility for Admissions:**

**6.1. Admission to B. Tech. First Year:**

Candidates who have passed Intermediate of U.P. Board or (10+2) (with minimum 50% marks in PCM or PCB) standard from other board with Physics and Mathematics along with any one of Chemistry/Bio-Technology/Computer Science/ Biology are eligible for admission to first year of 4 year B.Tech. Courses offered by Faculty of Engg &Technology affiliated to Rama University, Kanpur.

**6.2. Admission to B.Tech. Second Year through Lateral Entry Scheme:**

Candidates who have passed 3/4 year Diploma (with minimum 60% marks) from institutions recognized by the Board of Technical Education or University in any branch of Engineering/Technology except Agriculture Engg. are eligible for admission to Second year in any branch of Engg./Technology except Agriculture Engg.

**7. Procedure for Admission**

At the relevant time admission to the course shall be governed by The Acts, Statutes and Ordinances in force and issued by the University. Admission to the Course shall be made strictly on the basis of the merit of the Entrance Test.

Provided that while making admission to the course reservation policy of the Government of Uttar Pradesh governing admission to higher educational Institutions issued from time to time shall be applied

**8. Fee**

A student shall pay the fee prescribed by the University from time to time

**9. Attendance**

9.1 Every student is required to attend all the lectures, tutorials, practicals and other prescribed curricular and co-curricular activities. The attendance can be condoned up to 25% on medical grounds or for other genuine reasons beyond the control of students.

9.2 A further relaxation of attendance up to 10% for a student can be given by Dean provided that he/she has been absent with prior permission of the Head of Department for the reasons acceptable to him. Vice Chancellor may further condone attendance shortage up to 5% on genuine grounds. However, under no circumstances, a student with an attendance of less than 60% in a subject shall be allowed to appear in the semester-end examination of that subject. Provided that the late admitted students in the first semester of any course maintain at least 80% attendance (including medical and other reasons) from the date of their admission.

9.3 No student will be allowed to appear in the end semester examination if he / she do not satisfy the overall average attendance requirements of Clause Nos. 9.1, and 9.2 and such candidate(s) shall be treated as having failed and will be further governed by clause no. 2.5 & 2.6.

9.4 The attendance shall be counted from the date of admission in the college or start of academic session whichever is later.

**10. Make-up Policy**

Any student who misses any component of evaluation for genuine reasons must directly approach the instructor- in- charge/ instructor with a request for make-up examination stating the reasons, prior to the commencement of the examination. If the instructor-in-charge is satisfied with the request, he may arrange as soon as possible a make-up examination for the component of evaluation which the student had missed. If, on rare occasion, a student anticipates a genuine difficulty in meeting the date of the component of evaluation, he should take his instructor-in-charge/instructor into confidence prior to the event. The decision of the instructor-in-charge in all matters of make-up shall be final.

**11. Curriculum:**

11.1 The 4 year curriculum has been divided into 8 semesters and shall include lectures, tutorials, practicals, seminars and projects etc. in addition to industrial training and educational tour etc. as defined in the scheme and executive instructions issued by the University from time to time.

11.2 The curriculum will also include such other curricular, co-curricular and extra-curricular activities as may be prescribed by the University from time to time.

**12. Change of Branch:**

12.1 Change of branch may be allowed against the vacant seats in the following two stages, provided criteria at following sub clauses is satisfied:

(i) In first year, after the last date of admission to the B.Tech. I[st] semester, on the basis of merit of (10+2) examination marks on vacant seat subject to clause 12.2.

(ii) In the second year, on the basis of merit at the B.Tech. First year examination for those who are pass without any carry over paper.

12.2 After change of branch, number of students in branch(s) shall neither increase over the intake approved by UGC or A.I.C.T.E. nor it will decrease below 75% of intake approved by UGC or A.I.C.T.E..

12.3 Change of branch facility is not applicable to following:-

Candidates admitted in second year of B.Tech. Courses as per clauses 6.2.

12.4 The change of branch if allowed will become effective from B.Tech. III[rd] semester.

12.5 Further change of branch shall not be permitted.

**13. Teaching**

The objective of classroom education is to awaken the curiosity of the student, generate habits of rational thinking in him, gear his mind to face the unfamiliar and train him to stand on his own. Classroom instruction helps the student in the organization and correlation of facts, comprehension of ideas and the creative use of knowledge.

The teacher also has the additional responsibility to make the student search for knowledge on his own and induce him to use additional facilities like the library, laboratory and the environment, to optimize his learning process. Self-study by the student would therefore form an important factor in the planning of teaching and evaluation. The student is required to cooperate and respond to this challenge.

Every course whether single-section or multi-section is conducted by a member of the faculty called instructor-in-charge, with the assistance, wherever necessary, of the required number of instructors who will be partners with him in meeting the full academic perceptions and organizational needs of teaching the course and evaluating the students. Wherever the instructor-in-charge is mentioned hereafter, it connotes the team of instructors, acting as one entity under his captainship.

The instructor-in-charge should make a comprehensive plan in respect of conducting the course even before the semester begins. In a multi-section course, all instructors must remain in continuous interaction in order to ensure a smooth operation of the course. While recognizing variations due to personal attitudes and styles, it is important that these are smoothened out so that the operation and grading in different sections in a course, indeed between courses across the faculty, are free from any seeming arbitrariness.

At the beginning of class work, the instructor, in-charge/instructor must announce to his class/ section through a Course Handout/Lesson Plan, the necessary information in respect of (i) the operations of the course (its pace, coverage and level of treatment, textbooks and other reading assignments, home tasks etc); (ii) various components of evaluation, such as tutorials, laboratory exercises, home assignment, several quizzes/tests/examinations (announced or unannounced, open book or closed book), regularity of attendance, etc. (iii) the frequency, duration, tentative schedule, relative weightage etc., of these various components; (iv) the broad policy which governs decisions about make-up; (v) mid-semester grading; (vi) grading procedure (overall basis, review of border line cases, effect of class average etc.) vii) Chamber consultation hours and (viii) other matters found desirable and relevant.

**14. Examination:**

14.1 The performance of a student in a semester shall be evaluated through continuous evaluation and end semester examination. The continuous evaluation shall be based on Mid Term Examination, assignments/tutorials, quizzes/viva-voce and attendance. The marks for continuous evaluation (Sessional marks) shall be awarded at the end of the semester. The end semester examination shall be comprised of written papers, practicals and viva-voce, inspection of certified course work in classes and laboratories, project work, design reports or by means of any combination of these methods.

14.2 The distribution of marks for sessional, end semester theory papers, practicals and other examinations, seminar, project, industrial training shall be as prescribed.

14.3 The marks obtained in a subject shall consist of marks allotted in end semester theory paper, practical examination and sessional work.

14.4 The minimum pass marks in each theory subject (including sessional marks) shall be 40% with a minimum of 30% marks in each theory paper in the end semester examination. If there is no provision of sessional marks in any subject, the minimum pass marks in that subject shall be 30% in the end semester examination.

14.5 The minimum pass marks in a project/practical subject (including sessional marks if any) shall be 50%.

14.6 A candidate, in order to pass, must secure 50% marks in the aggregate in a particular academic year inclusive of both semesters of the academic year subjected to conditions as clause 17.2(a).

14.7 The minimum pass marks in Seminar, Industrial Training and Educational Tour, Viva-Voice etc shall be 50%.

Sarvesh AK NK Tripathi

**15. Evaluation Feedback**

Just as evaluation is done in continuous manner, feedback should also be available in a continuous manner. Thus, the answer scripts must be promptly evaluated, shown to the students for them to obtain any clarification on their performance and returned to the students whenever practical. The performance of the students in the examination should be discussed in the class giving as much details as possible like the highest, lowest and average performances. Solutions with marking schemes are displayed soon after a test.

**16. Promotion:**

16.1 A candidate satisfying all the requirements under clause 14 shall be promoted to the next academic year of study.

16.2. (a) A candidate shall be eligible for provisional promotion to the next academic year of study provided:

(i) He/she fails to satisfy the requirements of clause 14.4, 14.5 and 14.7 in not more than 6 theory subject and 2 practical/ project subjects on the basis of combined result of both semester examinations of a particular academic year.

(ii) He/she fails to satisfy the requirements of clause 14.4, 14.5 and 14.7 (theory and/or practical/ project subjects) in not more than 6 theory subjects and 2 practical/project subjects in addition he/she fails to satisfy requirement of clause 15.6 (aggregate marks) in the combined result of both semester examinations of a particular academic year. In such a case aggregate marks shall be treated as one theory subject.

(b) If a candidate satisfies the requirement of clauses 14.4, 14.5 & 14.7 but fails to satisfy the requirement of clause 14.6, he/she shall be eligible for provisional promotion with carry over. He/she may choose up to a maximum of any four theory papers of that particular academic year as per his/her choice to pass the examination of that year.

16.3 A candidate shall not be promoted to third year unless he/she passes all the subjects of first year. Similarly, a candidate shall not be promoted to fourth year unless he/she passes all the examinations of second year.

16.4 All other candidates who do not satisfy conditions laid down in clause 8 shall be declared fail and shall be required to repeat the whole academic year after taking re-admission. This facility is, however, subject to the time limits stipulated in clause-2.

**17. Carryover System:**

17.1 (a) A candidate who satisfies the requirements of clause 16.2 (a) will be required to appear in those theory papers / practicals in which he/she failed. However, a candidate of first year will be allowed to appear in the second semester

examination in those theory/ practical subjects in which he/she failed in the first semester examination, provided examination of those theory/practical subjects are held in second semester.

(b) A candidate satisfying clause 16.2 (b) shall be required to exercise his/her choice up to a maximum of Six theory papers in which he/she desires to appear in the examination to fulfill the requirements of clause 14.6. He/she shall inform the college about his/her choice within 15 days after the start of new session.

17.2 The highest marks secured in any subject in various attempts (end semester and carryover examinations) shall be considered.

**18. Ex-studentship:**

18.1 A candidate opting for ex-studentship shall be required to appear in all the theory & practical subjects in the end semester examinations of both semesters of the same academic year. However, the marks pertaining to Sessional, Industrial Training, and Seminar shall remain the same as those secured earlier.

18.2 A candidate opting for ex-studentship shall be required to apply to the FET by paying only examination fee within 15 days from the start of new session.

**19. Re-admission:**

A candidate may be allowed for re-admission provided he/she satisfies one of the following conditions:

19.1 A candidate is declared fail.

19.2 A candidate did not appear in a semester examination / or he/she was not granted permission to appear in the examination.

19.3 A candidate has been detained by the department and subsequently has been permitted to take re-admission.

19.4 A candidate as an ex-student passed the examination of the academic year or qualified for carryover system.

19.5 A candidate promoted with carry over subjects and he/she opted for re- admission.

**20. Results:**

20.1 The result of a candidate shall be declared on the basis of performance of both semesters of the same academic year. However, a final year student, who is not permitted in any one of the final year semester examinations due to shortage of attendance, will be

permitted in that particular semester of the next academic session to study as a regular student and appear at that semester examination.

20.2 Result of the final year shall be declared on the basis of working out Grand Total by adding marks of all the years of study in the following ways:

(a) For candidates admitted to B.Tech. Course as per clause 6.1 & 6.3

I Year 25% of aggregate marks

II Year 50% of aggregate marks

III Year 75% of aggregate marks

IV Year 100% of aggregate marks

(b) Candidates admitted in III semester of B.Tech. Course as per clause 6.2

II Year 50% of aggregate marks

III Year 75% of aggregate marks

IV Year 100% of aggregate marks

**21. Award of Division:** The division shall be awarded on the basis of final year result.

**21.1 Calculation of Grade Point and Grade Point Average**

Relative grading shall be adopted at the Faculty of Engineering & Technology, Rama University. The list of letter grades, the grade points associated with them are given below:

| Grade | Grade Point |
|---|---|
| **$A^+$** | **10** |
| **A** | **9** |
| **B** | **8** |
| **C** | **7** |
| **D** | **6** |
| **E** | **5** |
| **F** | **4** |

In order to arrive at alphabet grades, the total marks in a particular course for all the students pursuing the course are tabulated in the descending order (equivalently a

histogram).

The performance of the course is analyzed in terms of the highest, lowest and the average marks and the dividing lines between the clusters of students. Gaps and dips between the clusters and the nature of the clusters guide in drawing the dividing lines between the grades. In a normal class of large size, the C grade usually covers the average performance. This is, however not a hard and fast rule and exceptions may arise in case of small classes, skewed histogram etc. Borderline cases may be considered individually on the basis of regularity and the attendance, class room discussions, progressive good performance throughout the semester, etc.

**21.2 Calculation System of Semester Grade Point Average:**

- Computation of the Semester Grade Point Average (SGPA) and Cumulative Performance Index (CPI):

  The SGPA is an indicator of the overall academic performance of a student in all the courses he/she has registered during a given semester. It is computed as follows: If the grades awarded to a student are $G_1$, $G_2$ etc in courses with corresponding credits $C_1$, $C_2$ etc, the SGPA is given by:

$$SGPA = \frac{C_1 \times G_1 + C_2 \times G_2 + \cdots + C_n \times G_n}{C_1 + C_2 + \cdots + C_n}$$

- The CPI indicates the overall academic performance of a student in all the courses registered upto and including the latest completed semester/summer term. It is computed in the same manner as the SGPA, considering all the courses (say, n) and is given by:

$$CPI = \frac{\sum_{i=1}^{n} C_i \times G_i}{\sum_{i=1}^{n} C_i}$$

- Percentage conversion of CPI :

$$\boldsymbol{Percentage\ of\ marks\ =\ CPI\ \times\ 10}$$

- Students should get a minimum grade E in each subject with 5CPI to clear the semester.

AKG Sarvesh VK Tripathi

- CPI conversion

| | |
|---|---|
| **≥8 CPI** | **I division with honours** |
| **≥6 CPI** | **I division** |
| **≥5 CPI** | **II division** |
| **<5 CPI** | **Fail** |

21.3 If a candidate passes all examinations in first attempt without grace and secures 8CPI or more marks, he/she shall be placed in FIRST DIVISION WITH HONOURS and the candidates at first two top positions amongst First Div. with Honours only will be awarded medals viz. Gold and Silver respectively in order of merit.

**22. Award of Rank:**

On the basis of final year result, the top ten candidates in each branch shall be awarded rank according to their merit provided they pass all the examinations in first attempt.

**23. Grace Marks:**

23.1 A candidate may be awarded grace marks up to a maximum of total 15 marks, in maximum five subjects but not more than three marks in any subject including theory papers, practicals, project, seminar, industrial training and/ or aggregate marks in each academic year provided he/she can be declared to have passed the academic year by the award of these marks.

23.2 The grace marks shall not be added to the aggregate marks.

**24. Reports**

At the end of the course, in certain situations, the instructor-in-charge may report certain events/facts in suitable words, in place of grades discussed earlier. These reports are not to be construed as grades. The various reports listed below are elaborated in the subsequent clauses.

- Incomplete (I)
- Grade Awaited (GA)
- Withdrawn (W)
- Registration Cancelled (RC), Required to Register (RR), Discontinued from the Program (DP)
- Not Cleared (NC)

**Incomplete (I)**

If the instructor-in-charge finds a student having not fulfilled some of the requirements of a course before the final deadline for transmitting the grade, and he is satisfied that he is able to transmit some grade or a report with or without this particular fulfillment, but at his

discretion wishes to give the student an opportunity, he may, within the deadline, send a report 'I' (Incomplete) and also inform the student of the same. It shall be the responsibility of the student to contact the instructor-in-charge in time for replacement of the 'I' report within two weeks after the end of the semester (and within one week after the end of summer term, for a summer term course) which the instructor-in-charge will communicate whatever grade/report is possible for the situation. Whenever such relaxation is made, the Dean/Director will specify at his discretion, with the consent of the instructor-in-charge, the date by which 'I' report has to be converted.

The requirement envisaged in the above clause must be completed within the time allowed. If the extra time given goes beyond the registration in the next semester/term, registration in the next semester/term, is not possible. The student in such a situation should seek permission to stay away as per the above clause

**Grade Awaited (GA)**

There are many situations where operational and practical difficulties may cause a delay in the communication of a grade. Certain situations which are visualized in this connection are: (i) where a case of unfair means is pending; (ii) where a case of indiscipline is pending, and (iii) where the courses are being conducted at an off campus centre for IP students, where precise co-ordination between the Institute and these centers may not work in a timely manner. In these circumstances the Dean may authorize the instructor-in-charge to report GA (Grades Awaited).

A student may also get a "GA" report if he has, due to a genuine reason not been able to appear for an examination on the scheduled date and his request for make-up has been granted. In such a case, the student should ensure by the end of the term that either:

- He takes the make-up examination and convert the "GA" report onto a letter grade or
- He makes an application to the Dean/Director, through Instructor in Charge to convert "GA" report into a "NC" report.

Whenever the report GA appears in the grade sheet, a student will not be allowed to register for the subsequent semester, until the student takes steps to convert "GA" report into a letter grade or "NC" report.

**Withdrawn (W)**

A student may seek withdrawal from the course(s) in a semester for any of the following reasons:

- The student is unable to register for the course(s) for a genuine reason.
- The student is unable to cope up with the normal load and withdraws from the course(s) to reduce his academic load for a particular semester.

The request for withdrawal should be made to the Dean of the faculty, within two weeks of the commencement of the semester in case of (i) above and within the stipulated

duration as specified in the academic calendar in the case of (ii) In such cases the grade sheet/transcript of the student will indicate 'W' (Withdrawn against the course(s) from which the student has withdrawn his registration. The student will have to register for the course(s) when it is offered next and obtain a valid letter grade. If the course with 'W' report is a prerequisite course for another course, the registration to the course is possible only on obtaining a valid letter grade in the prerequisite course with 'W' report. If the withdrawal is made after the due date, the event will be reported as "RC" or "DP" as the case may be.

**Registration Cancelled (RC) or Required to Register (RR) or Discontinued from the Programme (DP)**

If a student's registration for a course has to be cancelled, this fact will be reported in the grade sheet as RC (Registration Cancelled). Registration would be cancelled and an RC is issued in the following cases:

- Cancellation is recommended as a part of disciplinary action for resorting to unfair means during examination or other unprofessional behaviour.
- Cancellation is recommended due to less than the minimum required percentage of attendance.
- Cancellation is recommended if a provisionally admitted student fails to submit the proof of necessary documents required for registration and/or does not satisfy the minimum eligibility requirements for the admission within the prescribed time limit.
- Cancellation is recommended when a student persistently and/or deliberately does not pay his dues.

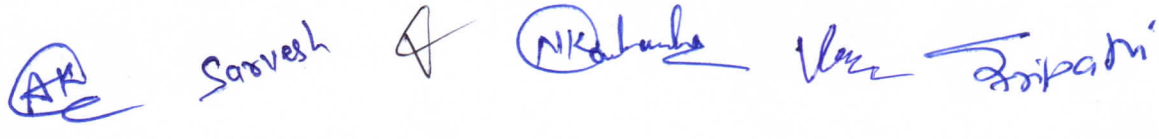
RC itself has many meanings and may be reported as the following:

- When it is clearly known that the student will be required to register again in the same course, the event will be reported as RRA (Required to Register Again).
- If RC amounts to discontinuation from the program it will be reported as DP (Discontinued from the Program)
- If the cancellation of registration is not reported either as RRA or as DP but is reported as RC, it does not necessarily mean that it is free from any constraint. The meaning of the constraint has to be construed from the context in which the RC is reported.

**Not Cleared (NC)**

If a student continued to remain registered in a course but gave the instructor inadequate opportunity to evaluate him by absenting himself from quizzes/tests/examinations/other components of evaluation, or by appearing in the same for the sake of appearance without applying himself to the task in hand or by submitting a blank script (answer book), these events would be reported as NC (Not Cleared).

Whenever a student gets a NC report in a course irrespective of whether he has a grade in the course or not earlier to this event, the following will govern further action. It is to be noted that a NC cannot be ignored, except under the situations described below:



- Whenever a student gets a NC report in a course which is in the compulsory package of his program, he is required to register again in the some course and get a valid grade therein.
- If a student has a NC report in a course taken as elective, he can either repeat the course to get a valid grade or ignore it to choose another course. However, a student must get valid grades in at least the prescribed number of electives in his program.
- Whenever a student's record has an NC in a course which remains unaccounted after a process of transfer has been completed it will not be possible for him to wipe out the NC report in such a course because this course is not a part of his program anymore; and he can graduate with this NC.
- If a student is reported NC in a project course, it will be administratively converted to RC by the Dean and future registration in project courses will be done only if the Dean is satisfied with the genuineness of the candidate's interest in the course.
- If a student is reported NC in Thesis or Seminar, he will be required to register in the same for one more semester. Operationally, this is to be achieved by requiring him to register once again in as many units of Thesis or Seminar in which he had registered when he was awarded NC. If these two courses get separated due to NC in one of them, there is no need to register in the other.

**25. Grade Sheet**

A student's grades, reports, CGPA, etc., at the end of every semester/term will be recorded on a grade sheet, a copy of which will be issued to him. The grade sheet will be withheld when a student has not paid his dues or when there is a case of breach of discipline or unfair means pending against him.

While registration with approval of appropriate authority consistent with these regulations is a token of permission to pursue studies, the grade sheet is a complete record of the outcome of what was intended in the original/amended/ revised registration. The various grades and reports discussed above would be appropriately used to tally the grade sheet with original/ amended/revised registration. It would be evident that this tally between what was registered for and what was obtained in terms of grades and reports will apply to all courses except the course, which was originally registered for, but subsequently replaced by another course through substitution.

The tally is made on a course basis at the end of semester/term to determine which of the courses have been cleared. A course is deemed to have been cleared if the student obtains a grade in the course. However, mere clearing of the prescribed courses does not tantamount to fulfilling the requirements of graduation.

While all the grades secured and other pertinent information for semesters are given in a grade sheet, the chronologically organized information from the grade sheets of a student with the necessary explanation constitutes his transcript which is issued at the time he leaves the Institute or at an intermediate point on request.

**26. Scrutiny and Revaluation:**

26.1Scrutiny shall be allowed in three theory papers.

26.2Revaluation of theory/practical papers is not permitted.

**27. Unfair means:**

Cases of unfair means shall be dealt as per the rules of the University and The U.P. Public Examination (Prevention of Unfair means) Act if any in prevalence.

**28. Award of Sessional Marks:**

Sessional marks for theory subjects, practicals and project shall be awarded as will be prescribed and at present the break-up of sessional marks shall be as follows:

**Evaluation Scheme:**

- **Course without practical components**

For Continuous Evaluation (CE) is such as: 20 Marks

1. Attendance: 5 Marks
2. Assignments/Quiz / Seminar/Term paper /Project :15Marks

MTE - Mid Term Examination: 20 Marks

a. First Mid Term Examination: 10 marks
b. Second Mid Term Examination: 10 marks

ETE - End Term Examination: 60 Marks

- **Course with practical components only**

For Continuous Evaluation (CE) is such as: 30 Marks
Conduct / Perform/Execution /Practical File/ Viva-Voice

MTE - Mid Term Examination: 20 Marks

a. First Mid Term Examination: 10 marks
b. Second Mid Term Examination: 10 marks

ETE - End Term Examination: 50 Marks

Make-up test may be held only for those students who could not appear in any one of mid-term class tests due to genuine reasons for which the prior permission from the Head of Department was taken. Make up test shall ordinarily be held about two weeks before the semester examination. The syllabus for the make-up test shall be the whole syllabus covered by the subject teacher up to that time.

**29. Award of Seminar, Industrial Training, Educational Tour Marks at Department level:**

29.1 The marks of Seminar, Industrial Training, Educational tour marks shall be awarded on the following basis:

| Criteria | Internal | External | |
|---|---|---|---|
| Project Report | 30 | - | |
| Viva Voce | 20 | 50 | |
| **Total** | 50 | 50 | 100 |
| **Criteria** | **Internal** | **External** | |
| Project Report | 30 | - | |
| Viva Voce | 20 | 50 | |
| **Total** | 50 | 50 | 100 |

29.2 The marks in Seminar, Industrial Training and Educational Tour shall be awarded by a committee consisting of following members:

(i) Head of the Department or his/her nominee.

(ii) Concerned Officer – Incharge.

(iii) Senior Faculty Member of the department nominated by the Head of Department.

**30. Cancellation of Admission:**

The admission of a student at any stage of study shall be cancelled if:

(i) He / She is not found qualified as per UGC/AICTE / State Government norms and guidelines or the eligibility criteria prescribed by the University.

or

(ii) He / She is found unable to complete the course within the stipulated time as prescribed in clause 2.vi

or

(iii) He / She are found involved in creating indiscipline in the FET or in the University.

31. The Academic Council shall have the power to relax any provision provided in the ordinance in any specific matter/situation subject to the approval of Executive Council of the University & such decision(s) shall be reported to the Chancellor of the University.

# Assessment Criteria

All courses of B. Tech. shall be evaluated by 100 marks. The subject shall be evaluated by 100 marks, out of which 40 marks shall be internal assessment and 60 marks for external assessment. Internal Assessment for 40 marks shall be as per the criteria given below:

| Criteria | Marks |
|---|---|
| First Mid Term Examination | 10 |
| Second Mid Term Examination | 10 |
| Assignments/ Quiz / Seminar/Term paper /Project | 15 |
| Attendance | 5 |
| **Total Internal Assessment** | **40** |

Marks for Attendance shall be awarded as per the criteria given below:

| Attendance Percentage | Marks |
|---|---|
| 91% to 100% | 5 |
| 81% to 90% | 4 |
| 71% to 80% | 3 |
| 61% to 70% | 2 |
| 51% to 60% | 1 |

All students should have a minimum of 75% attendance in all subjects, in order to appear in the end term examination / viva voce. The 75% criterion includes all leaves of absence – whether approved or not approved.

Students failing to obtain 75% attendance shall be required to repeat the course in the subsequent year, along with the next batch, to make up for the shortage of attendance.

Under extraordinary circumstances, a student with attendance below 75% shall be allowed to appear in the term exams / viva voce. This will be at the discretion of the Vice Chancellor of the University. Circumstances when such leniency shall be shown include:

a. Death of a blood relative – father, mother, grandfather, grandmother, brother or sister.

b. Extreme cases of health adversity requiring hospitalization of the student.

In such cases, the student shall be required to give a written application to the Vice Chancellor of the University, along with appropriate proof. In case of death of blood relative, an application from the parent(s) shall be considered.

***All faculty members shall maintain appropriate records and make them available to the University's examination centre at the end of the semester.***

**Credit system**

The B. Tech. Program has a total of 200 credits and students are required to complete all courses. On completion of all courses, the students shall earn 200 credits and would be eligible for award of the B. Tech. Degree.

***Seminar (B. Tech.)***

Each student shall select on one recent or hot topic for seminar. The students are required to prepare three copies of their seminar reports of which two have to be submitted to the Faculty. The reports shall be submitted within two weeks of commencement of the seventh semester. The report shall carry 30 marks, out of which 50 shall be evaluated by an External Examiner appointed by the University while the remaining 20 marks shall be evaluated by a Board of Internal Examiners (minimum two) appointed by the Dean, Faculty of Engineering & Technology. The Seminar shall be evaluated in the following manner:

| Criteria | Internal | External | |
|---|---|---|---|
| Project Report | 30 | - | |
| Viva Voce | 20 | 50 | |
| **Total** | 50 | 50 | 100 |

External evaluation will be conducted during seventh end semester practical exam.

***Summer Industrial Training (B. Tech.)***

Each student shall undergo practical training of six to eight weeks during the vacations after the sixth semester. The students are required to prepare three copies of their project reports of which two have to be submitted to the Faculty. The reports shall be submitted within two weeks of commencement of the seventh semester. The report shall carry 30 marks, out of which 50 shall

be evaluated by an External Examiner appointed by the University while the remaining 20 marks shall be evaluated by a Board of Internal Examiners (minimum two) appointed by the Dean, Faculty of Engineering & Technology. The summer training Project shall be evaluated in the following manner:

| **Criteria** | **Internal** | **External** | |
|---|---|---|---|
| Project Report | 30 | - | |
| Viva Voce | 20 | 50 | |
| **Total** | 50 | 50 | 100 |

External evaluation will be conducted during seventh end semester practical exam.

***Final Year Mini Project Report (B. Tech. 7th semester)***

During the seventh semester, each student shall undertake a project to be pursued by him/her under the supervision of a faculty guide/supervisor. The guide/ supervisor shall be appointed by the Dean, Faculty of Engineering & Technology. Minimum four copies of project report along with one soft copy in a CD shall be submitted at least two weeks prior to the commencement of the 7th End Term Examination. The mini project report shall carry 50 marks, out of which 25 shall be evaluated by an External Examiner appointed by the University while the remaining 25 marks shall be evaluated by a Internal Examiner appointed by the Dean, Faculty of Engineering & Technology. The mini project report shall be evaluated in the following manner:

| **Criteria** | **Internal** | **External** | |
|---|---|---|---|
| Project Report | 30 | - | |
| Viva Voce | 20 | 50 | |
| **Total** | 50 | 50 | 100 |

***Final Year Major Project Report (B. Tech.)***

The final year major project may be extension of seventh semester mini project. During the eight semesters, each student shall undertake a project to be pursued by him / her under the supervision of a guide/supervisor. The guide/supervisor shall be appointed by the Dean, Faculty

of Engineering & Technology. Minimum four copies of project report along with one soft copy in a CD shall be submitted at least two weeks prior to the commencement of the 8th End Term Examination. The major project report of 650 marks and shall be evaluated by a Board of Internal & External Examiners. The Board shall consist of a minimum of two Internal Faculty Members supervisor shall be appointed by the Dean, Faculty of Engineering & Technology and External Examiner shall be appointed by the University. The major project report shall be evaluated in the following manner:

| **Criteria** | **Internal** | **External** | |
|---|---|---|---|
| Project Report | 150 | 100 | |
| Viva Voce | 150 | 300 | |
| **Total** | 300 | 400 | 700 |

**Note:**

From 2nd year onwards, students will take up **BHU-001 (Human Values & Professional Ethics) and Disaster management** as an audit subject. The student shall have to clear this audit subject with minimum E grade during 2nd Year to 4th year but its grade shall not be considered in SGPA/CPI.

However, a student may opt more than two audit subject (with approval of Dean) for which shall not be compulsion to clear the subject, and the grade of these subjects shall not be considered in SGPA/ CPI.

**Calculation of Grade Point and Grade Point Average**

Relative grading shall be adopted at the Faculty of Engineering & Technology, Rama University. The list of letter grades, the grade points associated with them are given below:

| Grade | Grade Point |
|---|---|
| **$A^+$** | **10** |
| **A** | **9** |
| **B** | **8** |
| **C** | **7** |

| | |
|---|---|
| **D** | **6** |
| **E** | **5** |
| **F** | **4** |

In order to arrive at alphabet grades, the total marks in a particular course for all the students pursuing the course are tabulated in the descending order (equivalently a histogram).

The performance of the course is analysed in terms of the highest, lowest and the average marks and the dividing lines between the clusters of students. Gaps and dips between the clusters and the nature of the clusters guide in drawing the dividing lines between the grades. In a normal class of large size, the C grade usually covers the average performance. This is, however not a hard and fast rule and exceptions may arise in case of small classes, skewed histogram etc. Borderline cases may be considered individually on the basis of regularity and the attendance, class room discussions, progressive good performance throughout the semester, etc.

**Calculation System of Semester Grade Point Average:**

- Computation of the Semester Grade Point Average (SGPA) and Cumulative Performance Index (CPI):

  The SGPA is an indicator of the overall academic performance of a student in all the courses he/she has registered during a given semester. It is computed as follows: If the grades awarded to a student are $G_1$, $G_2$ etc in courses with corresponding credits $C_1$, $C_2$ etc, the SGPA is given by:

$$SGPA = \frac{C_1 \times G_1 + C_2 \times G_2 + \cdots + C_n \times G_n}{C_1 + C_2 + \cdots + C_n}$$

- The CPI indicates the overall academic performance of a student in all the courses registered upto and including the latest completed semester/summer term. It is computed in the same manner as the SGPA, considering all the courses (say, n) and is given by:

$$CPI = \frac{\sum_{i=1}^{n} C_i \times G_i}{\sum_{i=1}^{n} C_i}$$

- Percentage conversion of CPI:

$$\boldsymbol{Percentage\ of\ marks\ =\ CPI\ \times\ 10}$$

- Students should get a minimum grade E in each subject with 5CPI to clear the semester.

Sarvesh

- CPI conversion

| | |
|---|---|
| **≥8 CPI** | **I division with honours** |
| **≥6 CPI** | **I division** |
| **≥5 CPI** | **II division** |
| **<5 CPI** | **Fail** |

- In case a student gets a F grade in more than one subject, he / she has to repeat one or more of the subjects by registering for "Guided Study" in that semester. Registration for Guided Study shall be made on the payment of Rs. 500 per subject as well as registering for the examination with a payment of Rs. 1000 per subject.
- If the students get F grade in six theory subjects in an academic session, then he/ she will repeat the year.
- Whenever a student is permitted to repeat, the new grade with star will replace the old grade and computation of the SGPA will done by considering the new grade.
- B. Tech. Course should be completed within seven years. If a student does not complete the B. Tech. program in Seven years, he / she will have to appear in the program as a fresh.

# Rama University Uttar Pradesh, Kanpur

## Faculty of Engineering & Technology

### Course Detail and Evaluation Scheme

B. Tech. First Year (Computer Science & Engineering)

(Effective from the session 2014-15)

**SEMESTER-I**

| S. N. | Subject Code | Name of the Subject | Periods | | | Evaluation Scheme | | | Total Marks | Credit |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | L | T | P | CE | MTE | ETE | | |
| **Theory Subject** | | | | | | | | | | |
| 1 | BAS -103 | Engineering Mathematics-I | 3 | 1 | 0 | 20 | 20 | 60 | 100 | 4 |
| 2 | BEC-101 / BCS -101 | Basic Electronics Engineering / Computer System and Programming in C | 3 | 1 | 0 | 20 | 20 | 60 | 100 | 4 |
| 3 | BAS-102/ BAS-104 | Engineering Chemistry/ Professional Communication | 3 | 1 | 0 | 20 | 20 | 60 | 100 | 4 |
| 4 | BEE-101/ BME-102 | Basic Electrical Engineering / Engineering Mechanics | 3 | 1 | 0 | 20 | 20 | 60 | 100 | 4 |
| 5 | BAS-101 | Engineering Physics-I | 3 | 0 | 0 | 20 | 20 | 60 | 100 | 4 |
| 6 | BME-101/ BAS-105 | Basic Manufacturing Processes/ Environment & Ecology | 3 | 0 | 0 | 20 | 20 | 60 | 100 | 4 |
| **Practical / Design / Drawing** | | | | | | | | | | |
| 7 | BAS-152/ BAS-154 | Engineering Chemistry Lab/ Professional Communication | 0 | 0 | 2 | 30 | 20 | 50 | 100 | 1 |
| 8 | BEE-151/ BME-152 | Basic Electrical & Electronics Engineering Lab/ Engineering Mechanics Lab | 0 | 0 | 2 | 30 | 20 | 50 | 100 | 1 |
| 9 | BWS-151/ BCE-151 | Workshop Practice/ Basic Engineering Drawing | 0 | 0 | 3 | 30 | 20 | 50 | 100 | 1 |
| 10 | BAS-151/ BCS-151 | Engineering Physics Lab/ Computer Programming Lab | 0 | 0 | 2 | 30 | 20 | 50 | 100 | 1 |
| | | **TOTAL** | **18** | **4** | **9** | **240** | **200** | **560** | **1000** | **28** |

L-Lecture, T-Tutorial, P- Practical, CE- Continuous Evaluation, MTE-Mid Term Examination, ETE-End Term Examination

**Evaluation Scheme:**

- **Course without practical components**

For Continuous Evaluation (CE) is such as: 20 Marks

1. Attendance: 5 Marks
2. Assignments/ Quiz / Seminar/Term paper /Project :15Marks

MTE - Mid Term Examination: 20 Marks

a. First Mid Term Examination: 10 marks
b. Second Mid Term Examination: 10 marks

ETE - End Term Examination: 60 Marks

- **Course with practical components only**

For Continuous Evaluation (CE) is such as: 30 Marks

Conduct / Perform/Execution /Practical File/ Viva-Voice

MTE - Mid Term Examination: 20 Marks
a. First Mid Term Examination: 10 marks
b. Second Mid Term Examination: 10 marks

ETE - End Term Examination: 50 Marks

**Chairperson**

Signature: .....

Name : Dr. Vivek Srivastava

Date :

**Internal Members**

Signature:

1..... 2.....

Name: Mr. Sarvesh Kumar Mr. Somendra Tripathi

Date:

Signature: 3.....

Name: Ms. Rati Bajpay

Date:

**External Members**

Signature: 1.....

2.....

Name: Dr. Amod Tiwari Mr. Vishal Nagar

Date:

# Rama University Uttar Pradesh, Kanpur

## Faculty of Engineering & Technology

### Course Detail and Evaluation Scheme

B. Tech. First Year (Computer Science & Engineering)

(Effective from the session 2014-15)

**SEMESTER-II**

| S. N. | Subject Code | Name of the Subject | Periods | | | Evaluation Scheme | | | Total Marks | Credit |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | L | T | P | CE | MTE | ETE | | |
| **Theory Subject** | | | | | | | | | | |
| 1 | BAS -203 | Engineering Mathematics-II | 3 | 1 | 0 | 20 | 20 | 60 | 100 | 4 |
| 2 | BEC-201/ BCS -201 | Basic Electronics Engineering/ Computer System and Programming in C | 3 | 1 | 0 | 20 | 20 | 60 | 100 | 4 |
| 3 | BAS-202/ BAS-204 | Engineering Chemistry/ Professional Communication | 3 | 1 | 0 | 20 | 20 | 60 | 100 | 4 |
| 4 | BEE-201/ BME-202 | Basic Electrical Engineering / Engineering Mechanics | 3 | 1 | 0 | 20 | 20 | 60 | 100 | 4 |
| 5 | BAS-201 | Engineering Physics-II | 3 | 0 | 0 | 20 | 20 | 60 | 100 | 4 |
| 6 | BME-201/ BAS-205 | Basic Manufacturing Processes/ Environment & Ecology | 3 | 0 | 0 | 20 | 20 | 60 | 100 | 4 |
| **Practical / Design / Drawing** | | | | | | | | | | |
| 7 | BAS-252/ BAS-254 | Engineering Chemistry Lab/ Professional Communication Lab | 0 | 0 | 2 | 30 | 20 | 50 | 100 | 1 |
| 8 | BEE-251/ BME-252 | Basic Electrical & Electronics Engineering Lab/ Engineering Mechanics Lab | 0 | 0 | 2 | 30 | 20 | 50 | 100 | 1 |
| 9 | BWS-251/ BCE-251 | Workshop Practice/ Basic Engineering Drawing | 0 | 0 | 3 | 30 | 20 | 50 | 100 | 1 |
| 10 | BAS-251/ BCS-251 | Engineering Physics Lab/ Computer Programming Lab | 0 | 0 | 2 | 30 | 20 | 50 | 100 | 1 |
| | | **TOTAL** | **18** | **4** | **9** | **240** | **200** | **560** | **1000** | **28** |

L-Lecture, T-Tutorial, P- Practical, CE- Continuous Evaluation, MTE-Mid Term Examination, ETE-End Term Examination **Evaluation Scheme:**

- **Course without practical components**

For Continuous Evaluation (CE) is such as: 20 Marks

3. Attendance: 5 Marks
4. Assignments/ Quiz / Seminar/Term paper /Project :15Marks

MTE - Mid Term Examination: 20 Marks

a. First Mid Term Examination: 10 marks
b. Second Mid Term Examination: 10 marks

ETE - End Term Examination: 60 Marks

- **Course with practical components only**

For Continuous Evaluation (CE) is such as: 30 Marks

Conduct / Perform/Execution /Practical File/ Viva-Voice

MTE - Mid Term Examination: 20 Marks

a. First Mid Term Examination: 10 marks
b. Second Mid Term Examination: 10 marks

# Rama University Uttar Pradesh, Kanpur
## Faculty of Engineering & Technology

ETE - End Term Examination: 50 Marks

**Chairperson**

Signature: .....

Name : Dr. Vivek Srivastava

Date :

**Internal Members**

Signature:

1..... 2.....

Name: Mr. Sarvesh Kumar Mr. Somendra Tripathi

Date:

Signature: 3.....

Name: Ms. Rati Bajpay

Date:

**External Members**

Signature:

2..... 1.....

Name: Dr. Amod Tiwari Mr. Vishal Nagar

Date:

# Rama University Uttar Pradesh, Kanpur

## Faculty of Engineering & Technology

**Course Detail and Evaluation Scheme**

B. Tech. Second Year (Computer Science & Engineering)

(Effective from the session 2015-16)

**SEMESTER-III**

| S.N. | Subject Code | Subject Name | Period | | | Evaluation Scheme | | | Total Marks | Credit |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | L | T | P | CE | MTE | ETE | | |
| **Theory Subjects** | | | | | | | | | | |
| 1 | BEC-308 | Digital Logic Design | 3 | 1 | 0 | 20 | 20 | 60 | 100 | 4 |
| 2 | BAS-301 | Mathematics-III | 3 | 1 | 0 | 20 | 20 | 60 | 100 | 4 |
| 3 | BCS-301 | Data Structures Using C | 3 | 1 | 0 | 20 | 20 | 60 | 100 | 4 |
| 4 | BCS-302 | Discrete Mathematical Structures | 3 | 1 | 0 | 20 | 20 | 60 | 100 | 4 |
| 5 | BCS-303 | Web Technology | 3 | 1 | 0 | 20 | 20 | 60 | 100 | 4 |
| **Practicals / Project** | | | | | | | | | | |
| 6 | BCS-351 | Logic Design Lab | 0 | 0 | 2 | 30 | 20 | 50 | 100 | 1 |
| 7 | BCS-353 | Data Structures Lab | 0 | 0 | 3 | 30 | 20 | 50 | 100 | 1 |
| 8 | BEC-358 | Web Technology Lab | 0 | 0 | 2 | 30 | 20 | 50 | 100 | 1 |
| 9 | BCS-352 | Numerical Techniques Lab | 0 | 0 | 2 | 30 | 20 | 50 | 100 | 1 |
| | | **Total** | **15** | **5** | **9** | **220** | **180** | **500** | **900** | **24** |

BHU-001 Human Values & Professional Ethics (Audit Course)- Student can clear from 2nd year to final year

L-Lecture, T-Tutorial, P- Practical, CE- Continuous Evaluation, MTE-Mid Term Examination, ETE-End Term Examination

## Evaluation Scheme:

- **Course without practical components**

For Continuous Evaluation (CE) is such as: 20 Marks

- Attendance: 5 Marks
- Assignments/Quiz / Seminar/Term paper /Project :15Marks

MTE - Mid Term Examination: 20 Marks

- First Mid Term Examination: 10 marks
- Second Mid Term Examination: 10 marks

ETE - End Term Examination: 60 Marks

- **Course with practical components only**

For Continuous Evaluation (CE) is such as: 30 Marks

Conduct / Perform/Execution /Practical File/ Viva-Voice

MTE - Mid Term Examination: 20 Marks

- First Mid Term Examination: 10 marks
- Second Mid Term Examination: 10 marks

ETE - End Term Examination: 50 Marks

**Chairperson**

Signature: .....

Name : Dr. Vivek Srivastava

Date :

**Internal Members**

Signature:

1..... 2.....

Name: Mr. Sarvesh Kumar Mr. Somendra Tripathi

Date:

Signature: 3.....

Name: Ms. Neelu Kushwaha

Date:

**External Members**

Signature: 1.....

2.....

Name: Dr. Amod Tiwari Mr. Vishal Nagar

Date:

# Rama University Uttar Pradesh, Kanpur

## Faculty of Engineering & Technology

B. Tech. Second Year (Computer Science & Engineering)

(Effective from the session 2015-16)

**SEMESTER-IV**

| S.N. | Subject Code | Subject Name | Period | | | Evaluation Scheme | | | Total Marks | Credit |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | L | T | P | CE | MTE | ETE | | |
| **Theory Subjects** | | | | | | | | | | |
| 1 | BCS -041 To BCS -045 | Departmental Elective-I | 3 | 1 | 0 | 20 | 20 | 60 | 100 | 4 |
| 2 | BCS -401 | Software Engineering | 3 | 1 | 0 | 20 | 20 | 60 | 100 | 4 |
| 3 | BCS -402 | Advance Computer Organization & Architecture | 3 | 1 | 0 | 20 | 20 | 60 | 100 | 4 |
| 4 | BCS -403 | Database Management Systems | 3 | 1 | 0 | 20 | 20 | 60 | 100 | 4 |
| 5 | BCS -404 | Theory of Automata & Formal Languages | 3 | 1 | 0 | 20 | 20 | 60 | 100 | 4 |
| **Practicals / Project** | | | | | | | | | | |
| 6 | BCS -451 | Software Engineering Lab | 0 | 0 | 2 | 30 | 20 | 50 | 100 | 1 |
| 7 | BCS -452 | Computer Organization Lab | 0 | 0 | 2 | 30 | 20 | 50 | 100 | 1 |
| 8 | BCS -453 | DBMS Lab | 0 | 0 | 3 | 30 | 20 | 50 | 100 | 1 |
| 9 | BCS-454 | Principal of Programming Language | 0 | 0 | 2 | 30 | 20 | 50 | 100 | 1 |
| | | **Total** | **15** | **4** | **9** | **220** | **180** | **500** | **900** | **24** |

BHU-001 Human Values & Professional Ethics (Audit Course) - Student can clear from 2nd year to final year

L-Lecture, T-Tutorial, P- Practical, CE- Continuous Evaluation, MTE-Mid Term Examination, ETE-End Term Examination.

**Evaluation Scheme:**

- **Course without practical component**

For Continuous Evaluation (CE) is such as: 20 Marks

Attendance: 5 Marks

Assignments/Quiz / Seminar/Term paper /Project :15Marks

MTE - Mid Term Examination: 20 Marks

First Mid Term Examination: 10 marks

Second Mid Term Examination: 10 marks

ETE - End Term Examination: 60 Marks

- **Course with practical components only**

For Continuous Evaluation (CE) is such as: 30 Marks

Conduct / Perform/Execution /Practical File/ Viva-Voice

MTE - Mid Term Examination: 20 Marks

First Mid Term Examination: 10 marks

Second Mid Term Examination: 10 marks

ETE - End Term Examination: 50 Marks

**Chairperson**

Signature: .....

Name : Dr. Vivek Srivastava

Date :

**Internal Members**

Signature:

1..... 2.....

Name: Mr. Sarvesh Kumar Mr. Somendra Tripathi

Date:

Signature: 3.....

Name: Ms. Neelu Kushwaha

Date:

**External Members**

Signature:

2..... 1.....

Name: Dr. Amod Tiwari Mr. Vishal Nagar

Date:

# Rama University Uttar Pradesh, Kanpur

## Faculty of Engineering & Technology

### Course Detail and Evaluation Scheme

B. Tech. Third Year (Computer Science & Engineering)

(Effective from the session 2016-17)

**SEMESTER-V**

| S.N. | Subject Code | Subject Name | Period | | | Evaluation Scheme | | | Total Marks | Credit |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | L | T | P | CE | MTE | ETE | | |
| **Theory Subjects** | | | | | | | | | | |
| 1 | BCS -051 TO BCS -055 | Departmental Elective-II | 3 | 1 | 0 | 20 | 20 | 60 | 100 | 4 |
| 2 | BCS-501 | Operating System | 3 | 1 | 0 | 20 | 20 | 60 | 100 | 4 |
| 3 | BCS-502 | Design and Analysis of Algorithms | 3 | 1 | 0 | 20 | 20 | 60 | 100 | 4 |
| 4 | BCS-503 | Object Oriented Techniques | 3 | 1 | 0 | 20 | 20 | 60 | 100 | 4 |
| 5 | BCS-504 | Computer Graphics & Multimedia | 3 | 1 | 0 | 20 | 20 | 60 | 100 | 4 |
| **Practicals / Project** | | | | | | | | | | |
| 6 | BCS -551 | Operating System Lab | 0 | 0 | 2 | 30 | 20 | 50 | 100 | 1 |
| 7 | BCS -552 | Algorithms Lab | 0 | 0 | 3 | 30 | 20 | 50 | 100 | 1 |
| 8 | BCS -553 | Object Oriented Techniques Lab | 0 | 0 | 2 | 30 | 20 | 50 | 100 | 1 |
| 9 | BCS -554 | Computer Graphics & Multimedia Lab | 0 | 0 | 2 | 30 | 20 | 50 | 100 | 1 |
| | | **Total** | **15** | **4** | **9** | **220** | **180** | **500** | **900** | **24** |

BHU-001 Human Values & Professional Ethics (Audit Course)- Student can clear from 2nd year to final year

L-Lecture, T-Tutorial, P- Practical, CE- Continuous Evaluation, MTE-Mid Term Examination, ETE-End Term Examination

**Evaluation Scheme:**

- **Course without practical components**

For Continuous Evaluation (CE) is such as: 20 Marks

- Attendance: 5 Marks
- Assignments/Quiz / Seminar/Term paper /Project :15Marks

MTE - Mid Term Examination: 20 Marks

a. First Mid Term Examination: 10 marks
b. Second Mid Term Examination: 10 marks

ETE - End Term Examination: 60 Marks

- **Course with practical components only**

For Continuous Evaluation (CE) is such as: 30 Marks

Conduct / Perform/Execution /Practical File/ Viva-Voice

# Rama University Uttar Pradesh, Kanpur

## Faculty of Engineering & Technology

**Course Detail and Evaluation Scheme**

B. Tech. Third Year (Computer Science & Engineering)

(Effective from the session 2016-17)

**SEMESTER-V**

| S.N. | Subject Code | Subject Name | Period | | | Evaluation Scheme | | | Total Marks | Credit |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | L | T | P | CE | MTE | ETE | | |
| **Theory Subjects** | | | | | | | | | | |
| 1 | BCS -051 TO BCS -053 | Departmental Elective-II | 3 | 1 | 0 | 20 | 20 | 60 | 100 | 4 |
| 2 | BCS-501 | Operating System | 3 | 1 | 0 | 20 | 20 | 60 | 100 | 4 |
| 3 | BCS-502 | Design and Analysis of Algorithms | 3 | 1 | 0 | 20 | 20 | 60 | 100 | 4 |
| 4 | BCS-503 | Object Oriented Techniques | 3 | 1 | 0 | 20 | 20 | 60 | 100 | 4 |
| 5 | BCS-504 | Computer Graphics & Multimedia | 3 | 1 | 0 | 20 | 20 | 60 | 100 | 4 |
| **Practicals / Project** | | | | | | | | | | |
| 6 | BCS -551 | Operating System Lab | 0 | 0 | 2 | 30 | 20 | 50 | 100 | 1 |
| 7 | BCS -552 | Algorithms Lab | 0 | 0 | 3 | 30 | 20 | 50 | 100 | 1 |
| 8 | BCS -553 | Object Oriented Techniques Lab | 0 | 0 | 2 | 30 | 20 | 50 | 100 | 1 |
| 9 | BCS -554 | Computer Graphics & Multimedia Lab | 0 | 0 | 2 | 30 | 20 | 50 | 100 | 1 |
| | | **Total** | **15** | **4** | **9** | **220** | **180** | **500** | **900** | **24** |

BHU-001 Human Values & Professional Ethics (Audit Course)- Student can clear from 2nd year to final year

L-Lecture, T-Tutorial, P- Practical, CE- Continuous Evaluation, MTE-Mid Term Examination, ETE-End Term Examination

**Evaluation Scheme:**

- **Course without practical components**

For Continuous Evaluation (CE) is such as: 20 Marks

- Attendance: 5 Marks
- Assignments/Quiz / Seminar/Term paper /Project :15Marks

CANCEL

MTE - Mid Term Examination: 20 Marks

a. First Mid Term Examination: 10 marks
b. Second Mid Term Examination: 10 marks

ETE - End Term Examination: 60 Marks

- **Course with practical components only**

For Continuous Evaluation (CE) is such as: 30 Marks

Conduct / Perform/Execution /Practical File/ Viva-Voice

MTE - Mid Term Examination: 20 Marks

a. First Mid Term Examination: 10 marks
b. Second Mid Term Examination: 10 marks

ETE - End Term Examination: 50 Marks

**Chairperson**

Signature: .....

Name : Dr. Vivek Srivastava

Date :

**Internal Members**

Signature:

1..... 2.....

Name: Mr. Sarvesh Kumar Mr. Somendra Tripathi

Date:

Signature: 3.....

Name: Ms. Neelu Kushwaha

Date:

**External Members**

Signature:

1..... 2.....

Name: Dr. Amod Tiwari Mr. Vishal Nagar

Date:

# Rama University Uttar Pradesh, Kanpur

## Faculty of Engineering & Technology

**Course Detail and Evaluation Scheme**

B. Tech. Third Year (Computer Science & Engineering)

(Effective from the session 2016-17)

**SEMESTER-VI**

| S.N. | Subject Code | Subject Name | Period | | | Evaluation Scheme | | | Total Marks | Credit |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | L | T | P | CE | MTE | ETE | | |
| **Theory Subjects** | | | | | | | | | | |
| 1 | BHU-601 | Engineering Economics & Industrial Management | 3 | 1 | 0 | 20 | 20 | 60 | 100 | 4 |
| 2 | BCS-061 TO BCS-065 | Departmental Elective-III | 3 | 1 | 0 | 20 | 20 | 60 | 100 | 4 |
| 3 | BCS-601 | Data Mining & Data Warehousing | 3 | 1 | 0 | 20 | 20 | 60 | 100 | 4 |
| 4 | BCS-602 | Computer Network | 3 | 1 | 0 | 20 | 20 | 60 | 100 | 4 |
| 5 | BCS-603 | Compiler Design | 3 | 1 | 0 | 20 | 20 | 60 | 100 | 4 |
| **Practicals / Project** | | | | | | | | | | |
| 6 | BCS-651 | Data Mining & Data Warehousing Lab | 0 | 0 | 2 | 30 | 20 | 50 | 100 | 1 |
| 7 | BCS-652 | Computer Network Lab | 0 | 0 | 2 | 30 | 20 | 50 | 100 | 1 |
| 8 | BCS-653 | Compiler Lab | 0 | 0 | 3 | 30 | 20 | 50 | 100 | 1 |
| 9 | BCS-655 | .Net Lab | 0 | 0 | 2 | 30 | 20 | 50 | 100 | 1 |
| | | **Total** | **15** | **4** | **9** | **220** | **180** | **500** | **900** | **24** |

**BHU-001** Human Values & Professional Ethics (Audit Course)- Student can clear from 2nd year to final year

L-Lecture, T-Tutorial, P- Practical, CE- Continuous Evaluation, MTE-Mid Term Examination, ETE-End Term Examination

**Evaluation Scheme:**

- **Course without practical components**

For Continuous Evaluation (CE) is such as: 20 Marks

- Attendance: 5 Marks
- Assignments/Quiz / Seminar/Term paper /Project :15Marks

MTE - Mid Term Examination: 20 Marks

a. First Mid Term Examination: 10 marks
b. Second Mid Term Examination: 10 marks

ETE - End Term Examination: 60 Marks

- **Course with practical components only**

For Continuous Evaluation (CE) is such as: 30 Marks

Conduct / Perform/Execution /Practical File/ Viva-Voice

MTE - Mid Term Examination: 20 Marks

a. First Mid Term Examination: 10 marks
b. Second Mid Term Examination: 10 marks

ETE - End Term Examination: 50 Marks

**Chairperson**

Signature: .....

Name : Dr. Vivek Srivastava

Date :

**Internal Members**

Signature:

1..... 2.....

Name: Mr. Sarvesh Kumar Mr. Somendra Tripathi

Date:

Signature: 3.....

Name: Ms. Neelu Kushwaha

Date:

**External Members**

Signature:

1..... 2.....

Name: Dr. Amod Tiwari Mr. Vishal Nagar

Date:

# Rama University Uttar Pradesh, Kanpur

## Faculty of Engineering & Technology

**Course Detail and Evaluation Scheme**

B. Tech. Fourth Year (Computer Science & Engineering)

(Effective from the session 2017-18)

**SEMESTER-VII**

| S.N. | Subject Code | Subject Name | Period | | | Evaluation Scheme | | | Total Marks | Credit |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | L | T | P | CE | MTE | ETE | | |
| **Theory Subjects** | | | | | | | | | | |
| 1 | BCS-701 | Distributed Systems | 3 | 1 | 0 | 20 | 20 | 60 | 100 | 4 |
| 2 | BCS-702 | Digital Image Processing | 3 | 1 | 0 | 20 | 20 | 60 | 100 | 4 |
| 3 | BCS-703 | Artificial Intelligence | 3 | 1 | 0 | 20 | 20 | 60 | 100 | 4 |
| 4 | BCS-071 TO BCS-074 | Departmental Elective-IV | 3 | 1 | 0 | 20 | 20 | 60 | 100 | 4 |
| 5 | BOE-071 TO BOE-074 | Open Elective | 3 | 1 | 0 | 20 | 20 | 60 | 100 | 4 |
| **Practicals / Project** | | | | | | | | | | |
| 6 | BCS-751 | Distributed Systems Lab | 0 | 0 | 2 | 30 | 20 | 50 | 100 | 1 |
| 7 | BCS-752 | Mini Project | 0 | 0 | 2 | 30 | 20 | 50 | 100 | 1 |
| 8 | BCS-753 | Seminar | 0 | 0 | 3 | 30 | 20 | 50 | 100 | 1 |
| 9 | BCS-754 | Industrial Training Viva-Voce | 0 | 0 | 2 | 30 | 20 | 50 | 100 | 1 |
| | | **Total** | **15** | **4** | **9** | **220** | **180** | **500** | **900** | **24** |

**BHU-001** Human Values & Professional Ethics (Audit Course)- Student can clear from 2nd year to final year

L-Lecture, T-Tutorial, P- Practical, CE- Continuous Evaluation, MTE-Mid Term Examination, ETE-End Term Examination

**Evaluation Scheme:**

- **Course without practical components**

For Continuous Evaluation (CE) is such as: 20 Marks

- Attendance: 5 Marks
- Assignments/Quiz / Seminar/Term paper /Project :15Marks

MTE - Mid Term Examination: 20 Marks

- First Mid Term Examination: 10 marks
- Second Mid Term Examination: 10 marks

ETE - End Term Examination: 60 Marks

- **Course with practical components only**

For Continuous Evaluation (CE) is such as: 30 Marks

Conduct / Perform/Execution /Practical File/ Viva-Voice

MTE - Mid Term Examination: 20 Marks

- First Mid Term Examination: 10 marks
- Second Mid Term Examination: 10 marks

ETE - End Term Examination: 50 Marks

**Chairperson**

Signature: .....

Name : Dr. Vivek Srivastava

Date :

**Internal Members**

Signature:

1..... 2.....

Name: Mr. Sarvesh Kumar Mr. Somendra Tripathi

Date:

Signature: 3.....

Name: Ms. Neelu Kushwaha

Date:

**External Members**

Signature:

1..... 2.....

Name: Dr. Amod Tiwari Mr. Vishal Nagar

Date:

# Rama University Uttar Pradesh, Kanpur

## Faculty of Engineering & Technology

**Course Detail and Evaluation Scheme**

B. Tech. Fourth Year (Computer Science & Engineering)

(Effective from the session 2017-18)

**SEMESTER-VIII**

| S.N. | Subject Code | Subject Name | Period | | | Evaluation Scheme | | | Total Marks | Credit |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | L | T | P | CE | MTE | ETE | | |
| **Theory Subjects** | | | | | | | | | | |
| 1 | BCS-081 TO BCS-084 | Departmental Elective-V | 3 | 1 | 0 | 20 | 20 | 60 | 100 | 4 |
| 2 | BCS-085 TO BCS-88 | Departmental Elective-VI | 3 | 1 | 0 | 20 | 20 | 60 | 100 | 4 |
| **Practicals / Project** | | | | | | | | | | |
| 3 | BCS-851 | Major Project | 0 | 0 | 21 | 300 | --- | 400 | 700 | 16 |
| | | **Total** | **6** | **2** | **21** | **340** | **40** | **520** | **900** | **24** |

**BHU-001** Human Values & Professional Ethics (Audit Course)- Student can clear from 2nd year to final year

L-Lecture, T-Tutorial, P- Practical, CE- Continuous Evaluation, MTE-Mid Term Examination, ETE-End Term Examination

**Evaluation Scheme:**

**Course without practical components**

For Continuous Evaluation (CE) is such as: 20 Marks

- Attendance: 5 Marks
- Assignments/Quiz / Seminar/Term paper /Project :15Marks

MTE - Mid Term Examination: 20 Marks

- First Mid Term Examination: 10 marks
- Second Mid Term Examination: 10 marks

ETE - End Term Examination: 60 Marks

- **Course with practical components only**

For Continuous Evaluation (CE) is such as: 300 Marks
Major Project/Conduct / Perform/Execution /Practical File/ Viva-Voice

MTE - Mid Term Examination: 20 Marks

- First Mid Term Examination: 10 marks
- Second Mid Term Examination: 10 marks

ETE - End Term Examination: 50 Marks\

**Chairperson**

Signature: .....

Name : Dr. Vivek Srivastava

Date :

**Internal Members**

Signature:

1..... 2.....

Name: Mr. Sarvesh Kumar Mr. Somendra Tripathi

Date:

Signature: 3.....

Name: Ms. Neelu Kushwaha

Date:

**External Members**

Signature:

1..... 2.....

Name: Dr. Amod Tiwari Mr. Vishal Nagar

Date:

| L | T | P | |
|---|---|---|---|
| 3 | 1 | 0 | **Credits: -4** |

**Content:**

**Unit - 1: Differential Calculus - I** **8 Hours**

Differentiation, nth Derivative, Leibnitz's theorem, Partial derivatives, Euler's theorem for homogeneous functions, Total derivatives, Change of variables, Curve tracing: Cartesian and Polar coordinates.

**Unit - 2: Differential Calculus - II** **8 Hours**

Maclaurin's and Taylor's Theorems, Expansion of function of several variables, Jacobian, Approximation of errors, Extrema of functions of several variables, Lagrange's method of multipliers (Simple applications).

**Unit-3: Linear Algebra** **8 Hours**

Inverse of a matrix by elementary transformations, Rank of a matrix (Echelon & Normal form), Linear dependence, Consistency of linear system of equations and their solution. Characteristic equation, Eigen values and eigenvectors, Cayley-Hamilton Theorem, Application of matrices to engineering problems. A brief introduction to Vector Spaces, Subspaces. Rank & Nullity. Linear transformations.

**Unit - 4: Multiple Integrals** **8 Hours**

Double and triple integrals, Change of order of integration, Change of variables, Application of Integration to lengths, Surface areas and Volumes - Cartesian and Polar coordinates. Beta and Gamma functions, Dirichlet's integral and applications.

**Unit - 5: Vector Calculus** **8 Hours**

Point function, Gradient, Divergence and Curl and their physical interpretations, Vector identities, Directional derivatives. Line, Surface and Volume integrals, Applications of Green's, Stoke's and Gauss divergence theorems (without proofs).

**Text Books:**

- B.V.Ramana, Higher Engineering Mathematics, Tata Mc Graw- Hill Publishing Company Ltd.
- R.K.Jain & S.R.K. Iyenger, Advance Engineering Mathematics, Narosa Publishing House.
- E. Kreyszig:Advanced Engineering Mathematics-Volume-I,John Wiley & Sons

**Reference Books:**

- B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers.
- Peter V. O' Neil, Advanced Engineering Mathematics, Thomas ( Cengage) Learning.
- Thomas & Finley, Calculus, Narosa Publishing House
- Rukmangadachari, Engineering Mathematics - I, Pearson Education.

| L | T | P |
|---|---|---|
| 3 | 1 | 0 |

**Credits: -4**

**Content:**

**Unit 1** **10 Hours**

**Semiconductor materials and properties:** Group-IV materials, Covalent bond, electron-hole concepts Basic concepts of energy bands in materials, concept of forbidden gap Intrinsic and extrinsic semiconductors, donors and acceptors impurities Junction diode, p-n junction, depletion layer, V-I characteristics, diode resistance, capacitance diode ratings (average current, repetitive peak current, non-repetitive current, peak-inverse voltage), Hall effect.

**Diode Applications:** rectifiers (half wave and full wave) calculation of transformer utilization factor and diode ratings, filter, calculation of ripple factor and load regulation clipping circuits, clamping circuits, voltage multipliers, Breakdown diodes breakdown mechanisms (zener and avalanche) breakdown characteristics, zener resistance, zener diode ratings zener diode application as shunt regulator.

**Unit 2** **8 Hours**

**Operational Amplifiers:** Concept of ideal operational amplifiers, ideal op-amp parameters, inverting, non-inverting and unity gain amplifiers, adders, difference amplifiers, integrators etc.

**Instrumentation:** Digital Voltmeter, Digital Multimeter, **Oscilloscope:** Introduction, Basic Principle, CRT, Block Diagram of Oscilloscope, Simple CRO, Measurement of voltage , current phase and frequency.

**Unit 3** **8 Hours**

**Bipolar Junction Transistor**: Basic construction, transistor action CB, CE and CC configurations, input/output characteristics Biasing of transistors-fixed bias, emitter bias, potential divider bias, comparison of biasing circuits Transistor

**Unit 4**

**Field Effect Transistor:**

**JFET:** Basic construction, transistor action, concept of pinch off, maximum drain saturation current, input and transfer characteristics, characteristic equation CG, CS and CD configurations, fixed, self-biasing.

**MOSFET:** depletion and enhancement type MOSFET-construction, operation and characteristics.

**Unit 5** **7 Hours**

**Switching theory and logic design**: Number systems, conversion of bases Boolean algebra, logic gates, concept of universal gate, canonical forms. Minimization using K-map, Combinational Circuits, Basic of Flip flops.

**Text Book/ Reference books:**

- Boylestad and Nashelsky, "Electronic Devices and circuits" PHI, 6e.
- Morris Mano, "Digital Computer Design", PHI.
- Millman J. and Halkias C., Jit Satybrat, "Integrated Electronics ", Tata McGraw-Hill.

### BAS 105/ BAS 205: Environment and Ecology

| L | T | P | |
|---|---|---|---|
| 3 | 1 | 0 | **Credits: -4** |

**Content:**

**UNIT-I: Nature and Scope of Environment** **10 Hours**

Introduction to Environmental Science - Definition and scope and need for public awareness Ecosystems Concept, structure and functions, restoration of damaged ecosystems Biodiversity – Definition, description at national and global level, threats and conservation Natural Resources -Renewable and non-renewable and their equitable use for sustainability, Material cycles – carbon, nitrogen and sulphur cycle. Conventional and Non-conventional Energy Sources –fossil fuel-based, hydroelectric, wind, -nuclear and solar energy, biomass, biodiesel, hydrogen as an alternative fuel.

**UNIT-II: Environmental Changes and Human Health** **10 Hours**

Social Issues Related to Environment– Sustainable development, urban problems (related to water and energy conservation and waste management), resettlement and rehabilitation Environmental ethics. Environmental Pollution–Definition, causes and effects, control measures for water, air, soil, marine, land, noise, thermal pollution, Climate change– Greenhouse effect and global warming, acid rain, ozone layer formation and depletion Impact on human health – water and air borne diseases, diseases induced by residual impurities in drinking water (fluoride and arsenic); Toxic wastes and carcinogens; Nuclear hazards.

**UNIT- III: Environmental Protection through Assessment and Education** **10 Hours**

Indicators and Impact Assessment – Bio-indicators, Natural disasters and disaster management, Impact assessment through inventorying and monitoring. Environmental Protection– Role of individuals, organizations and government in pollution control. Laws, Conventions and Treaties–National legislation, issues in the enforcement of environmental legislation, initiatives by non- governmental organizations, global efforts in environmental protection.

**Recommended Textbook**:

Environmental Studies, J Krishnawamy , R J Ranjit Daniels, Wiley India.

**Recommended Reference Books:**


- Environmental Science, Bernard J. Nebel, Richard T. Right, 9780132854467, Prentice Hall
- Professional 1993.
- Environment and Ecology, R K Khandal, 978-81-265-4277-2, Wiley India.
- Environmental Science, 8th Ed ISV, Botkin and Keller, 9788126534142, Wiley India.
- Environmental Studies, R Rajagopalan, 978-0195673937, Oxford University Press

| L | T | P | |
|---|---|---|---|
| 3 | 1 | 0 | **Credits: -4** |

**Content:**

**Unit - 1: Differential Equations** **7 Hours.**

Linear differential equations of $n^{th}$ order with constant coefficients, Complementary function and Particular integral, Simultaneous linear differential equations, Solution of second order differential equations by changing dependent & independent variables, Normal form, Method of undetermined coefficient Method of variation of parameters, Applications to engineering problems (without derivation).

**Unit - 2: Series Solution and Special Functions** **7 Hours**

Series solution of second order ordinary differential equations with variable coefficient (Frobenius method), Bessel and Legendre equations and their series solutions, Properties of Bessel function and Legendre polynomials.

**Unit - 3: Laplace Transform** **7 Hours**

Laplace transform, Existence theorem, Laplace transforms of derivatives and integrals, Initial and final value theorems, Unit step function, Dirac- delta function, Laplace transform of periodic function, Inverse Laplace transform, Convolution theorem, Application to solve simple linear and simultaneous differential equations.

**Unit - 4: Fourier series and Partial Differential Equations** **7 Hours**

Periodic functions, Fourier series of period $2\pi$, Euler's Formulae, Functions having arbitrary periods, Change of interval, Even and odd functions, Half range sine and cosine series, Harmonic analysis. Solution of first order partial differential equations by Lagrange's method, Solution of second order linear partial differential equations with constant coefficients.

**Unit - 5: Applications of Partial Differential Equations** **7 Hours**

Classification of second order partial differential equations, Method of separation of variables for solving partial differential equations, Solution of one and two dimensional wave and heat conduction equations, Laplace equation in two dimensions, Equation of transmission lines.

**Text Books:**

- B.V.Ramana, Higher Engineering Mathematics, Tata Mc Graw- Hill Publishing Company Ltd.
- 2. R.K.Jain & S.R.K. Iyenger, Advance Engineering Mathematics, Narosa Publishing House.
- E.Kreyszig,Advanced Engineering Mathematics, John Wiley & Sons.

**Reference Books:**

- B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers.
- Peter V. O' Neil, Advanced Engineering Mathematics, Thomas (Cengage) Learning.
- Chandrika Prasad, Advanced Mathematics for Engineers, Prasad Mudranalaya
- A. C. Srivastava & P. K. Srivastava, Engineering Mathematics, Vol. - II, PHI Learning Pvt. Ltd.
- Rukmangadachari, Engineering Mathematics - II, Pearson Education.

| L | T | P |
|---|---|---|
| 3 | 0 | 0 |

**Credit-4**

**Content:**

**Unit-I** **08 Hours**

**Introduction:** Computer basics and classification of computers, operations of computer, components of a computer and operating system concepts.

**Number System:** Binary, Octal and hexadecimal number systems, Binary arithmetic.

**Programming Concepts:** Approaches of problem solving, computer algorithms and flow charts. Introduction of computer languages - machine language, assembly language and high level language.

**Unit-II** **08 Hours**

**Program Structure and Execution:** Representing and manipulating information. Information storage: data sizes, addressing and representing strings. Integer representation and arithmetic, Boolean algebra, logical, shift and bit level operations.

**Running Programs on a System**

Concept of assembler, compiler, loader and linker, exceptional control flow, processes, process control, system calls, Error handling, program execution time.

**Unit-III** **08 Hours**

**Programming Concepts in C**

Standard input and output in C, Fundamental data types and sizes: character, integer, short, long, unsigned, single and double floating point. Storage classes: automatic, register, static and external. Operators and expressions: arithmetic, relational and logical operators, operator precedence and order of evaluation.

**Unit-IV** **08 Hours**

**Control Flow**: Statements and blocks, 'If-Else', 'Else-If', 'Switch', nesting 'If-Else', loops 'While', 'Do-while' and 'For', use of 'Break' and 'Continue', 'Goto' and 'Labels'.

**Functions**: Basics of functions, types of functions, functions with array, passing values to functions and recursive functions.

**Unit-V** **08 Hours**

**Pointers and Arrays:** Pointers and addresses, pointers and functions arguments, pointers and arrays, Address arithmetic, pointers arrays, multidimensional arrays, pointers to functions.

**Structure**: Introduction, structures and functions, arrays and pointers of structures.

**File Handling**: Standard C preprocessors, file access, defining and calling macros and standard libraries.

**Reference Book:**


- Programming in C – Gottfried B.S. (TMH).
- let us C – Kanetkar Y. (BPB).
- 3.The C Programming Language - Kernighan B.W., Ritchie D.M. (PHI).
- 4.C++: The Complete Reference (4th Ed) – Schildt H. (TMH).
- 5.The C++ Programming Language – Stroustrup B. (Addison-Wesley

# Rama University Uttar Pradesh, Kanpur

## Faculty of Engineering & Technology

**BCS-151/BCS-251: Computer Programming Lab**

| L | T | P | Credit- |
|---|---|---|---|
| 0 | 0 | 2 | |

| S No | Name of the program |
|---|---|
| 1 | a) To evaluate algebraic exp(ax+b)/(ax-b)<br>b) To Evaluate algebraic exp 2.5logx+cos32+\|x*x-y*y\|+sqrt(2*x*y)<br>c) To evaluate the algebraic expaepower-rt<br>d) To evaluate algebraic exp x power5 +10 x power 4+8 x power3+4x+2 |
| 2 | To evaluate area of triangle (sqrt(s(s-a)(s-b)(s-c) |
| 3 | To swap 2 no |
| 4 | Greatest of 2 no |
| 5 | Greatest of 3 numbers |
| 5 | Greatest of 3 onto print the given no in ascending order |
| 6 | To perform the arithmetic expression using switch statement |
| 7 | Factorial of given no using do while statement |
| 8 | To print prime up to n no |
| 9 | Sum of n natural no |
| 10 | Total no. of even integers |
| 11 | Total no. of odd integers |
| 12 | Sum of even integers |
| 13 | Sum of odd integers |
| 14 | A program to print the product of two matrices of any order |
| 15 | Write a program to print Fibonacci series |
| 16 | Write a program to print o/ps<br>a)1 b) 1 c) 1 d) 1<br>2 2 2 2 2 3<br>3 3 3 3 3 3 4 5 6 |
| 17 | Write a program to read n num of students and 5 sub marks |
| 18 | Write a program to find factorial of a num using 3 types of funs |
| 19 | Write a program to convert all lower case to uppercase characters. |
| 20 | Write a program to extract a string |
| 21 | Write a program to sort 5 city names in alphabetical order |
| 22 | Write a program to find the factorial of a number using recursion |
| 23 | A program to print address of variable |
| 24 | A program to access a variable using pointers |
| 25 | A program to print the element of array using pointers |
| 26 | A program to implement call by reference |
| 27 | A program to find greatest of 'n' num using funs |
| 28 | A program to print the elements of a structure using pointers |
| 29 | A program to display student information by initializing structures |
| 30 | A program to find total number of marks |
| 31 | Write a program to open a file. |
| 32 | Write a program to read a file. |
| 33 | Write a program to write a file. |
| 34 | Write a program to save a file. |

# Rama University Uttar Pradesh, Kanpur

## Faculty of Engineering & Technology

### BAS 102/ BAS 202: Engineering Chemistry

**L T P**

**3 1 0** **Credits: -4**

**Content:**

**UNIT-I** **8 Hours**

Molecular orbital theory and its applications in diatomic molecules. Band theory of solids. Liquid crystals & it's application. Space lattice (only cubes), types of unit cell, calculation of density of unit cell. Types of hydrogen bonding and its applications. Structure and applications of Graphite and Fullerenes.

**UNIT-II** **8 Hours**

Polymers, its classification and their applications. Thermoplastic and Thermosetting resins. Elastomers and synthetic fibres. Conducting and biodegradable polymers. Elementary ideas and simple applications Visible, UV, IR $^{1}$HNMR and mass spectroscopic Techniques, Ziegler-Natta catalyst

**UNIT-III** **8 Hours**

Stereochemistry with special reference to chirality, E - Z and R - S nomenclature. Elementary idea of inductive effect, mesomeric effect, reaction intermediate (carbcation, carbanion and free redical carbene). Types of organic reactions with special reference of nucleophilic substitution reaction. Grignard Reagent.

**UNIT-IV** **8 Hours**

Hardness of water. Disadvantage of hard water. Techniques for water softening; Calgon, Zeolite, Lime-Soda, Ion exchange resin, Reverse osmosis. Fuels; Classification of fuels. Analysis of Coal. Determination of Calorific values. Biogas and Biomass.

**UNIT-V** **8 Hours**

Rate, order and molecularity of reaction, Integrated rate equation of zero order, first order and second order reactions, activation energy. Galvanic cell, electrochemical theory of corrosion and its protection. Phase Rule and its application to one component system (water and sulfur).

**Reference Books**


- Chemistry (9th ed), by Raymond Chang, Tata McGraw-Hill
- Chemistry Concepts and Applications by Steven S. Zumdahl; Cengage Learning
- Concise Inorganic Chemistry by J.D. Lee; Wiley India
- Organic Chemistry (6 ed) by Morrison & Boyd; Pearson Education
- Physical Chemistry by Gordon M. Barrow; Mc-Graw Hill

### BAS-152 /BAS-252: Engineering Chemistry Lab

**L T P**
**0 0 2** **Credit:-1**

**List of Experiments: -**

1. Determination of alkalinity in the given water sample.
2. Determination of Temporary and Permanent hardness in water sample using EDTA as standard solution.
3. Determination of available chlorine in bleaching powder.
4. Determination of chloride content in the given water sample by Mohr's method.
5. Determination of Iron content in the given Iron ore sample by using [ $K_3$ Fe $(CN)_6$] as an external indicator.
6. Determination of solubility of salt (NaCl) at room temperature.
7. Determine the viscosity of a given solution.
8. Determination of Iron concentration in sample of water by colorimetric method. The method involves the use of KCNS as a colour developing agent and the measurement are carried out at $\lambda_{max}$ 480 nm.
9. Element detection and Functional group identification in organic compounds.
10. Preparation of Bakelite & Urea Formaldehyde resin.

**L T P**

**3 0 0** **Credit:-4**

**Content:**

**Unit -I** **8 Hours**

**Modern Physics:** Wave Mechanics: Wave- particle duality, de-Broglie matter waves, Phase and Group velocities, Davisson- Garner experiment, Heisenberg uncertainty principle and its applications, Wave function and its significance, Schrödinger's wave equation - particle in one dimensional potential box, Eigen values and Eigen function.

**Unit -II** **8 Hours**

**Wave Optics:** Interference: Interference of light, Interference in thin films (parallel and wedge shaped film), Newton's rings.

**Diffraction:** Single, double and N- Slit Diffraction, Diffraction grating, Grating spectra, dispersive power, Rayleigh's criterion and resolving power of grating.

**Polarization:** Phenomena of double refraction, Nicol prism, Production and analysis of plane, circular and elliptical polarized light, Retardation Plate

**Unit -III** **8 Hours**

**Modern Optics**

**Laser:** Spontaneous and stimulated emission of radiation, population inversion, concept of 3 and 4 level Laser, construction and working of Ruby, He-Ne lasers and laser applications.

Fiber Optics: Fundamental ideas about optical fiber, Propagation mechanism, Acceptance angle and cone, Numerical aperture, Single and Multi Mode Fibers, Holography: Basic Principle of Holography, Construction and reconstruction of Image on hologram and applications of holography.

**Reference Books:**


- Concepts of Modern Physics - Aurthur Beiser (Mc-Graw Hill)
- Introduction to Special theory of - Robert Resnick - Wielly
- Optical Fibre & Laser - Anuradha De. ( New Age )
- Optics -Aloy Ghatak ( Tata McGraw Hill Education Private Ltd. New Delhi)
- Optics - Brijlal & Subramanian (S. Chand )

**L T P**

**3 0 0** **Credit:-4**

**Content:**

**Unit - I** **8 Hours**

**Crystal Structures and X-ray Diffraction**:

Space lattice, basis, Unit cell, Lattice parameter, Seven crystal systems and Fourteen Bravais lattices, Crystal-System Structure, Packing factor (cubic, body and face), Crystal structure of NaCl and diamond, Lattice planes and Miller Indices, Reciprocal Lattice, Diffraction of X-rays by crystal, Laue's experiment, Bragg's Law, Bragg's spectrometer.

**Unit - II** **8 Hours**

**Dielectric and Magnetic Properties of Materials**:

**Dielectric Properties**: Dielectric constant and Polarization of dielectric materials, Types of Polarization (Polarizability). Equation of internal fields in liquid and solid (One- Dimensional), Claussius Mussoti- Equation, Frequency dependence of dielectric constant, Dielectric Losses, Important applications of dielectric material,

**Magnetic Properties**: Magnetization, Origin of magnetic moment, Dia, para and ferro magnetism, Langevin's theory for diamagnetic material, Phenomena of hysteresis and its applications.

**Unit - III** **8 Hours**

**Electromagnetic Theory** Displacement Current, Equation of continuity, Maxwell's Equations (Integral and Differential Forms), Poynting theorem and Poynting vectors, EM - Wave equation and its propagation characteristics in free space, non-conducting and in conducting media, Skin depth.

**Reference Books:**


- Concepts of Modern Physics - Aurthur Beiser (Mc-Graw Hill)
- Optical Fibre & Laser - Anuradha De. ( New Age )
- Optics -Aloy Ghatak ( Tata McGraw Hill Education Private Ltd. New Delhi)
- Optics - Brijlal & Subramanian (S. Chand )

# Rama University Uttar Pradesh, Kanpur

## Faculty of Engineering & Technology

### BAS-151/BAS-251: Engineering Physics Lab

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**Credits: -1**

**List of Experiments-**

Any ten experiments, at least four from each group.

**Group -A**

1. To determine the wavelength of monochromatic light by Newton's ring.
2. To determine the wavelength of monochromatic light with the help of Fresnel's biprism.
3. To determine the focal length of two lenses by nodal slide and locate the position of cardinal points.
4. To determine the specific rotation of cane sugar solution using polarimeter.
5. To determine the wavelength of spectral lines using plane transmission grating.

**Group - B**

6. To determine the specific resistance of a given wire using Carey Foster's bridge.
7. To study the variation of magnetic field along the axis of current carrying - Circular coil and then to estimate the radius of the coil.
8. To verify Stefan's Law by electrical method.
9. To calibrate the given ammeter and voltmeter by potentiometer.
10. To study the Hall effect and determine Hall coefficient, carrier density and - mobility of agiven semiconductor using Hall effect set up.
11. To determine the energy band gap of a given semiconductor material.
12. To determine E.C.E. of copper using Tangent or Helmholtz galvanometer.
13. To draw hysteresis curve of a given sample of ferromagnetic material and from - this to determine magnetic susceptibility and permeability of the given specimen.
14. To determine the ballistic constant of a ballistic galvanometer.
15. To determine the coefficient of viscosity of a liquid.

**L T P**

**3 1 0** **Credits: 4**

**Content:**

**UNIT- I: Fundamentals of Communication** **8 hours**

Technical Communication: Features: Distinction between General and Technical communication; Language as a tool of communication; Levels of communication: Interpersonal, Organizational, Mass communication; The flow of communication: Downward, Upward, Lateral or Horizontal (peer group); Importance of technical communication; Barriers to Communication.

**UNIT-II: Writing Correct English** **8 hours**

The Sentence: Meaning and definition, Kinds of Sentences; Tenses; Present, Past and Future; Concord: Meaning; Concord of Numbers and Persons; Articles.

**UNIT-III: Constituents of Technical Written Communication** **8 hours**

Words and Phrases: Word formation, Synonyms and Antonyms; Homophones; Select vocabulary of about 500- 1000 new words; Correct Usage; All Parts of Speech; Requisites of Sentence Construction: Paragraph Development: Techniques and Methods- Inductive, Deductive, Spatial, Linear, Chronological etc.

**UNIT-IV: Business Communication** **8 hours**

Principles; Sales & Credit letters; Claim and Adjustment Letters; Job application and Resumes. Reports: Types; Significance; Structure, Style & Writing of Reports; Technical Proposal; Parts; Types; Writing of Proposal and its significance.

**UNIT-V: Presentation Strategies And Speech Mechanism** **8 hours**

Defining Purpose; Audience and Locale, Organizing Contents; Preparing Outline; Audio-Visual Aida; Nuance of Delivery; Body Language; Dimensions of Speech; Syllable; Accent Pitch; Rhythm; Intonation; Difference between stress and intonation; Paralinguistic features of voice.

**Text books:**

- Technical Communication: Principles and Practice. Meenakshi Raman and Sangeeta Sharma, Oxford University Press, New Delhi.
- Professional Communication. Dr. Malti Agarwal, Krishna Prakashan Media (P) Ltd., Meerut.

**Reference books:**

- Gerson, Sharon J. & Gerson, Steven M., *Technical Writing- Process and Product* , Delhi, Pearson/ Education Publications.
- Rizvi, Ashraf M., *Effective Technical Communication*, New Delhi, Tata Mc Graw Hill Publishing Company Ltd.
- Sinha, R.P., English Grammar and Usage, New Delhi, Oxford University Press.

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**Credit: 1**

**LIST OF PRACTICALS:**

1. Introduction to sounds in English language. Practice of consonants, vowels and diphthongs (sounds).

2. Stress and intonation in speech.

3. Conversational skills: Group Discussion: Practical based on accurate and current grammatical patterns.

4. Conversational skills for interviews under suitable Professional Communication Lab conditions with emphasis on kinesics.

5. Official/Public speaking, Sample speeches by eminent people (video).

6. Theme- presentation/ Key-note presentation.

7. Individual speech delivery/conferences with skills to defend interjections/quizzes.

8. Role plays with argumentative skills/Role play presentation with stress and intonation.

9. Comprehension skills based on reading and listening. Practical based on a model audio-visual usage.

**Text book:**


- Communication Lab (English). Dr. Malti Agarwal, Krishna Prakashan Media (P) Ltd. Meerut.


**Reference books:**


- Kenjer,Hanif., *All the Right Answers*, New Delhi, Macmillan India Ltd.
- Taylor,Grant., *English Conversation Practice*, New Delhi, Tata Mc Graw Hill Publishing Company Ltd.
- Pandey, L.U.B., Singh, R.P., *A Manual of Practical Communication*, Delhi, A.I.T.B.S.Pub. India.Ltd.
- Jones Daniel., *English Pronouncing Dictionary*, New Delhi, Cambridge University Press.

**L T P**

**3 1 0** **Credits: 4**

**Content:**

**UNIT- I: D C Circuit Analysis and Network Theorems** **9 hours**

Circuit Concepts: Concepts of network, Active and passive elements, Voltage and current sources, Concept of linearity and linear network, Unilateral and bilateral elements, R, L and C as linear elements, Source transformation, Kirchhoff's laws, Loop and nodal methods of analysis, Star-delta transformation.

Network theorems: Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum Power Transfer theorem.

**UNIT-II: Steady- State Analysis of Single Phase AC Circuits** **8 hours**

AC fundamentals: Sinusoidal, square and triangular waveforms - Average and effective values, Form and peak factors, Concept of phasors, phasor representation of sinusoidally varying voltage and current, Analysis of series, parallel and series-parallel RLC Circuits, Resonance in series and parallel circuits, bandwidth and quality factor, Apparent, active & reactive powers, Power factor, Causes and problems of low power factor, Concept of power factor improvement.

**UNIT-III: Three Phase AC Circuits** **7 hours**

Three phase system-its necessity and advantages, Star and delta connections, Balanced supply and balanced load, Line and phase voltage/current relations, Three-phase power and its measurement.

**Measuring Instruments:** Types of instruments, Construction and working principles of PMMC and moving iron type voltmeters & ammeters, Single phase dynamometer wattmeter, Use of shunts and multipliers.

**UNIT-IV: Introduction to Earthing and Electrical Safety** **9 hours**

Need of Earthing of equipment and devices, important electrical safety issues.

**Magnetic Circuit**: Magnetic circuit concepts, analogy between electric & magnetic circuits, B-H curve, Hysteresis and eddy current losses, Mutual coupling with dot convention, Magnetic circuit calculations.

**Single Phase Transformer**: Principle of operation, Construction, EMF equation, Equivalent circuit, Power losses, Introduction to auto transformer.

**UNIT-V: Electrical Machines** **8 hours**

Concept of electro mechanical energy conversion

**DC machines:** Types, EMF equation of generator and torque equation of motor, Characteristics and applications of DC motors.

Three Phase Induction Motor: Types, Principle of operation, Slip-torque characteristics, Applications.

**Single Phase Induction motor**: Principle of operation and introduction to methods of starting, applications.

**Three Phase Synchronous Machines**: Principle of operation of alternator and synchronous motor and their applications.

**Text Books and Reference Books:**


- V. Del Toro, "Principles of Electrical Engineering", Prentice Hall International.
- D P Kothari, I.J. Nagarath, "Basic Electrical Engineering", Tata McGraw Hill.
- S N Singh, "Basic Electrical Engineering", Prentice Hall International.
- B Dwivedi, A Tripathi, "Fundamentals of Electrical Engineering", Wiley India.
- Kuldeep Sahay, "Basic Electrical Engineering", New Age International Publishers

# Rama University Uttar Pradesh, Kanpur

## Faculty of Engineering & Technology

### BEE151/BEE251: Electrical and Electronics Engineering Lab

**L T P** **Credits: 1**

**0 0 2**

1. Verification of Kirchhoff's laws.
2. Verification of (i) Superposition theorem (ii) Thevenin's Theorem (iii) Maximum Power Transfer Theorem.
3. Measurement of power and power factor in a single phase ac series inductive circuit and study improvement of power factor using capacitor.
4. Study of phenomenon of resonance in RLC series circuit and obtain resonant frequency.
5. Measurement of power in 3- phase circuit by two wattmeter method and determination of its power factor.
6. Determination of parameters of ac single phase series RLC circuit .
7. Determination of (i) Voltage ratio (ii) polarity and (iii) efficiency by load test of a single phase transformer.
8. To study speed control of dc shunt motor using (i) armature voltage control (ii) field flux control.
9. Determination of efficiency of a dc shunt motor by load test.
10. To study running and speed reversal of a three phase induction motor and record speed in both directions.
11. To measure energy by a single phase energy meter and determine error.
12. To study P-N diode characteristics.
13. To study full wave and half wave rectifier circuits with and without capacitor and determine ripple factors.
14. To study various logic gates.
15. To study Operational Amplifier as Adder and Subtractor.
16. To study transistor as a switch.

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**Content:**

**UNIT I** **8 hours**

**Two Dimensional Force Systems**: Basic concepts, Laws of motion, Principle of Transmissibility of forces, Transfer of a force to parallel position , Resultant of a force system, Simplest Resultant of Two dimensional concurrent and Non-concurrent Force systems, Distributed force system, Free body diagrams, Equilibrium and Equations of Equilibrium, Applications

**Friction**: Introduction, Laws of Coulomb Friction, Equilibrium of Bodies involving Dry friction,

Belt friction, Application.

**UNIT II** **8 hours**

**Beam**: Introduction, Shear force and Bending Moment, Differential Equations for Equilibrium, Shear force and Bending Moment Diagrams for Statically Determinate Beams.

**Trusses:** Introduction, Simple Truss and Solution of Simple truss, Method f Joints and Method of Sections.

**UNIT III** **8 hour**

**Centroid and Moment of Inertia**: Centroid of plane, curve, area, volume and composite bodies, Moment of inertia of plane area, Parallel Axes Theorem, Perpendicular axes theorems, Principal Moment Inertia, Mass Moment of Inertia of Circular Ring, Disc, Cylinder, Sphere and Cone about their Axis of Symmetry.

**UNIT IV** **8hours**

**Kinematics of Rigid Body**: Introduction, Plane Motion of Rigid Body, Velocity and Acceleration under Translation and Rotational Motion, Relative Velocity.

**UNIT V** **8 hours**

**Kinetics of Rigid Body**: Introduction, Force, Mass and Acceleration, Work and Energy, Impulse and Momentum, D'Alembert's Principles and Dynamic Equilibrium

**Reference Books:**


- "Engineering Mechanics: Statics" , J.L Meriam , Wiley
- "Engineering Mechanics: Dynamics" , J.L Meriam , Wiley
- "Engineering Mechanics " , F L Singer
- "Engineering Mechanics : Statics and Dynamics", R. C. Hibbler, Pearson
- "Engineering Mechanics " , Thimoshenko & Young , 4ed, Tata McGraw Hill
- "Engineering Mechanics: Statics and Dynamics", A. Nelason, McGraw-Hill
- "Engineering Mechanics : Statics and Dynamics", Shames and Rao, Pearson
- "Engineering Mechanics : Statics and Dynamics", S. Rajasekaran and G. Sankarasubramanian, Vikas 9. "Engineering Mechanics", V. Jayakumar and M. Kumar, PHI

| L | T | P | Credit -4 |
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**Content:**

**Unit-I Introduction to Engineering Materials** **8 hours**

Materials and Engineering, Classification of Engineering Materials. Industrial applications of common engineering materials, Metals & Alloys: Properties and Applications. Steels and Cast Irons, Alloys of Non Ferrous metals.

**Unit-II Basic Metal Forming & Casting Process** **8 hours**

**Forming Processes:** Basic metal forming operations & uses of such as: Forging, Rolling, Wire & Tube drawing/making and Extrusion, and their uses.

**Press-work:** Die & Punch assembly, cutting and forming, its applications. Hot-working versus cold-working

**Casting: Pattern:** Materials, types and allowances. Type and composition of Molding sands and their desirable properties. Mould making with the use of a core. Gating system. Casting defects & remedies. Cupola Furnace. Die-casting and its uses.

**Unit-III Machining and Welding operations and their applications** **8 hours**

**Machining:** Basic principles of Lathe-machine and operations performed on it. Basic description of machines and operations of Shaper-Planer, Drilling, Milling & Grinding.

**Welding:** Introduction, classification of welding processes. Gas-welding, types of flames and their applications. Electric-Arc welding. Resistance welding. Soldering & Brazing processes and their uses.

**Unit-IV Misc. Topics** **8 hours**

**Heat Treatment Processes**: Introduction to Heat- treatment of carbon steels: annealing, normalizing, quenching, tempering and case-hardening.

**Manufacturing Establishment**: Plant location. Plant layout-its types. Types of Production. Production versus Productivity.

**Non-Metallic Materials:** Common types & uses of Wood, Cement-concrete, Ceramics, Rubber, Plastics and Composite-materials.

**Misc. Processes:** Powder-metallurgy process & its applications, Plastic-products manufacturing, Galvanizing and Electroplating.

**Reference Books:**


- "Processes and Materials of Manufacture", Lindberg, PHI
- "Manufacturing Engineering And Technology", Kalpakjian and Schmid, Pearson
- "Manufacturing Processes", Kalpakjian and Schmid, Pearson
- "Manufacturing Processes", H. N .Gupta, R. C. Gupta, Arun Mital,

**L T P** **Credits:-1**

**0 0 2**

**Note: Any 10 experiments of the following or similar experiments suitably designed**

1. To verify the law of parallelogram of forces.
2. To study the equilibrium of a body under three forces.
3. To determine the coefficient of friction of a flat surface.
4. Friction experiment on screw-jack.
5. Experiment based on analysis of truss.
6. To determine the mass moment of inertia of a rotating disc.
7. To conduct the tensile test and determine the ultimate tensile strength, percentage elongation for a mild steel specimen.
8. To conduct the Impact-tests (Izod / Charpy) on Impact-testing machine to find the Impact Strength of the specimen.
9. To determine the hardness of the given specimen using Vicker/Brinell/Rockwell hardness testing machine.
10. Simple & compound gear-train experiment.
11. Worm & worm-wheel experiment for load lifting.
12. Belt-Pulley experiment.
13. Dynamics experiment on momentum conservation

# Rama University Uttar Pradesh, Kanpur

## Faculty of Engineering & Technology

### BWS-151/251: WORKSHOP PRACTICE

**L T P** **Credits: -1**

**0 0 3**

**1. Carpentry Shop:** 1. Study of tools & operations and carpentry joints. 2. Simple exercise using jack plane. 3. To prepare half-lap corner joint, mortise & tennon joints. 4. Simple exercise on woodworking lathe.

**2. Fitting (Bench Working) Shop:** 1. Study of tools & operations 2. Simple exercises involving
fitting work. 3. Make perfect male-female joint. 4. Simple exercises involving
Drilling/tapping/dieing.

**3. Black Smithy Shop:** 1. Study of tools & operations 2. Simple exercises based on black smithy operations such as upsetting, drawing down, punching, bending, fullering & swaging.

**4. Welding Shop:** 1.Study of tools & operations of Gas welding & Arc welding 2. Simple butt and Lap welded joints. 3. Oxy-acetylene flame cutting.

**5. Sheet-metal Shop:** 1. Study of tools & operations. 2. Making Funnel complete with 'soldering'.
3. Fabrication of tool-box, tray, electric panel box etc.

**6. Machine Shop:** 1. Study of Single point cutting tool, machine tools and operations. 2. Plane turning. 3. Step turning 4. Taper turning. 5. Threading

**7. Foundry Shop:** 1. Study of tools & operations 2. Pattern making. 3. Mould making with the use of a core. 4. Casting

| L | T | P | Credits: -1 |
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**1. Introduction to Engineering drawing**

Introduction, Drawing Instruments and their uses, BIS conventions, lettering Dimensioning and free hand practicing. Computer screen, layout of the software, standard tool bar/menus and description of most commonly used tool bars, navigational tools. Coordinate system and reference planes. Co-ordinate points, axes, poly-lines, square, rectangle, polygons, splines, circles, ellipse, text, move, copy, off-set, mirror, rotate, trim,extend, break, chamfer, fillet, curves, constraints viz. tangency, parallelism, inclination and perpendicularity. Dimensioning, line convention, material conventions and lettering. **2-Sheet**

**2. Orthographic Projections**

Introduction, Definitions- Planes of projection, reference line and conventions employed, Projections of points in all the four quadrants, Projections of straight lines (located in Firstquadrant/first angle only), True and apparent lengths, True and apparent inclinations toreference planes (No application problems**). 2-Sheet**

**3. Orthographic Projections of Plane Surfaces (First Angle Projection Only)**

Introduction, Definitions-projections of plane surfaces-triangle, square rectangle, rhombus, pentagon, hexagon and circle, planes in different positions by change of position method only (No problems on punched plates and composite plates.) **1-Sheet**

**4. Projections of Solids (First Angle Projection Only)**

Introduction, Definitions- Projections of right regular- tetrahedron, hexahedron (cube), prisms, pyramids, cylinders and cones in different positions. (No problems on octahedrons and combination solid) **2-Sheet**

**5. Sections and Development of Lateral Surfaces of Solids**

Introduction, Section planes, Sections, section views, Sectional views, apparent shapes and True shapes of Sections of right regular prisms, pyramids, cylinders and cones resting with base on HP. (No problems on section of solids) **1-Sheet**

**6. Isometric Projection (Using Isometric Scale Only)**

Introduction, Isometric scale, Isometric Projection of simple plane figures, Isometric Projection of

tetrahedron, hexahedron (cube), right regular prisms, pyramids, cylinders, cones, spheres, cut spheres and combination of solids (Maximum of three Solids). **1-Sheet**

**7. Introduction to Auto CAD**

**Reference Books:**


- Engineering Drawing - N.D. Bhatt & V.M. Panchal, 48th edition, 2005- Charotar Publishing House, Gujarat.
- Computer Aided Engineering Drawing - S. Trymbaka Murthy, -I.K. International Publishing House Pvt. Ltd., New Delhi, 3rd revised edition- 2006.
- Engineering Graphics - K.R. Gopalakrishna, 32nd edition, 2005- Subash Publishers Bangalore.
- Fundamentals of Engineering Drawing with an Introduction to Interactive Computer Graphics for Design and Production-Luzadder Warren J., Duff John M., Eastern Economy Edition, 2005-Prentice-Hall of India Pvt. Ltd., New Delhi.
- Engineering Drawing - M.B. Shah, B.C.Rana, 2ndEdition.

# Rama University Uttar Pradesh, Kanpur
## Faculty of Engineering & Technology
### BEC-308: Digital Logic Design

**L T P** **Credit-4**

**3 1 0**

**Content:**

**Unit-I** **08 Hours**

Digital system and binary numbers: Signed binary numbers, binary codes, cyclic codes, error detecting and correcting codes, hamming codes. Floating point representation, Gate-level minimization: The map method up to five variable, don't care conditions, POS simplification, NAND and NOR implementation, Quine McClusky method (Tabular method).

**Unit-II** **08 Hours**

**Combinational Logic:** Combinational circuits, analysis procedure, design procedure, binary adder-subtractor, decimal adder, binary multiplier, magnitude comparator, decoders, encoders, multiplexers.

**Unit-III** **08 Hours**

**Synchronous Sequential logic:** Sequential circuits, storage elements: latches, flip flops, analysis of clocked sequential circuits, state reduction and assignments, design procedure.

**Registers and Counters**: Shift registers, ripple counter, synchronous counter, and other counters.

**Unit-IV** **08 Hours**

Memory and programmable logic: RAM, ROM, PLA, and PAL.

Design at the register transfer level: ASMs, design example, design with multiplexers.

**Unit-V** **08 Hours**

**A synchronous sequential logic:** Analysis procedure, circuit with latches, design procedure, reduction of state and flow table ,race free state assignment, hazards.

**Text Book:**

M. Morris Mano and M.D. Ciletti, "Digital Design", 4th Edition, Pearson Education

# Rama University Uttar Pradesh, Kanpur

## Faculty of Engineering & Technology

### BAS-301: Mathematics-III

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**Content:**

**Unit - I: Function of Complex variable** **08 Hours**

Analytic function, C-R equations, Cauchy's integral theorem, Cauchy's integral formula for derivatives of analytic function, Taylor's and Laurent's series, singularities, Residue theorem, Evaluation of real integrals of the type.

**Unit - II : Statistical Techniques - I** **08 Hours**

Moments, Moment generating functions, Skewness, Kurtosis, Curve fitting, Method of least squares, fitting of straight lines, Polynomials, Exponential curves etc., Correlation, Linear, non -linear and multiple regression analysis, Probability theory.

**Unit - III : Statistical Techniques - II** **08 Hours**

Binomial, Poisson and Normal distributions, Sampling theory (small and large), Tests of significations: Chi-square test, t-test, Analysis of variance (one way) , Application to engineering, medicine, agriculture etc.

Time series and forecasting (moving and semi-averages), Statistical quality control methods, Control charts, , R, p, np, and c charts.

**Unit - IV: Numerical Techniques-I** **08 Hours**

Zeroes of transcendental and polynomial equation using Bisection method, Regula-falsi method and Newton-Raphson method, Rate of convergence of above methods.

Interpolation: Finite differences, difference tables, Newton's forward and backward interpolation, Lagrange's and Newton's divided difference formula for unequal intervals.

**Unit-V: Numerical Techniques-II** **08 Hours**

Solution of system of linear equations, Gauss- Seidal method, Crout method. Numerical differentiation, Numerical integration , Trapezoidal , Simpson's one third and three-eight rules, Solution of ordinary differential (first order, second order and simultaneous)equations by Euler's, Picard's and forth-order Runge- Kuttamehthods.

**Test Books:-**

- Peter V. O' Neil, Advance Engineering Mathematics Thomson (Cengage) Learning, 2007.
- Jain, Iyenger & Jain, Numerical Methods for Scientific Computation, New Age International, New Delhi , 2003.
- J.N. Kapur, Mathematical Statistics, S. Chand & company Ltd., 2000.

**Reference Books:-**

- R.K. Jain & S.R.K. Iyenger, Advance Engineering Mathematics, Narosa Publication House, 2002.
- Chandrika Prasad, Advanced Mathematics for Engineers, Prasad Mudralaya,1996.
- Kreysig, Advanced Engineering Mathematics, John Wiley & Sons, 2005.
- S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 2005.

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## Content:

**Unit-1** **08 Hours**

**Introduction:** Basic Terminology, Elementary Data Organization, Algorithm, Efficiency of an Algorithm, Time and Space Complexity, Asymptotic notations: Big-Oh, Time-Space trade-off. Abstract Data Types (ADT)

**Arrays:** Definition, Single and Multidimensional Arrays, Representation of Arrays: Row Major Order, and Column Major Order, Application of arrays, Sparse Matrices and their representations.

**Linked lists:** Array Implementation and Dynamic Implementation of Singly Linked Lists, Doubly Linked List, Circularly Linked List, Operations on a Linked List. Insertion, Deletion, Traversal, Polynomial Representation and Addition, Generalized Linked List.

**Unit-II** **08 Hours**

**Stacks:** Abstract Data Type, Primitive Stack operations: Push & Pop, Array and Linked Implementation of Stack in C, Application of stack: Prefix and Postfix Expressions, Evaluation of

postfix expression, Recursion, Tower of Hanoi Problem, Simulating Recursion, Principles of recursion, Tail recursion, Removal of recursion .

Queues, Operations on Queue: Create, Add, Delete, Full and Empty, Circular queues, Array and linked implementation of queues in C, Dequeue and Priority Queue.

**Unit-III** **08 Hours**

**Trees:** Basic terminology, Binary Trees, Binary Tree Representation: Array Representation and Dynamic Representation, Complete Binary Tree, Algebraic Expressions, Extended Binary Trees, Array and Linked Representation of Binary trees, Tree Traversal algorithms: In order, Preorder and Post order, Threaded Binary trees, Traversing Threaded Binary trees, Huffman algorithm.

**Unit-IV** **08 Hours**

**Graphs:** Terminology, Sequential and linked Representations of Graphs: Adjacency Matrices, Adjacency List, Adjacency Multi list, Graph Traversal : Depth First Search and Breadth First Search, Connected Component, Spanning Trees, Minimum Cost Spanning Trees: Prims and Kruskal algorithm. Transitive Closure and Shortest Path algorithm: Warshal Algorithm and Dijikstra Algorithm. Introduction to Activity Networks.

**Unit-V** **08 Hours**

**Searching**: Sequential search, Binary Search, Comparison and Analysis.

**Internal Sorting**: Insertion Sort, Selection, Bubble Sort, Quick Sort, Two Way Merge Sort, Heap

Sort, Radix Sort, Practical consideration for Internal Sorting.

**Search Trees:** Binary Search Trees (BST), Insertion and Deletion in BST, Complexity of Search Algorithm, AVL trees, Introduction to m-way Search Trees, B Trees & B+ Trees

Hashing: Hash Function, Collision Resolution Strategies

Storage Management: Garbage Collection and Compaction.

***Text books and References:***


- Aaron M. Tenenbaum, Yedidyah Langsam and Moshe J. Augenstein "Data Structures Using C and C++", PHI
- Horowitz and Sahani, "Fundamentals of Data Structures", Galgotia Publication
- Jean Paul Trembley and Paul G. Sorenson, "An Introduction to Data Structures with applications", McGraw Hill
- R. Kruse etal, "Data Structures and Program Design in C", Pearson Education
- Lipschutz, "Data Structures" Schaum's Outline Series, TMH
- G A V Pai, "Data Structures and Algorithms", TMH

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## Content:

**Unit-I** **08 Hours**

**Set Theory:** Introduction, Combination of sets, Multisets, Ordered pairs. Proofs of some general identities on sets.

**Relations:** Definition, Operations on relations, Properties of relations, Composite Relations, Equality of relations, Recursive definition of relation, Order of relations.

**Functions:** Definition, Classification of functions, Operations on functions, Recursively defined functions. Growth of Functions.

**Natural Numbers:** Introduction, Mathematical Induction, Variants of Induction, Induction with Nonzero Base cases. Proof Methods, Proof by counter - example, Proof by contradiction.

**Unit-II** **08 Hours**

Algebraic Structures: Definition, Groups, Subgroups and order, Cyclic Groups, Cosets, Lagrange's theorem, Normal Subgroups, Permutation and Symmetric groups, Group Homomorphism's, Definition and elementary properties of Rings and Fields, Integers Modulo *n*.

**Unit-III** **08 Hours**

Partial order sets: Definition, Partial order sets, Combination of partial order sets, Hasse diagram. Lattices: Definition, Properties of lattices - Bounded, Complemented, Modular and Complete lattice.

Boolean algebra: Introduction, Axioms and Theorems of Boolean algebra, Algebraic manipulation of Boolean expressions. Simplification of Boolean Functions, Karnaugh maps, Logic gates, Digital circuits and Boolean algebra.

**Unit-IV** **08 Hours**

Propositional Logic: Proposition, well formed formula, Truth tables, Tautology, Satisfiability, Contradiction, Algebra of proposition, Theory of Inference.

Predicate Logic: First order predicate, well formed formula of predicate, quantifiers, Inference theory of predicate logic.

**Unit-V** **08 Hours**

Trees: Definition, Binary tree, Binary tree traversal, binary search tree.

Graphs: Definition and terminology, Representation of graphs, Multigraphs, Bipartite graphs, Planar Graphs, Isomorphism and Homeomorphism of graphs, Euler and Hamiltonian paths, Graph coloring, Recurrence Relation & Generating function: Recursive definition of functions, Recursive algorithms, Method of solving recurrences.

**Combinatory**: Introduction, Counting Techniques, Pigeonhole Principle, Pólya's Counting Theory.

**Text & References Book:**


- Koshy, Discrete Structures, Elsevier Pub. 2008
- Kenneth H. Rosen, Discrete Mathematics and Its Applications, 6/e, McGraw-Hill, 2006.
- B. Kolman, R.C. Busby, and S.C. Ross, Discrete Mathematical Structures, 5/e, Prentice Hall, 2004.
- E.R. Scheinerman, Mathematics: A Discrete Introduction, Brooks/Cole, 2000.
- R.P. Grimaldi, Discrete and Combinatorial Mathematics, 5/e, Addison Wesley, 2004.

# Rama University Uttar Pradesh, Kanpur

## Faculty of Engineering & Technology

### BCS-303: Web technology

| L | T | P | Credit-4 |
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**Content:**

**Unit I:** **08 Hours**

Introduction & Web Develop. Strategic: Introduction Web Technology, History of Web, Protocols governing Web, Creating Websites for Individual & Corporate World, Cyber Laws, Web application, Writing Web Projects, Identification of Objects, Web Team, Planning & Process Development

**Unit II:** **08 Hours**

HTML, XML & SCRIPTING LANGAUGE: List, Tables, Images, Forms, Frames, CSS, Document type

Definition, XML Schemes, Object Models, Presenting XML, Processing: DOM & SAX, Introduction of

Java Script, Object in Java Script, Dynamic HTML with Java Script

**Unit III:** **08 Hours**

JAVA BEANS & WEB SERVERS: Introduction of Java Beans, Java Beans Advantage & properties, BDK, Introduction of EJB, Java Beans API, Introduction to Servlets, Life Cycle of Servlet & JSDK, Servlet API, Servlet Packages: HTTP Package, Working with HTTP Request &Response, Security Issues.

**Unit IV:** **08 Hours**

JAVA SERVER PAGES: Introduction of JSP, JSP Processing, JSP Application Design, Tomcat Server, Implicit JSP Objects, Conditional Processing, Declaring Variable & Methods, Error Handling & Debugging, Sharing Data b\w JSP pages-sharing Session, Sharing Data b\w JSP pages-sharing Application Data.

**Unit V:** **08 Hours**

DATABASE CONNECTIVITY: Database Programming using JDBC, Studying Javax.sql.*, Accessing a database from JSP pages, Application -specific Database Action, Developing Java Beans in a JSP page, Introduction of struts frame work.

**Text & Reference Books:**


- Patrick Naughton and Herbertz Schildt, "J ava-2 The Complete Reference" 199, TMH.
- Shelley Powers, "Dynamic Web Publishing" 2nd Ed. Techmedia, 1998.
- Ivor Horton, "Beginning Java-2" SPD Publication
- Jason Hunter, "Java Servlet Programming" O'Reilly

## BCS-351: Logic Design Lab

**Credit-1**

| L | T | P |
|---|---|---|
| 0 | 0 | 2 |

**Content:**

1. Introduction to digital electronics lab- nomenclature of digital ICs, specifications, study of the data sheet, concept of $V_{cc}$ and ground, verification of the truth tables of logic gates using TTL ICs.
2. Implementation of the given Boolean function using logic gates in both SOP and POS forms.
3. Verification of state tables of RS, JK, T and D flip-flops using NAND & NOR gates.
4. Implementation and verification of Decoder/De-multiplexer and Encoder using logic gates.
5. Implementation of 4x1 multiplexer using logic gates.
6. Implementation of 4-bit parallel adder using 7483 IC.
7. Design, and verify the 4-bit synchronous counter.
8. Design, and verify the 4-bit asynchronous counter.
9. Mini Project.

# Rama University Uttar Pradesh, Kanpur
## Faculty of Engineering & Technology
### BCS-353: Data Structure Lab

| L | T | P | Credit-1 |
|---|---|---|---|
| 0 | 0 | 3 | |

**Content:**

**Write Program in C or C++ for following.**

1. Array implementation of Stack, Queue, Circular Queue, List.
2. Implementation of Stack, Queue, Circular Queue, List using Dynamic memory Allocation.
3. Implementation of Tree Structures, Binary Tree, Tree Traversal, Binary Search Tree, Insertion and Deletion in BST.
4. Implementation of Searching and Sorting Algorithms.
5. Graph Implementation, BFS, DFS, Min. cost spanning tree, shortest path algorithm

# Rama University Uttar Pradesh, Kanpur

## Faculty of Engineering & Technology

### BEC-358: Web Technology Lab

| L | T | P | Credit-1 |
|---|---|---|---|
| 0 | 0 | 2 | |

**Content:**

**EXPERIMENTS:**

1. Create a web page with the following using HTML

i) To embed an image map in a web page

ii) To fix the hot spots

iii) Show all the related information when the hot spots are clicked.

2. Create a web page with all types of Cascading style sheets.

3. Client Side Scripts for Validating Web Form Controls using DHTML

4. Write programs in Java to create applets incorporating the following features:

- Create a color palette with matrix of buttons
- Set background and foreground of the control text area by selecting a color from color palette.
- In order to select Foreground or background use check box control as radio buttons
- To set background images

5. Write programs in Java using Servlets:

- To invoke servlets from HTML forms
- To invoke servlets from Applets

6. Write programs in Java to create three-tier applications using JSP and Databases

- for conducting on-line examination.
- for displaying student mark list. Assume that student information is available in a database which has been stored in a database server.

7. Programs using XML - Schema - XSLT/XSL

8. Programs using AJAX

9. Consider a case where we have two web Services- an airline service and a travel agent and the travel agent is searching for an airline. Implement this scenario using Web Services and Database.

# Rama University Uttar Pradesh, Kanpur

## Faculty of Engineering & Technology

### BCS-352: Numerical Techniques Lab

| L | T | P | Credit-4 |
|---|---|---|---|
| 0 | 0 | 2 | |

**Content:**

**Write Programs in 'C' Language:**

1. To deduce error envolved in polynomial equation.
2. To Find out the root of the Algebraic and Transcendental equations using
3. Bisection, Regula-falsi, Newton Raphson and Iterative Methods. Also give the
4. rate of convergence of roots in tabular form for each of these methods.
5. To implement Newton's Forward and Backward Interpolation formula.
6. To implement Gauss Forward and Backward, Bessel's, Sterling's and Evertt's
7. Interpolation formula
8. To implement Newton's Divided Difference and Langranges Interpolationformula.
9. To implement Numerical Differentiations.

-To implement Numerical Integration using Trapezoidal, Simpson1/3 andSimpson3/8 rule.

-To implement Least Square Method for curve fitting.

-To draw frequency chart like histogram, frequency curve and pie-chart etc.

-To estimate regression equation from sampled data and evaluate values of

I. standard deviation, t-statistics, regression coefficient, value of $R^2$ for atleast two

II. independent variables.

**Departmental Elective-I**

1. BCS -041 Software Testing
2. BCS -042 Software Reliability
3. BCS -043 Software Quality Engineering
4. BCS-044 Principal of Programming Language
5. BCS-045 Management Information System

# Rama University Uttar Pradesh, Kanpur
## Faculty of Engineering & Technology
### BCS-041: Software Testing

| L | T | P | Credit-4 |
|---|---|---|---|
| 3 | 1 | 0 | |

**Content:**

**Unit-I: Introduction** **08 hours**

Faults, Errors, and Failures, Basics of software testing, Testing objectives, Principles of testing, Requirements, behavior and correctness, Testing and debugging, Test metrics and measurements, Verification, Validation and Testing, Types of testing, Software Quality and Reliability, Software defect tracking.

**Unit-II: White Box and Black Box Testing** **08 hours**

White box testing, static testing, static analysis tools, Structural testing: Unit/Code functional testing, Code coverage testing, Code complexity testing, Black Box testing, Requirements based testing, Boundary value analysis, Equivalence partitioning, state/graph based testing, Model based testing and model checking, Differences between white box and Black box testing.

**Unit-III: Integration, System, and Acceptance Testing** **08 hours**

Top down and Bottom up integration, Bi-directional integration, System integration, Scenario Testing, Defect Bash, Functional versus Non-functional testing, Design/Architecture verification, Deployment testing, Beta testing, Scalability testing, Reliability testing, Stress testing, Acceptance testing: Acceptance criteria, test cases selection and execution,

**Unit-IV: Test Selection & Minimization for Regression Testing** **08 hours**

Regression testing, Regression test process, Initial Smoke or Sanity test, Selection of regression tests, Execution Trace, Dynamic Slicing, Test Minimization, Tools for regression testing, Ad hoc Testing: Pair testing, Exploratory testing, Iterative testing, Defect seeding.

**Unit-V: Test Management and Automation** **08 hours**

Test Planning, Management, Execution and Reporting, Software Test Automation: Scope of automation, Design & Architecture for automation, Generic requirements for test tool framework, Test tool selection, testing in Object Oriented Systems.

**Text & Reference Books:**


- S. Desikan and G. Ramesh, "Software Testing: Principles and Practices", Pearson Education.
- Aditya P. Mathur, "Fundamentals of Software Testing", Pearson Education.
- Naik and Tripathy, "Software Testing and Quality Assurance", Wiley
- K. K. Aggarwal and Yogesh Singh, "Software Engineering", New Age International Publication.

# Rama University Uttar Pradesh, Kanpur
## Faculty of Engineering & Technology
### BCS-042: Software Reliability

| L | T | P | Credit-4 |
|---|---|---|---|
| 3 | 1 | 0 | |

**Content:**

**UNIT-I: Introduction** **08 hours**

Defining Software Reliability, Software Reliability Attributes and Specification, Concept of Defects, Faults, Failures, Defect Rate and Reliability, Defect Prevention, Reduction, and Containment, Overview of Different Types of Software Review, Introduction to Measurement and Inspection Process, Documents and Metrics.

**UNIT-II: Software Reliability Metrics** **08 hours**

Collection of fault and failure data, Measurement of internal and external product attributes, Customer Problems Metric, Customer Satisfaction Metrics, In-Process Quality Metrics: Defect Arrival Pattern, Phase-Based Defect Removal Pattern, Defect Removal Effectiveness, Metrics for Software Maintenance, Software Reliability indicators, Software Reliability Metrics, Static Code Metrics, Dynamic Metrics.

**UNIT-III: Software Reliability Assessment Models** **08 hours**

Basics of Reliability Theory, Software Reliability Problem, Modeling Process, Software Reliability Models, Parametric Reliability Growth Models, The Rayleigh Model, Exponential Distribution and Software Reliability Growth Models, Software Quality Assessment Models: Hierarchical Model of Software Quality Assessment.

**UNIT-IV: Software Reliability Allocation Models** **08 hours**

Software Reliability Allocation Models, Criteria for Model Evaluation, Optimal Reliability Allocation, Quality Planning and Control, Quality Improvement Process, Evolution of Software Quality Assurance (SQA), Major SQA Activities, Major SQA Issues, Zero Defect Software.

**UNIT-V: Software Reliability Techniques** **08 hours**

Reliability Techniques: Trending Reliability Techniques, Predicting Reliability Techniques, Error Seeding, Failure Rate, Curve Fitting, Reliability Growth, Models and Tools: Study of tools like CASRE, SARA, SMERFS.

**Text & Reference Books:**


- John Musa, "Software Reliability Engineering", McGraw-Hill
- Fenton, and P fleeger, "Software Metrics: A Rigorous and Practical Approach", International Thomson Computer Press
- Jeff Tian, Software Quality Engineering (SQE), Wiley.

| L | T | P | Credit-4 |
|---|---|---|---|
| 3 | 1 | 0 | |

## Content:

**UNIT-I: Introduction** **08 hours**

Defining Software Quality, Software Quality Attributes and Specification, Cost of Quality, Defects, Faults, Failures, Defect Rate and Reliability, Defect Prevention, Reduction, and Containment, Overview of Different Types of Software Review, Introduction to Measurement and Inspection Process, Documents and Metrics.

**UNIT-II: Software Quality Metrics** **08 hours**

Product Quality Metrics: Defect Density, Customer Problems Metric, Customer Satisfaction Metrics, Function Points, In-Process Quality Metrics: Defect Arrival Pattern, Phase-Based Defect Removal Pattern, Defect Removal Effectiveness, Metrics for Software Maintenance: Backlog Management Index, Fix Response Time, Fix Quality, Software Quality Indicators.

**UNIT-III: Software Quality Management and Models** **08 hours**

Modeling Process, Software Reliability Models: The Rayleigh Model, Exponential Distribution and Software Reliability Growth Models, Software Reliability Allocation Models, Criteria for Model Evaluation, Software Quality Assessment Models: Hierarchical Model of Software Quality Assessment.

**UNIT-IV: Software Quality Assurance** **08 hours**

Quality Planning and Control, Quality Improvement Process, Evolution of Software Quality Assurance (SQA), Major SQA Activities, Major SQA Issues, Zero Defect Software, SQA Techniques, Statistical Quality Assurance, Total Quality Management, Quality Standards and Processes.

**UNIT-V: Software Verification, Validation & Testing:** **08 hours**

Verification and Validation, Evolutionary Nature of Verification and Validation, Impracticality of Testing all Data and Paths, Proof of Correctness, Software Testing,

Functional, Structural and Error Oriented Analysis & Testing, Static and Dynamic Testing Tools, Characteristics of Modern Testing Tools.

**Text & Reference Books:**


- Jeff Tian, Software Quality Engineering (SQE), Wiley
- Stephen H. Kan, Metrics and Models in Software Quality Engineering, Addison-Wesley

# Rama University Uttar Pradesh, Kanpur
## Faculty of Engineering & Technology
### BCS-044: Principal of Programming Languages

**L T P** **Credit-4**

**3 1 0**

**Content:**

**UNIT I** **08 hours**

Program Design: Introduction- fundamental Design Concepts - Modules and Modularization Criteria Design notation: Procedure Template, Pseudo Code - Structured Flow Chart - Decision Tables-Designt echniques: Stepwise refinement, Levels of abstraction, Top down- Test Plans- Design Guidelines. Implementation Issues: Introduction - Structured Coding techniques: single entry and single exit constructs, Efficiency consideration, Validation of single entry and single exit, Coding Style.

**UNIT II** **08 hours**

Introduction: Characteristics of programming Languages, Factors influencing the evolution of programming language, Development in programming methodologies, desirable features and design issues. Programming Language processors: Structure and operations of translators, software simulated computer, syntax, semantics, structure, virtual computers, binding and binding time.

**UNIT III** **08 hours**

Data types: Properties of types and objects - elementary data types - structured data types. Abstraction: Abstract data types - encapsulation by subprograms - type definition – storage management.

**UNIT IV** **08 hours**

Sequence Control: Implicit and explicit sequence control - sequencing with arithmetic and non arithmetic expressions - sequence control between statements. Subprograms Control: Subprogram sequence control - attributes of data control - shared data in.

**UNIT V** **08 hours**

Object Oriented Programming: The class notion - Information hiding and data abstraction using classes, derived classes and inheritance, Polymorphism, Parameterized

types. Logic Programming: Formal logical systems - PROLOG. Functional Programming: Features of functional languages - LISP - Applications of functional and logic programming languages.

**TEXT BOOK:**

- Richard Fairley," Software Engineering Concepts", Tata Macgraw Hill, 2006 (UNIT I)
- Terrance W. Pratt, and Marvin V. Zelkowitz, "Programming Languages, Design and Implementation", Prentice-Hall of India, Fourth edition, 2002 (UNIT II to V)

**REFERENCES:**


- Ravi Sethi, "Programming Languages - Concepts and Constructs", Addison-Wesley, Second edition, 1996.
- Allen B. Tucker, Robert Noonan, Programming Languages: Principles and Paradigms, Tata McGraw- Hill, 2006.
- E. Horowitz, "Fundamentals of Programming Languages", Galgotia Publishers, 1984.
- A.B. Tucker, Robert, Noonan, "Programming Languages", McGraw-Hill, 2002.
- Robert W. Sebesta, "Concepts of Programming Languages", Addison Wesley, Sixth edition, 2003.

# Rama University Uttar Pradesh, Kanpur

## Faculty of Engineering & Technology

### BCS-045: Management Information System

| L | T | P | Credit-4 |
|---|---|---|---|
| 3 | 1 | 0 | |

**Content:**

**UNIT I** **08 hours**

**INFORMATION SYSTEM AND ORGANIZATION**

Matching the Information System Plan to the Organizational Strategic Plan – Identifying Key Organizational Objective and Processes and Developing an Information System Development User role in Systems Development Process - Maintainability and Recoverability in System Design.

**UNIT II** **08 hours**

**REPRESENTATION AND ANALYSIS OF SYSTEM STRUCTURE**

Models for Representing Systems: Mathematical, Graphical and Hierarchical (Organization Chart, Tree Diagram) - Information Flow - Process Flow - Methods and Heuristics - Decomposition and Aggregation - Information Architecture - Application of System Representation to Case Studies.

**UNIT III** **08 hours**

**SYSTEMS, INFORMATION AND DECISION THEORY**

Information Theory - Information Content and Redundancy - Classification and Compression Summarizing and Filtering - Inferences and Uncertainty - Identifying Information needed to Support Decision Making - Human Factors - Problem characteristics and Information System Capabilities in Decision Making.

**UNIT IV** **08 hours**

**INFORMATION SYSTEM APPLICATION**

Transaction Processing Applications - Basic Accounting Application - Applications for Budgeting and Planning - Other use of Information Technology: Automation - Word Processing - Electronic Mail Evaluation Remote Conferencing and Graphics - System and Selection - Cost Benefit Centralized versus Decentralized Allocation Mechanism.

**UNIT V** **08 hours**

**DEVELOPMENT AND MAINTENANCE OF INFORMATION SYSTEMS**

Systems analysis and design - System development life cycle - Limitation - End User Development Managing End Users - off- the shelf software packages - Outsourcing - Comparison of different methodologies.

**TEXT & REFERENCE BOOKS:**


- Laudon K.C, Laudon J.P, Brabston M.E, "Management Information Systems - Managing the digital firm", Pearon Education, 2004.
- Turban E.F, Potter R.E, "Introduction to Information Technology"; Wiley, 2004.
- Jeffrey A.Hoffer, Joey F.George, Joseph S. Valachich, "Modern Systems Analysis and Design", Third Edition, Prentice Hall, 2002.

| L | T | P | Credit-4 |
|---|---|---|---|
| 3 | 1 | 0 | |

## Content:

**Unit I** **08 Hours**

Overview of System Analysis & Design, Business System Concept, System Development Life Cycle, Water fall Model, Spiral Model, Feasibility Analysis, Technical Feasibility, Cost Benefit Analysis, COCOMO model.

**Unit II** **08 Hours**

System Requirement Specification-DFD, Data Dictionary, ER diagram, Process Organization &Interactions. System Design- Problem Partitioning, Top down and Bottom Up design; Decision tree, decision table and structured English; Functional vs. Object Oriented approach.

**Unit III** **08 Hours**

Coding & Documentation Structured Programming, OOPS Programming, Information Hiding, Reuse, System Documentation. Testing - Levels of Testing, Integration Testing, Test case Specification, Reliability Assessment. , Validation & Verification Metrics, Monitoring & Control.

**Unit IV** **08 Hours**

Software Project Management - Project Scheduling, Staffing, Software Configuration Management.

**Unit V** **08 Hours**

Quality Assurance, Project Monitoring. CASETOOLS: Concepts, use and application.

**Text & Reference Books:**


- R.G.Pressman-Software Engineering, TMH
- Behforooz, Software Engineering Fundamentals, OUP
- Ghezzi, Software Engineering, PHI
- Pankaj Jalote-An Integrated Approach to Software Engineering, NAROSA.
- Object Oriented & Classical Software Engineering (Fifth Edition),SCHACH,TMH

# Rama University Uttar Pradesh, Kanpur

## Faculty of Engineering & Technology

## BCS-402: Advance Computer Organization & Architecture

**Credit-4**

| L | T | P |
|---|---|---|
| 3 | 1 | 0 |

**Content:**

**Unit-I** **08 Hours**

**Introduction**: Number representation; fixed and floating point number representation, IEEE standard for floating point representation. Error detection and correction codes: Hamming code. Digital computer generation, computer types and classifications, functional units and their interconnections, buses, bus architecture, types of buses and bus arbitration. Register, bus and memory transfer.

**Unit-II** **08 Hours**

**Central Processing Unit:** Addition and subtraction of signed numbers look ahead carry adders. Multiplication: Signed operand multiplication, Booths algorithm and array multiplier. Division and logic operations. Floating point arithmetic operation Processor organization, general registers organization, stack organization and addressing modes.

**Unit-III** **08 Hours**

**Control Unit:** Instruction types, formats, instruction cycles and sub cycles ( fetch and execute etc) , micro-operations, execution of a complete instruction.

**Hardwire and micro programmed control**: microprogramming sequencing, wide branch addressing, and microinstruction with next address field, pre-fetching microinstructions, concept of horizontal and vertical microprogramming.

**Unit-IV** **08 Hours**

**Memory:** Basic concept and hierarchy, semiconductor RAM memories, 2D & 2 1/2D memory organization. ROM memories.

**Cache Memories:** concept and design issues 9 performance, address mapping and replacement)

**Auxiliary Memories:** magnetic disk, magnetic tape and optical disks Virtual memory: concept implementation.

**Unit-V** **08 Hours**

**Input / Output:** Peripheral devices, I/O interface, I/O ports, Interrupts: interrupt hardware, types of interrupts and exceptions.

**Modes of Data Transfer:** Programmed I/O, interrupt initiated I/O and Direct Memory Access. I/O channels and processors.

**Serial Communication:** Synchronous & asynchronous communication, standard communication interfaces.

**Text Books:**


- Patterson, Computer Organisation and Design, Elsevier Pub. 2009
- William Stalling, " Computer Organization", PHI
- Vravice, Hamacher & Zaky, "Computer Organization", TMH
- Mano," Computer System Architecture", PHI


**Reference Books:**


- John P Hays, " Computer Organization", McGraw Hill
- Tannenbaum," Structured Computer Organization', PHI
- P Pal chaudhry, ' Computer Organization & Design', PHI

# Rama University Uttar Pradesh, Kanpur

## Faculty of Engineering & Technology

### BCS-403: Data Base Management System

| L | T | P | Credit-4 |
|---|---|---|---|
| 3 | 1 | 0 | |

## Content:

**Unit-I** **08 Hours**

**Introduction:** An overview of database management system, database system Vs file system, Database system concept and architecture, data model schema and instances, data independence and database language and interfaces, data definitions language, DML, Overall Database Structure.

**Data modeling using the Entity Relationship Model:**

ER model concepts, notation for ER diagram, mapping constraints, keys, Concepts of Super Key, candidate key, primary key, Generalization, aggregation, reduction of an ER diagrams to tables extended ER model, relationship of higher degree.

**Unit-II** **08 Hours**

**Relational data Model and Language**: Relational data model concepts, integrity constraints, entity integrity, referential integrity, Keys constraints, Domain constraints, relational algebra, relational calculus, tuple and domain calculus.

**Introduction on SQL:** Characteristics of SQL, advantage of SQL. SQL data type and literals. Types of SQL commands.SQL operators and their procedure. Tables, views and indexes. Queries and sub queries. Aggregate functions. Insert, update and delete operations, Joins, Unions, Intersection, Minus, Cursors, Triggers, Procedures in SQL/PLSQL

**Unit-III** **08 Hours**

**Data Base Design & Normalization:** Functional dependencies, normal forms, first, second, third normal forms, BCNF, inclusion dependence, loss less join decompositions, normalization using FD, MVD, and JDs, alternative approaches to database design.

**Unit-IV** **08 Hours**

**Transaction Processing Concept:** Transaction system, Testing of serializability, serializability of schedules, conflict & view serializable schedule, recoverability, Recovery from transaction failures, log based recovery, checkpoints, deadlock handling.

**Distributed Database:** distributed data storage, concurrency control, directory system.

**Unit-V** **08 Hours**

Concurrency Control Techniques: Concurrency control, Locking Techniques for concurrency control, Time stamping protocols for concurrency control, validation based protocol, multiple

Granularity, Multi version schemes, Recovery with concurrent transaction, case study of Oracle.

## Reference Books:


- Date C J, " An Introduction to Database Systems", Addision Wesley
- Korth, Silbertz, Sudarshan," Database Concepts", McGraw Hill
- Elmasri, Navathe, "Fudamentals of Database Systems", Addision Wesley O'Neil, Databases, Elsevier Pub.


## Text Books:


- Leon & Leon, "Database Management Systems", Vikas Publishing House
- Bipin C. Desai, " An Introduction to Database Systems", Gagotia Publication

# Rama University Uttar Pradesh, Kanpur
## Faculty of Engineering & Technology
### BCS-404: Theory of Automata and Formal Languages

| L | T | P | Credit-4 |
|---|---|---|---|
| 3 | 1 | 0 | |

**Content:**

**Unit – I** **8 Hours**

**Introduction:**
Alphabets, Strings and Languages; Automata and Grammars, Deterministic finite Automata (DFA)-Formal Definition, Simplified notation: State transition graph, Transition table, Language of DFA, Nondeterministic finite Automata (NFA), NFA with epsilon transition, Language of NFA, Equivalence of NFA and DFA, Minimization of Finite Automata, Distinguishing one string from other, My hill-Nerode Theorem .

**Unit - II** **8 Hours**

Regular expression (RE), Definition, Operators of regular expression and The precedence, Algebraic laws for Regular expressions, Kleen's Theorem, Regular expression to FA, DFA to Regular expression, Arden Theorem, Non Regular Languages, Pumping Lemma for regular Languages. Application of Pumping Lemma, Closure properties of Regular Languages, Decision properties of Regular Languages, FA with output: Moore and Mealy machine, Equivalence of Moore and Mealy Machine, Applications and Limitation of FA.

**Unit - III** **8 Hours**

**Context free grammar (CFG) and Context Free Languages (CFL):** Definition, Examples, Derivation, Derivation trees, Ambiguity in Grammar, Inherent ambiguity, Ambiguous to Unambiguous CFG, Useless symbols, Simplification of CFGs, Normal forms for CFGs: CNF and GNF, Closure properties of CFLs, Decision Properties of CFLs: Emptiness, Finiteness and Membership, Pumping lemma for CFLs.

**Unit - IV** **8 Hours**

**Push Down Automata (PDA):** Description and definition, Instantaneous Description, Language of PDA, Acceptance by Final state, Acceptance by empty stack, Deterministic PDA, Equivalence of PDA and CFG, CFG to PDA and PDA to CFG, Two stack PDA.

**Unit–V** **8 Hours**

**Turing machines (TM):** Basic model, definition and representation, Instantaneous Description, Language acceptance by TM, Variants of Turing Machine, TM as Computer of Integer functions, Universal TM, Church's Thesis, Recursive and recursively enumerable languages, Halting problem, Introduction to Undesirability, Undecidable problems about TMs. Post correspondence problem (PCP), Modified PCP, Introduction to recursive function theory.

## Text and Reference Books:


- Hopcroft, Ullman, "Introduction to Automata Theory, Languages and Computation", Pearson Education
- K.L.P. Mishra and N.Chandrasekaran, "Theory of Computer Science: Automata, Languages and Computation", PHI
- Martin J. C., "Introduction to Languages and Theory of Computations", TMH
- Papadimitrou, C. and Lewis, C.L., "Elements of the Theory of Computation", PHI

# Rama University Uttar Pradesh, Kanpur
## Faculty of Engineering & Technology
### BCS-451: Software Engineering Lab

| L | T | P | Credit-1 |
|---|---|---|---|
| 0 | 0 | 2 | |

**Content:**

1. Program for configuration Management.
2. Perform SA/SD for the following software.
   - Hotel Automation System
   - Book Shop Automation Software
   - Word processing Software
   - Software Component Cataloguing Software.
3. Design and development of test cases for testing.
4. Writing program in Java for Computing Cyclomatic Complexity.
5. Development of Software t ool for Halstead Analysis.
6. Perform Cost/Benefit analysis.
7. Illustration of various activities of Software development using MS Project 2000.
8. Lab exercise involving development of various practical applications using software Like VJ++VB, SYBASE, JDK.

[Students are to be given a major assignment t to be completed using one or more of these tools,

Student's exposure to any CASE tool is desirable]

9. Case Studies: Payroll System, Banking System, Purchase Order System, Library Management

System, Railway Reservation System, Bill Tracking System, College Admission System, State management System.

# Rama University Uttar Pradesh, Kanpur

## Faculty of Engineering & Technology

### BCS-452: Computer Organization LAB

| L | T | P | Credit-1 |
|---|---|---|---|
| 0 | 0 | 2 | |

**Content:**

- Bread Board Implementation of Flip-Flops.
- Experiments with clocked Flip-Flop. Design of Counters.

# Rama University Uttar Pradesh, Kanpur

## Faculty of Engineering & Technology

### BCS-453: DBMS LAB

| L | T | P | Credit-1 |
|---|---|---|---|
| 0 | 0 | 2 | |

**Content:**

1. Write the queries for Data Definition and Data Manipulation Language.
2. Write SQL queries using logical operations (=,<,>,etc)
3. Write SQL queries using SQL operators
4. Write SQL query using character, number, date and group functions
5. Write SQL queries for relational algebra
6. Write SQL queries for extracting data from more than one table
7. Write SQL queries for sub queries, nested queries
8. Write a programme by the use of PL/SQL
9. Concepts for ROLL BACK, COMMIT & CHECK POINTS
10. Create VIEWS, CURSORS and TRGGERS & write ASSERTIONS.
11. Create FORMS and REPORTS

**Note:**

1. The queries to be implemented on DBMS using SQL
2. Students are advised to use Developer 2000/Oracle9i or other latest version for above experiments.. However student may use Power Builder/SQL SERVER .Mini Projects may also be planned & carried out throughout the semester to understand important concepts of database.

# Rama University Uttar Pradesh, Kanpur

## Faculty of Engineering & Technology

### BCS-454: Principal of Programming Language LAB

| L | T | P | Credit-1 |
|---|---|---|---|
| 0 | 0 | 2 | |

**Content:**

1. Introducing Turbo C++ Compiler and its environment / Linux Environment
2. A Sample C program. Some problems related formatted strings.
3. Write a program to convert centigrade to Fahrenheit. [F = 9/5 * C + 32]
4. Write a program that calculates the area of a circle and circumference.
5. Write a program that calculates the area of a triangle.
6. Write a program that reads the marks in each subject and calculates the percentage.
7. Write a program that reads a number and identifies whether the given number is even or odd.
8. Write a program to find the largest number among two numbers
9. Write a program to read the mark of a subject and prints the equivalent grade.
10. Write a program to read a sentence and counts the total number of character (excluding space) using while loop.
11. Write a program to generate Fibonacci number using do while loop.
12. Write a program to read number and identifies whether the given number is a prime number or not.
13. Write a program to identify whether the given number is a perfect number or not. 28 is a perfect number.
14. Write a program to calculate the factorial of a given number.
15. Write a program to identify whether the given number is a perfect number or not using a function. 28 is a perfect number.
16. Write a program to evaluate GCD of two given integers. Use function that returns GCD.
17. Write a recursive program to find the factorial of a given number.
18. Write a recursive program to find a GCD of two numbers.
19. Write a recursive program to find the sum of n natural numbers.
20. Write a C program to store N numbers in a one dimensional array and calculate its average with the help of the function.

21. Write a C program to convert a binary number to decimal with the help of the function.

[*Inttodecimal (char bits[20], int length)]* here *bits* is the character array to represent bits of

binary numbers and *length* is the number of bits in the binary number.

22. Write a program to evaluate transpose of n by n matrix with the help of function.

[*int [][20] transpose(int matrix[][20],n*] here *matrix is* the matrix is the to be transformed and

*n* is the dimension of *matrix*. The function should return transpose of the matrix.

23. Write a C program for matrix addition with the help of function

[*int [][20] add(int a[][20], int b[][20], int n, int m)*] Here *a* and *b* are matrix to be added and *n* and *m* are dimension of *a* and *b*. the function should return *m* by *n* matrix containing the addition data.

**Departmental Elective-II**

1. BCS -051 Graph Theory & Combinatorics
2. BCS -052 Mobile Computing
3. BCS -053 Software Project Management
4. BCS-054 E-Commerce Technology
5. BCS-055 Microprocessor

# Rama University Uttar Pradesh, Kanpur

## Faculty of Engineering & Technology

## BCS-051: Graph Theory and Combinatory

**L T P** **Credit-4**

**3 1 0**

**Content:**

**Unit –I** **08 hours**

Introduction to graphs - definitions - sub graphs - paths and cycles - matrix representation of graphs Euler tours - Chinese postman problem planar graphs Euler's formula platonic bodies applications of Kuratowski's theorem - Hamiltonian graphs - graph coloring and chromatic polynomials – map coloring.

**Unit –II** **08 hours**

Trees - definitions and properties - rooted trees - trees and sorting - weighted trees and prefix code biconnected components and articulation points - the max-flow min-cut theorem - maximum bipartite matching - Matching's' and augmenting paths -the personal assignment problem – Networks flows and cuts - ford and Fulkerson algorithm - separating sets.

**Unit- III** **08 hours**

Planer graphs, combinatorial and geometric dual: Kuratowski graphs, detection of planarity, geometric dual, Discussion on criterion of planarity, thickness and crossings.

**Unit- IV** **08 hours**

Fundamental principles of counting permutations and combinations binomial theorem combinations with repetition combinatorial numbers principle of inclusion and exclusion derangements arrangements with forbidden positions.

**Unit –V** **08 hours**

Generating functions partitions of integers, the exponential generating function the summation operator - recurrence relations first order and second order non-homogeneous recurrence relations method of generating functions.

**Text & Reference Books:**


- Corman T.H., Leiserson C.E. & Rivest R.L., Introduction to Algorithms, Prentice Hall India.
- Mott J.L., Kandel A. & Baker T.P, Discrete Mathematics for Computer Scientists and arithmeticians, Prentice Hall of India.
- Liu C.L., Elements of Discrete Mathematics, McGraw Hill.
- Rosen K.H., Discrete Mathematics and Its Applications, McGraw Hill.

| L | T | P | Credit-4 |
|---|---|---|---|
| 3 | 1 | 0 | |

**Content:**

**Unit–I** **08 hours**

Introduction, issues in mobile computing, overview of wireless telephony: cellular concept, GSM: air-interface, channel structure, location management: HLR-VLR, hierarchical, handoffs, channel allocation in cellular systems, CDMA, GPRS.

**Unit - II** **08 hours**

Wireless Networking, Wireless LAN Overview: MAC issues, IEEE 802.11, Blue Tooth, Wireless multiple access protocols, TCP over wireless, Wireless applications, data broadcasting, Mobile IP, WAP: Architecture, protocol stack, application environment, applications.

**Unit - III** **08 hours**

Data management issues, data replication for mobile computers, adaptive clustering for mobile wireless networks, File system, Disconnected operations.

**Unit - IV** **08 hours**

Mobile Agents computing, security and fault tolerance, transaction processing in mobile computing environment.

**Unit - V** **08 hours**

Adhoc networks, localization, MAC issues, Routing protocols, global state routing (GSR), Destination sequenced distance vector routing (DSDV), Dynamic source routing (DSR), Ad Hoc on demand distance vector routing (AODV), Temporary ordered routing algorithm (TORA), QoS in Ad Hoc Networks, applications.

**Text & Reference Books:**


- J. Schiller, Mobile Communications, Addison Wesley.
- Charles Perkins, Mobile IP, Addison Wesley.
- Charles Perkins, Ad hoc Networks, Addison Wesley.
- Upadhyaya, "Mobile Computing", Springer

# Rama University Uttar Pradesh, Kanpur

## Faculty of Engineering & Technology

### BCS-053: Software Project Management

**L T P** **Credit-4**

**3 1 0**

**Content:**

**UNIT-I: Introduction and Software Project Planning** **08 hours**

Fundamentals of Software Project Management (SPM), Need Identification, Vision and Scope document, Project Management Cycle, SPM Objectives, Management Spectrum, SPM Framework, Software Project Planning, Planning Objectives, Project Plan, Types of project plan, Structure of a Software Project Management Plan, Software project estimation, Estimation methods, Estimation models, Decision process.

**UNIT-II: Project Organization and Scheduling** **08 hours**

Project Elements, Work Breakdown Structure (WBS), Types of WBS, Functions, Activities and Tasks, Project Life Cycle and Product Life Cycle, Ways to Organize Personnel, Project schedule, Scheduling Objectives, Building the project schedule, Scheduling terminology and techniques, Network Diagrams: PERT, CPM, Bar Charts: Milestone Charts, Gantt Charts.

**UNIT-III: Project Monitoring and Control** **08 hours**

Dimensions of Project Monitoring & Control, Earned Value Analysis, Earned Value Indicators: Budgeted Cost for Work Scheduled (BCWS), Cost Variance (CV), Schedule Variance (SV), Cost Performance Index (CPI), Schedule Performance Index (SPI), Interpretation of Earned Value Indicators, Error Tracking, Software Reviews, Types of Review: Inspections, Desk checks, Walkthroughs, Code Reviews, Pair Programming.

**UNIT-IV: Software Quality Assurance and Testing** **08 hours**

Testing Objectives, Testing Principles, Test Plans, Test Cases, Types of Testing, Levels of Testing, Test Strategies, Program Correctness, Program Verification & validation, Testing Automation & Testing Tools, Concept of Software Quality, Software Quality Attributes, Software Quality Metrics and Indicators, The SEI Capability Maturity Model CMM), SQA Activities, Formal SQA Approaches: Proof of correctness, Statistical quality assurance, Clean room process.

**UNIT-V: Project Management and Project Management Tools** **08 hours**

Software Configuration Management: Software Configuration Items and tasks, Baselines, Plan for Change, Change Control, Change Requests Management, Version Control, Risk Management: Risks and risk types, Risk Breakdown Structure (RBS), Risk Management Process: Risk identification, Risk analysis, Risk planning, Risk monitoring, Cost Benefit Analysis, Software Project Management Tools: CASE Tools, Planning and Scheduling Tools, MS-Project.

**Text & Reference Books:**

- M. Cotterell, Software Project Management, Tata McGraw-Hill Publication.
- Royce, Software Project Management, Pearson Education
- Kieron Conway, Software Project Management, Dreamtech Press
- S. A. Kelkar, Software Project Management, PHI Publication.

# Rama University Uttar Pradesh, Kanpur
## Faculty of Engineering & Technology
### BCS-054: E-Commerce Technology

**L T P** **Credit-4**

**3 1 0**

**Content:**

**UNIT I** **08 hours**

**Internet Concepts:** WWW, Internet and E-Commerce, Linking to the Internet, Internet Address, Internet Tools- Information Retrieval tools (ftp, Gopher), Communication Tools(Email, FTP, Telnet, Usenet), Multimedia Information Tools(Home page), Information Search Tools( Archie, Veronica, WAIS). Domain Name System.

**Intranet and Extranet:** Intranet, Intranet vs. Groupware, Intranet Hardware, Intranet Software, Intranet Services (Web (HTTP) Publishing, HTML, Hypertext), Communication Systems (Email, Fax), Software used in Electronic mail, Electronic Meeting Systems (Audio conferencing, Video Conferencing, Groupware), Extranet.

**UNIT II** **08 hours**

**Working of the internet with TCP/IP:** Origin of TCP/IP.,TCP/IP communication architecture, Internet Architecture, Working of TCP/IP,TCP/IP Applications-FTP, Telnet, Trivial File Transfer Protocol, Simple Mail Transfer Protocol, Network File System. TCP/IP implementations

**Internet Security:** Security on the internet, Network and Website Security Risks, Site Hacking, Security Incidents on the internet, security and email, network and website security, Firewall (Concept, Components and Constituents, Benefits, Enterprise wide security Framework, secure physical infrastructure).

**UNIT III** **08 hours**

**Overview of E-Commerce Technologies:** Encryption overview, Elements of an encryption system, Secret key encryption, Public-key encryption, Digital signatures, Digital Certificates, Cryptography export restrictions, Secure Sockets Layer(SSL), Secure Electronic Transactions (SET),Smart Cards and its applications.

**UNIT IV** **08 hours**

**Electronic Data Interchange-** Evolution, uses, Benefits, Working of EDI, EDI Standards (includes variable length EDI standards), Cost Benefit Analysis of EDI, Electronic Trading Networks, EDI Components, File Types, EDI Services, EDI Software, Business Approach of EDI, EDIFACT (Overview, Structure, EDIFACT Software), Business Future of EDI,EDI Administration. EDI Security, Security Mechanisms, Technological aspects (Smart Cards, Worm Disks, Biometrics), Security Mechanism.

**Security Issues in E-Commerce Technologies-** Introduction to Security, Passwords, Viruses, Firewalls, Encryption (PGP, SHTTP, SSL).

**UNIT V** **08 hours**

**Enterprise Resource Planning**-Evolution of ERP, Characteristics, Features, Components, Need, ERP Vendors, Business Process Reengineering, Advantages of ERP Packages, Implementation of ERP Packages, Future of ERP Systems, Integrated SAP Model, Integrated Data-Master Data, Transactional data, Integrated Processes, Pros and cons of integration, SAPArchitecture and Integration.

**Text & Reference Books:**


- Doing Business on the Internet E-COMMERCE (Electronic Commerce for Business) S. Jaiswal, Galgotia Publications.
- E-Commerce An Indian Perspective, P.T.Joseph, S.J., PHI.
- Electronic Commerce: Greenstein, Merylin, Tata Mc.Graw Hill

# Rama University Uttar Pradesh, Kanpur
## Faculty of Engineering & Technology
### BCS-055: Microprocessor

**L T P** **Credit-4**

**3 1 0**

**Content:**

**UNIT I** **08 hours**

Architecture of 8085 microprocessor, registers, flags, ALU-Address bus and data bus De-multiplexing address / data bus-control and status signals-Control bus-Programmer's model of 8085-Pin-out signal function diagram-Functions of different pins.

**UNIT II** **08 hours**

Instruction set of 8085-data transfer, arithmetic, logic, branching and machine control group of instructions-Addressing modes-register, register indirect, direct, and immediate and implied addressing modes. Assembly language and machine language - Programming exercises addition, Subtraction, multiplication and division (all 8-bit) of binary and BCD numbers. [6]

**UNIT III** **08 hours**

Stack and stack related operations-Subroutines-Advanced programming techniques: Code conversions Binary to BCD, BCD to Binary, Binary to ASCII, ASCII to Binary, BCD to ASCII and ASCII to BCD, Block transfer, ascending order and descending order - Time delays using single register and register pair-Delay calculations-Debugging a program.

**UNIT IV** **08 hours**

RAM, ROM, EPROM, EEPROM functional explanation-Memory interface, interfacing ROM, 2K X 8 and 4K X 8-Interfacing RAM, 2K X 8 and 4K X 8-Timing diagrams for memory read and memory write cycles-Instruction cycle, machine cycle and T-state.

**UNIT V** **08 hours**

Explanation of timing diagram for 8085 instructions, MOV $R_d$, $R_s$, MVIR, data 8, STA address 16 Introduction of Wait states-Halt state-Dynamic RAM-Cache memory-Direct Memory Access (DMA), explanation with block diagram.

**Text & Reference Books:**


- Ramesh S. Gaonkar: Microprocessor Architecture, Programming and Application with the 8085-Penram International Publishing, Mumbai
- B. Ram: Fundamentals of microprocessors and microcomputers-Dhanpat Rai Publications, New Delhi
- V. Vijayendran: Fundamentals of microprocessor-8085- S. Viswanathan publishers, Chennai

# Rama University Uttar Pradesh, Kanpur
## Faculty of Engineering & Technology
### BCS-501: Operating System

| L | T | P | Credit-4 |
|---|---|---|---|
| 3 | 1 | 0 | |

**Content:**

**Unit–I** **8 Hours**

**Introduction :** Operating system and functions, Classification of Operating systems- Batch, Interactive, Time sharing, Real Time System, Multiprocessor Systems, Multiuser Systems, Multiprocess Systems, Multithreaded Systems, Operating System Structure- Layered structure, System Components, Operating System services, Reentrant Kernels, Monolithic and Microkernel Systems.

**Unit – II** **8 Hours**

**Concurrent Processes:** Process Concept, Principle of Concurrency, Producer Consumer Problem, Mutual Exclusion, Critical Section Problem, Dekker's solution, Peterson's solution, Semaphores, Test and Set operation; Classical Problem in Concurrency- Dining Philosopher Problem, Sleeping Barber Problem; Inter Process Communication models and Schemes, Process generation.

**Unit – III** **8 Hours**

**CPU Scheduling:** Scheduling Concepts, Performance Criteria, Process States, Process Transition Diagram, Schedulers, Process Control Block (PCB), Process address space, Process identification information, Threads and their management, Scheduling Algorithms, Multiprocessor Scheduling. Deadlock: System model, Deadlock characterization, Prevention, Avoidance and detection, Recovery from deadlock.

**Unit – IV** **8 Hours**

Memory Management: Basic bare machine, Resident monitor, Multiprogramming with fixed partitions, Multiprogramming with variable partitions, Protection schemes, Paging, Segmentation, Paged segmentation, Virtual memory concepts, Demand paging, Performance of demand paging, Page replacement algorithms, Thrashing, Cache memory organization, Locality of reference.

**Unit-V** **8 Hours**

I/O Management and Disk Scheduling: I/O devices, and I/O subsystems, I/O buffering, Disk storage and disk scheduling, RAID. File System: File concept, File organization and access mechanism, File directories, and File sharing, File system implementation issues, File system protection and security.

**Text & Reference Books:**


- Silberschatz, Galvin and Gagne, "Operating Systems Concepts", Wiley
- Sibsankar Halder and Alex A Aravind, "Operating Systems", Pearson Education
- Harvey M Dietel, " An Introduction to Operating System", Pearson Education
- D M Dhamdhere, "Operating Systems : A Concept based Approach", 2nd Edition, TMH

# Rama University Uttar Pradesh, Kanpur
## Faculty of Engineering & Technology
### BCS-502: Design and Analysis of Algorithms

| L | T | P | Credit-4 |
|---|---|---|---|
| 3 | 1 | 0 | |

**Content:**

**Unit-I** **8 Hours**

**Introduction:** Algorithms, Analyzing algorithms, Complexity of algorithms, Growth of functions, Performance measurements, sorting and order Statistics - Shell sort, Quick sort, Merge sort, Heap sort, Comparison of sorting algorithms, Sorting in linear time.

**Unit –II** **8 Hours**

**Advanced Data Structures:** Red-Black trees, B - trees, Binomial Heaps, Fibonacci Heaps.

**Unit – III** **8 Hours**

Divide and Conquer with examples such as Sorting, Matrix Multiplication, Convex hull and Searching. Greedy methods with examples such as Optimal Reliability Allocation, Knapsack, Minimum Spanning trees - Prim's and Kruskal's algorithms, Single source shortest paths - Dijkstra's and Bellman Ford algorithms.

**Unit – IV** **8 Hours**

Dynamic programming with examples such as Kanpsack, All pair shortest paths - Warshal's and Floyd's algorithms, Resource allocation problem. Backtracking, Branch and Bound with examples such as Travelling Salesman Problem, Graph Coloring, n-Queen Problem, Hamiltonian Cycles and Sum of subsets.

**Unit –V** **8 Hours**

Selected Topics: Algebraic Computation, Fast Fourier Transform, String Matching, Theory of NP-completeness, Approximation algorithms and Randomized algorithms.

**Text & Reference Books:**


- Thomas H. Coreman, Charles E. Leiserson and Ronald L. Rivest, "Introduction to Algorithms", Printice Hall of India.
- RCT Lee, SS Tseng, RC Chang and YT Tsai, "Introduction to the Design and Analysis of Algorithms", McGraw Hill, 2005.
- E. Horowitz & S Sahni, "Fundamentals of Computer Algorithms",Berman, Paul," Algorithms", Cengage Learning.

# Rama University Uttar Pradesh, Kanpur

## Faculty of Engineering & Technology

### BCS-503: Object Oriented Techniques

| L | T | P | Credit-4 |
|---|---|---|---|
| 3 | 1 | 0 | |

**Content:**

**Unit I** **8 Hours**

**Introduction:** The meaning of Object Orientation, object identity, Encapsulation, information hiding, polymorphism, generosity, importance of modeling, principles of modeling, object oriented modeling, Introduction to UML, conceptual model of the UML, Architecture.

**Unit II** **8 Hours**

**Basic Structural Modeling:** Classes, Relationships, common Mechanisms, and diagrams. Class & Object Diagrams: Terms, concepts, modeling techniques for Class & Object Diagrams. Collaboration Diagrams: Terms, Concepts, depicting a message, polymorphism in collaboration Diagrams, iterated messages, use of self in messages. Sequence Diagrams: Terms, concepts, depicting asynchronous messages with/without priority, callback mechanism, broadcast messages.

**Basic Behavioral Modeling**: Use cases, Use case Diagrams, Activity Diagrams, State Machine, Process and thread, Event and signals, Time diagram, interaction diagram, Package diagram.

**Architectural Modeling:** Component, Deployment, Component diagrams and Deployment diagrams.

**Unit III** **8 Hours**

Object Oriented Analysis, Object oriented design, Object design, Combining three models, Designing algorithms, design optimization, Implementation of control, Adjustment of inheritance, Object representation, Physical packaging, Documenting design considerations. Structured analysis and structured design (SA/SD), Jackson Structured Development (JSD). Mapping object oriented concepts using non-object oriented language, Translating classes into data structures, Passing arguments to methods, Implementing inheritance, associations encapsulation.

**Object Oriented Programming Style:** reusability, extensibility, robustness, programming in the large. Procedural v/s OOP, Object oriented language features. Abstraction and Encapsulation.

**Unit IV** **8 Hours**

Introduction to Java, History, Features, Object Oriented concept of Java, Classes and Objects, Inheritance, Packages, Interface , abstract method and classes, Polymorphism, Inner classes, String Handling, I/O , Networking, Event Handling. Multi threading, Collection, Java APIs,

**Java Beans**: Application Builder tools, The bean developer kit(BDK), JAR files, Introspection, Developing a simple bean, using Bound properties, The Java Beans API, Session Beans, Entity Beans,Introduction to Enterprise Java beans (EJB).

**Unit V** **8 Hours**

**Java Swing:** Introduction to AWT, AWT v/s Swing, Creating a Swing Applet and Application. Utility of Java as internet programming language, JDBC, The connectivity model, JDBC/ODBC Bridge, Introduction to servlets.

**Text & Reference Books:**


- James Rumbaughet. al, "Object Oriented Modeling and Design", PHI
- Grady Booch, James Rumbaugh, Ivar Jacobson, "The Unified Modeling Language User Guide", Pearson Education
- Naughton, Schildt, "The Complete Reference JAVA2", TMH
- Mark Priestley "Practical Object-Oriented Design with UML", TMH
- Booch, Maksimchuk, Engle, Young, Conallen and Houstan, "Object Oriented Analysis and Design with Applications", Pearson Education
- Pandey, Tiwari, " Object Oriented Programming with JAVA" , Acme Learning


Sarvesh

# Rama University Uttar Pradesh, Kanpur
## Faculty of Engineering & Technology
### BCS 504: Computer Graphics& Multimedia

| L | T | P | Credit-4 |
|---|---|---|---|
| 3 | 1 | 0 | |

**Content:**

**Unit–I** **8 Hours**

**Introduction to computer graphics & graphic systems:**

Overview of computer graphics, representing pictures, preparing, presenting & interacting with pictures or presentations; Visualization & image processing; RGB color model, direct coding, lookup table; storage tube graphics display, Raster scan display, 3D viewing devices, Plotters, printers, digitizers, Light pens etc.; Active & Passive graphics devices; Computer graphics software.

**Scan conversion:**

Points & lines, Line drawing algorithms; DDA algorithm, Bresenham's line algorithm, Circle generation algorithm; Ellipse generating algorithm; scan line polygon, fill algorithm, boundary fill algorithm, flood fill algorithm.

**Unit – II** **8 Hours**

**2D-transformation & viewing**

Basic transformations: translation, rotation, scaling; Matrix representations & homogeneous coordinates, Transformations between coordinate systems; reflection shear; Transformation of points, lines, parallel lines, intersecting lines. Viewing pipe line, Window to view port coordinate transformation, clipping operations, point clipping, line clipping, clipping circles, polygons &ellipse.

**3D transformation & viewing**

3D transformations: translation, rotation, scaling & other transformations. Rotational about an arbitrary axis in space, reflection through an arbitrary plane; general parallel projection transformation; clipping, viewport clipping, 3D viewing.

**Unit –III** **8 Hours**

**Curves**

Curve representation, surfaces, designs, Bezier curves, B-spline curves, end conditions for periodic B- spline curves, rational B-spline curves.

**Hidden surfaces**

Depth comparison, Z-buffer algorithm, Back face detection, BSP tree method, the Printer's algorithm, scan line algorithm; Hidden line elimination, wire frame methods, fractal geometry. Color & shading models Light &color model; interpolative shading model; Texture;

**Unit – IV** **8 Hours**

**Multimedia**

Introduction to Multimedia: Concepts, uses of multimedia, hypertext and hypermedia. Image, video and audio standards.

Audio: digital audio, MIDI, processing sound, sampling, compression.

**Unit- V** **8 Hours**

Video: MPEG compression standards, compression through spatial and temporal redundancy, inter frame and intra frame compression.

Animation: types, techniques, key frame animation, utility, morphing. Virtual Reality concepts.

**Text & Reference Books:**


- Foley, Vandam, Feiner, Hughes-"Computer Graphics principles (2ndEd.)-Pearson Education.
- W.M. Newman, R.F.Sprou-"Principles of Interactive computer Graphics"-TMH.
- Elsom Cook-"Principles of Interactive Multimedia"-McGrawHi


Sarvesh Tripathi

# Rama University Uttar Pradesh, Kanpur

## Faculty of Engineering & Technology

### BCS-551: Operating System Lab

| L | T | P | Credit-1 |
|---|---|---|---|
| 0 | 0 | 2 | |

**Contents:**

**1. Shell programming:** creating a script, making a script executable, shell syntax (variables, conditions, control structures, functions, commands).

**2. Process:** starting new process, replacing a process image, duplicating a process image, waiting for a Process, zombie process.

**3. Signal:** signal handling, sending signals, signal interface, signal sets.

**4. Semaphore:** programming with semaphores (use functions semctl, semget, semop, set_semvalue, del_semvalue, semaphore_p, semaphore_v).

**5. POSIX Threads:** programming with pthread functions (viz. pthread_create, pthread_join, pthread_exit,pthread_attr_init, pthread_cancel)

**6. Inter-process communication:** pipes (use functions pipe, popen, pclose), named pipes (FIFOs, accessing FIFO)

## BCS-552: Algorithm lab

| L | T | P | Credit-1 |
|---|---|---|---|
| 0 | 0 | 3 | |

**Content:**

Programming assignments on each algorithmic strategy:

1. Divide and conquer method (quick sort, merge sort, Strassen's matrix multiplication),

2. Greedy method (knapsack problem, job sequencing, optimal merge patterns, minimal spanning trees).

3. Dynamic programming (multistage graphs, OBST, 0/1 knapsack, traveling sales person

Programming assignments on each algorithmic strategy:

4. Back tracking (n-queens problem, graph coloring problem, Hamiltonian cycles).

5. Sorting: Insertion sort, Heap sort, Bubble sort

6. Searching: Sequential and Binary Search

7. Selection: Minimum/ Maximum, Kth smallest element

# Rama University Uttar Pradesh, Kanpur

## Faculty of Engineering & Technology

### BCS-553: Object Oriented Techniques Lab

| L | T | P | Credit-1 |
|---|---|---|---|
| 0 | 0 | 2 | |

**Content:**

1. To become familiar with classes that represent entities that can interact with the user.
2. To successfully write simple programs that involve if statements.
3. To gain practice in the use of Boolean operators like && and ||.
4. To construct a class that represents a simple ATM (automatic teller machine).
5. Write a new program called Options.java that will request that the user enter an integer and then will display the message, positive, negative or zero. if the value that was entered was greater than zero, less than zero, or equal to zero, respectively.
6. Write a simple program called RandomGeneration.java that will request N, the number of values desired, and then generate a list of N random double values. Use a View Frame for input and output.
7. Write program for Java Applets.
8. Use Java Servlets for proxy server.

## BCS-554: Computer Graphics & Multimedia Lab

| L | T | P | Credit-1 |
|---|---|---|---|
| 0 | 0 | 2 | |

**Content**:

1. Point plotting, line & regular figure algorithms
2. Raster scans line & circle drawing algorithms
3. Clipping &Windowing algorithms for points, lines & polygons
4. 2D/3Dtransformations
5. Simple fractals representation
6. Filling algorithms
7. Web document creation using Dreamweaver.
8. Creating Animation using Flash.

# Rama University Uttar Pradesh, Kanpur
## Faculty of Engineering & Technology
### BHU-601: Engineering Economics &Industrial Management

| L | T | P |
|---|---|---|
| 3 | 1 | 0 |

**Credit-4**

**Content:**

**Unit-I** **8 Hours**

Introduction: Meaning, Nature and Scope of Economics, Meaning of Science, Engineering and Technology Managerial Economics and its scope in engineering perspective.

Basic Concepts Demand Analysis, Law of Demand, Determinates of Demand, Elasticity of Demand-Price, and Income and cross Elasticity. Uses of concept of elasticity of demand in managerial decision.

**Unit-II** **8 Hours**

Demand forecasting**:** Meaning, significance and methods of demand forecasting, production function, Laws of returns to scale & Law of Diminishing returns scale. An overview of Short and Long run cost curves - fixed cost, variable cost, average cost, marginal cost, Opportunity cost.

**Unit-III** **8 Hours**

Market Structure: Perfect Competition, Imperfect competition, features of price determination and various market conditions. National Income, Inflation and Business Cycles Concept of N.I. and Measurement. Meaning of Inflation, Type causes & prevention methods, Phases of business cycle.

**Unit-IV** **8 Hours**

Introduction: Concept, Development, application and scope of Industrial Management. Management Function: Principles Production requirements.

**Productivity:** Definition, measurement, productivity index, types of production system, Industrial of Management- Management Tools - time and motion study, work simplification- process charts and flow diagrams, Production Planning, Specification of Ownership.

**Unit-V** **8 Hours**

Inventory control: Inventory, cost, Deterministic models, Introduction to supply chain Management. **Quality control:** Meaning, process control, SQC control charts, single, double and Sequential sampling, Introduction to TQM.

**Environmental Issues:** Environmental Pollution - various management techniques to Control Environmental pollution - Various control acts for Air, Water, Solid waste and Noise pollution.

**Text & Reference Books**

- Koutsoyiannis A: Modern Microeconomics, ELBS.
- Managerial Economics for Engineering: Prof. D.N. Kakkar
- Managerial Economics: D.N. Dwivedi
- Managerial Economics: Maheshwari.
- Khanna O.P.: Industrial Engineering

**Departmental Elective-III**

1. BCS-061 Real Time System
2. BCS-062 Advance Computer Architecture
3. BCS-063 Cryptography & Network Security
4. BCS -064 Distributed Database
5. BCS -065 Data Compression

# Rama University Uttar Pradesh, Kanpur

## Faculty of Engineering & Technology

### Department Elective-III

### BCS-061: Real Time System

| L | T | P | Credit-4 |
|---|---|---|---|
| 3 | 1 | 0 | |

**Content:**

**UNIT-I** **08 hours**

**Introduction**

Definition, Typical Real Time Applications: Digital Control, High Level Controls, Signal Processing etc., Release Times, Deadlines, and Timing Constraints, Hard Real Time Systems and Soft Real Time Systems, Reference Models for Real Time Systems: Processors and Resources, Temporal Parameters of Real Time Workload, Periodic Task Model, Precedence Constraints and Data Dependency.

**UNIT-II** **08 hours**

**Real Time Scheduling**

Common Approaches to Real Time Scheduling: Clock Driven Approach, Weighted Round Robin Approach, Priority Driven Approach, Dynamic Versus Static Systems, Optimality of Effective Deadline-First (EDF) and Least-Slack-Time-First (LST) Algorithms, Rate Monotonic Algorithm, Offline Versus Online Scheduling, Scheduling Aperiodic and Sporadic jobs in Priority Driven and Clock Driven Systems.

**UNIT-III** **08 hours**

**Resources Sharing**

Effect of Resource Contention and Resource Access Control (RAC), Non-preemptive Critical Sections, Basic Priority-Inheritance and Priority-Ceiling Protocols, Stack Based Priority Ceiling Protocol, Use of Priority-Ceiling Protocol in Dynamic Priority Systems, Preemption Ceiling Protocol, Access Control in Multiple-Unit Resources, Controlling Concurrent Accesses to Data Objects.

**UNIT-IV** **08 hours**

**Real Time Communication**

Basic Concepts in Real time Communication, Soft and Hard RT Communication systems, Model of Real Time Communication, Priority-Based Service and Weighted

Round-Robin Service Disciplines for Switched Networks, Medium Access Control Protocols for Broadcast Networks, Internet and Resource Reservation Protocols.

**UNIT-V** **08 hours**

**Real Time Operating Systems and Databases**

Features of RTOS, Time Services, UNIX as RTOS, POSIX Issues, Characteristic of Temporal data, Temporal Consistency, Concurrency Control, Overview of Commercial Real Time databases.

**Text & Reference Books:**

- Real Time Systems by Jane W. S. Liu, Pearson Education Publication.
- Mall Rajib, "Real Time Systems", Pearson Education

# Rama University Uttar Pradesh, Kanpur

## Faculty of Engineering & Technology

### BCS-062: Advance Computer Architecture

| L | T | P | Credit-4 |
|---|---|---|---|
| 3 | 1 | 0 | |

**Content:**

**UNIT-I** **08 hours**

**Parallel Computer Models**

The state of Computing, Multiprocessors and Multicomputer, Multivector and SIMD Computers, PRAM and VLSI Models

**Program and Network Properties**

Conditions of Parallelism, Program Partitioning and Scheduling, Program Flow Mechanism, System Interconnect Architecture

**UNIT-II** **08 hours**

**Processors and Memory Hierarchy**

Advanced Processor Technology, Superscalar and vector Processors, Memory Hierarchy Technology, Virtual Memory Technology.

**UNIT-III** **08 hours**

**Bus, Cache, and Shared Memory**

Backplane Bus Systems, Cache Memory Organizations, Shared-Memory Organizations, Sequential and Weak Consistency Models

**Pipelining and Superscalar Techniques**

Linear Pipeline Processors, Nonlinear Pipeline Processors, Instruction Pipeline Design, Arithmetic Pipeline Design, Superscalar and Super pipeline Design.

**UNIT-IV** **08 hours**

**Multiprocessors and Multicomputer**

Multiprocessor System Interconnects, Cache Coherence and Synchronization Mechanisms, Message-Passing Mechanisms.

**UNIT-V** **08 hours**

**Multivector, Scalable, Multithreaded, Data Flow Architecture**

Vector Processing principles, Multivector Multiprocessors, Compound Vector Processing, Principles of Multithreading, Dataflow and Hybrid Architectures.

**Text & References:**

- Advanced Computer Architecture by Kai Hwang, McGraw Hill {Single author edition}
- Computer Architecture by Micheal J. Flynn, Narosa.

# Rama University Uttar Pradesh, Kanpur

## Faculty of Engineering & Technology

### BCS-063: Cryptography & Network Security

| L | T | P | Credit-4 |
|---|---|---|---|
| 3 | 1 | 0 | |

**Content:**

**UNIT-I** **08 hours**

Introduction to security attacks, services and mechanism, Classical encryption techniques substitution ciphers and transposition ciphers, cryptanalysis, steganography, Stream and block ciphers.

Modern Block Ciphers: Block ciphers principles, Shannon's theory of confusion and diffusion, fiestal structure, Data encryption standard (DES), Strength of DES, Idea of differential cryptanalysis, block cipher modes of operations, Triple DES.

**UNIT-II** **08 hours**

Introduction to group, field, finite field of the form GF(p), modular arithmetic, prime and relative prime numbers, Extended Euclidean Algorithm, Advanced Encryption Standard (AES) encryption and decryption Fermat's and Euler's theorem, Primality testing, Chinese Remainder theorem, Discrete Logarithmic Problem, Principals of public key crypto systems, RSA algorithm, security of RSA

**UNIT-III** **08 hours**

**Message Authentication Codes:** Authentication requirements, authentication functions, message authentication code, hash functions, birthday attacks, security of hash functions, secure hash algorithm (SHA).

**Digital Signatures:** Digital Signatures, Elgamal Digital Signature Techniques, Digital signature standards (DSS), proof of digital signature algorithm.

**UNIT-IV** **08 hours**

**Key Management and distribution:** Symmetric key distribution, Diffie-Hellman Key Exchange, Public key distribution, X.509 Certificates, Public key Infrastructure. Authentication Applications: Kerberos.

**Electronic mail security:** pretty good privacy (PGP),S/MIME.

**UNIT-V** **08 hours**

**IP Security:** Architecture, Authentication header, Encapsulating security payloads, combining security associations, key management. Introduction to Secure Socket Layer, Secure electronic, and transaction (SET).

**System Security:** Introductory idea of Intrusion, Intrusion detection, Viruses and related threats, Firewalls.

**Text & Reference Books:**


- William Stallings, "Cryptography and Network Security: Principals and Practice", Pearson Education.
- Behrouz A. Frouzan: Cryptography and Network Security, Tata McGraw Hill
- Bruce Schiener, "Applied Cryptography". John Wiley & Sons
- 4. Bernard Menezes," Network Security and Cryptography", Cengage Learning

# Rama University Uttar Pradesh, Kanpur
## Faculty of Engineering & Technology
### BCS-064: Distributed Database

| L | T | P |
|---|---|---|
| 3 | 1 | 0 |

**Credit-4**

**Content:**

**UNIT-I** **08 hours**

Transaction and schedules, Concurrent Execution of transaction, Conflict and View Serializability, Testing for Serializability, Concepts in Recoverable and Cascade less schedules.

**UNIT-II** **08 hours**

Lock based protocols, time stamp based protocols, Multiple Granularity and Multiversion Techniques, Enforcing serializablity by Locks, Locking system with multiple lock modes, architecture for Locking scheduler.

**UNIT-III** **08 hours**

Distributed Transactions Management, Data Distribution, Fragmentation and Replication Techniques, Distributed Commit, Distributed Locking schemes, Long duration transactions, Moss Concurrency protocol.

**UNIT-IV** **08 hours**

Issues of Recovery and atomicity in Distributed Databases, Traditional recovery techniques, Log based recovery, Recovery with Concurrent Transactions, Recovery in Message passing systems, Checkpoints, Algorithms for recovery line, Concepts in Orphan and Inconsistent Messages.

**UNIT-V** **08 hours**

Distributed Query Processing, Multiway Joins, Semi joins, Cost based query optimization for distributed database, Updating replicated data, protocols for Distributed Deadlock Detection, Eager and Lazy Replication Techniques.

**Text & Reference Books:**


- Silberschatz, orth and Sudershan, Database System Concept', McGraw Hill
- Ramakrishna and Gehrke,' Database Management System, McGraw Hill
- Garcia-Molina, Ullman,Widom,' Database System Implementation' Pearson Education
- Ceei and Pelagatti,'Distributed Database', TMH
- Singhal and Shivratri, 'Advance Concepts in Operating Systems' MC Graw Hill

# Rama University Uttar Pradesh, Kanpur
## Faculty of Engineering & Technology
### BCS-065: Data Compression

| L | T | P | Credit-4 |
|---|---|---|---|
| 3 | 1 | 0 | |

**Content:**

**UNIT-I** **08 hours**

**Compression Techniques:** Loss less compression, Lossy Compression, Measures of performance Modeling and coding, Mathematical Preliminaries for Lossless compression: A brief introduction to information theory.

**Models:** Physical models, Probability models, Markov models, composite source model, Coding: uniquely decodable codes, Prefix codes.

**UNIT-II** **08 hours**

**The Huffman coding algorithm:** Minimum variance Huffman codes, Adaptive Huffman coding: Update procedure, Encoding procedure, Decoding procedure. Golomb codes, Rice codes, Tunstall Codes, Applications of Hoffman coding: Loss less image compression, Text compression, Audio Compression.

**UNIT-III** **08 hours**

Coding a sequence, Generating a binary code, Comparison of Binary and Huffman coding, Applications: Bi-level image compression-The JBIG standard, JBIG2, Image compression. Dictionary Techniques: Introduction, Static Dictionary: Diagram Coding, Adaptive Dictionary. The LZ77 Approach, The LZ78 Approach, Applications: File Compression-UNIX compress, Image Compression: The Graphics Interchange Format (GIF), Compression over Modems: V.42 bits, Predictive Coding: Prediction with Partial match (ppm): The basic algorithm, The ESCAPE SYMBOL, length of context, The Exclusion Principle, The Burrows-Wheeler Transform: Move to-front coding, CALIC, JPEG-LS, Multi-resolution Approaches, Facsimile Encoding, Dynamic Markoy Compression.

**UNIT-IV** **08 hours**

Distortion criteria, Models, Scalar Quantization: The Quantization problem, Uniform Quantizer, Adaptive Quantization, Non uniform Quantization.

**UNIT-V** **08 hours**

Advantages of Vector Quantization over Scalar Quantization, the Linde-Buzo-Gray Algorithm, Treestructured Vector Quantizers. Structured Vector Quantizers.

**Reference Books:**

- Khalid Sayood, Introduction to Data Compression, Morgan Kaufmann Publishers

# Rama University Uttar Pradesh, Kanpur

## Faculty of Engineering & Technology

### BCS-601 Data Mining and Data warehousing

| L | T | P |
|---|---|---|
| 3 | 1 | 0 |

**Credit-4**

**Content:**

**Unit I** **8 Hours**

Data Preprocessing, Language, Architectures, Concept Description: Preprocessing, Cleaning, Integration, Transformation, Reduction, Discretization, Concept Hierarchy Generation, Data Mining Primitives, Query Language, Graphical User Interfaces, Architectures, Concept Description, Data Generalization, Characterizations, Class Comparisons, Descriptive Statistical Measures.

**Unit II** **8 Hours**

Association Rule: Association Rule Mining, Single-Dimensional Boolean Association Rules from Transactional Databases, Multi-Level Association Rules from Transaction Databases-mining multidimensional Association rules -association mining to correlation analysis-constraint based association mining.

**Unit III** **8 Hours**

Classification and Prediction: Classification and Prediction, Issues, Decision Tree Induction, Bayesian Classification, Association Rule Based, Other Classification Methods, Prediction, Classifier Accuracy.

**Unit IV** **8 Hours**

Cluster Analysis: Cluster Analysis, Types of data, Categorization of methods, Partitioning methods, hierarchical methods, density based methods, grid based methods - Outlier Analysis. Recent trends - Multidimensional Analysis and Descriptive Mining of Complex Data Objects, Spatial Databases, Multimedia Databases, Time Series and Sequence Data, Text Databases, World Wide Web, Applications and Trends in Data Mining.

**Unit V** **8 Hours**

Data Warehousing: Introduction, Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Implementation - Data Warehousing to Data Mining -Data

warehousing components- building a data warehouse - mapping the data warehouse to an architecture – data extraction - cleanup- transformation tools- metadata - OLAP - Patterns and models - Data visualization principles.

**TEXT BOOKS:**

- J. Han and M. Kamber, "Data Mining: Concepts and Techniques", Harcourt India /Morgan Kauffman, 2001. (UNITs 1 to IV)
- Alex Berson and Stephen J. Smith, "Data Warehousing, Data mining and OLAP", TataMcGraw-Hill, 2004. (UNIT V)

**REFERENCES:**

- Margaret H. Dunham, "Data Mining: Introductory and Advanced Topics", PearsonEducation, 2004.
- Sam Anahory and Dennis Murry, "Data Warehousing in the Real World", Pearson Education, 2003.

# Rama University Uttar Pradesh, Kanpur
## Faculty of Engineering & Technology
### BCS-602: Computer Network

| L | T | P | Credit-4 |
|---|---|---|---|
| 3 | 1 | 0 | |

**Content:**

**Unit –I** **8 Hours**

**Introduction Concepts**: Goals and Applications of Networks, Network structure and architecture, The OSI reference model, services, Network Topology Design - Delay Analysis, Back Bone Design, Local Access Network Design, Physical Layer Transmission Media, Switching methods, ISDN, Terminal Handling.

**Unit-II** **8 Hours**

**Medium Access sub layer:** Medium Access sub layer - Channel Allocations, LAN protocols -ALOHA protocols - Overview of IEEE standards - FDDI. Data Link Layer - Elementary Data Link Protocols, Sliding Window protocols, Error Handling.

**Unit – III** **8 Hours**

**Network Layer:** Network Layer - Point - to Pont Networks, routing, Congestion control Internetworking -TCP / IP, IP packet, IP address, IPv6.

**Unit – IV** **8 Hours**

**Transport Layer: Transport Layer** - Design issues, connection management, session Layer Design issues, remote procedure call. Presentation Layer-Design issues, Data compression techniques, cryptography - TCP - Window Management.

**Unit-V** **8 Hours**

**Application Layer:** Application Layer: File Transfer, Access and Management, Electronic mail, Virtual Terminals, Other application. Example Networks - Internet and Public Networks.

**Text & Reference Books :**


- Forouzen, "Data Communication and Networking", TMH A.S. Tanenbaum, Computer Networks, Pearson Education
- W. Stallings, Data and Computer Communication, Macmillan Press Anuranjan Misra, "Computer Networks", Acme Learning
- G. Shanmugarathinam, "Essential of TCP/ IP", Firewall Media

# Rama University Uttar Pradesh, Kanpur
## Faculty of Engineering & Technology
### BCS-603: Compiler Design

| L | T | P | Credit-4 |
|---|---|---|---|
| 3 | 1 | 0 | |

**Content:**

**Unit–I** **8 Hours**

**Introduction to Compiler:** Phases and passes, Bootstrapping, Finite state machines and regular expressions and their applications to lexical analysis, Optimization of DFA-Based Pattern Matchers implementation of lexical analyzers, lexical-analyzer generator, LEX-compiler, Formal grammars and their application to syntax analysis, BNF notation, ambiguity, YACC. The syntactic specification of programming languages: Context free grammars, derivation and parse trees, capabilities of CFG.

**Unit – II** **8 Hours**

**Basic Parsing Techniques:** Parsers, Shift reduce parsing, operator precedence parsing, top down parsing, predictive parsers Automatic Construction of efficient Parsers: LR parsers, the canonical Collection of LR(0) items, constructing SLR parsing tables, constructing Canonical LR parsing tables, Constructing LALR parsing tables, using ambiguous grammars, an automatic parser generator, implementation of LR parsing tables.

**Unit – III** **8 Hours**

**Syntax-directed Translation:** Syntax-directed Translation schemes, Implementation of Syntax-directed Translators, Intermediate code, postfix notation, Parse trees & syntax trees, three address code, quadruple & triples, translation of assignment statements, Boolean expressions, statements that alter the flow of control, postfix translation, translation with a top down parser. More about translation: Array references in arithmetic expressions, procedures call, declarations and case statements.

**Unit – IV** **8 Hours**

**Symbol Tables:** Data structure for symbols tables, representing scope information. Run-Time Administration: Implementation of simple stack allocation scheme, storage allocation in block structured language. Error Detection & Recovery: Lexical Phase errors, syntactic phase errors semantic errors.

**Unit–V** **8 Hours**

**Code Generation**: Design Issues, the Target Language. Addresses in the Target Code, Basic Blocks and Flow Graphs, Optimization of Basic Blocks, Code Generator.

**Code optimization:** Machine-Independent Optimizations, Loop optimization, DAG representation of basic blocks, value numbers and algebraic laws, Global Data-Flow analysis.

**Text & Reference Books:**


- Aho, Sethi& Ullman, "Compilers: Principles, Techniques and Tools", Pearson Education
- V Raghvan, "Principles of Compiler Design", TMH
- Kenneth Louden," Compiler Construction", Cengage Learning.
- Charles Fischer and Ricard LeBlanc," Crafting a Compiler with C", Pearson Education

# Rama University Uttar Pradesh, Kanpur

## Faculty of Engineering & Technology

### BCS-651: Data Mining and Data Warehousing Lab

| L | T | P | Credit-1 |
|---|---|---|---|
| 0 | 0 | 2 | |

**Content**

1. Evolution of data management technologies, introduction to data warehousing concepts.
2. Develop an application to implement defining subject area, design of fact dimension table, data mart.
3. Develop an application to implement OLAP, roll up, drill down, slice and dice operation
4. Develop an application to construct a multidimensional data.
5. Develop an application to implement data generalization and summarization technique.
6. Develop an application to extract association rule of data mining.
7. Develop an application for classification of data.
8. Develop an application for one clustering technique
9. Develop an application for Naïve Bayes classifier.
10. Develop an application for decision tree.

# Rama University Uttar Pradesh, Kanpur

## Faculty of Engineering & Technology

### BCS-652: Computer Network Lab

| L | T | P | Credit-1 |
|---|---|---|---|
| 0 | 0 | 2 | |

**Contents:**

1. IPC (Message queue)
2. NIC Installation & Configuration (Windows/Linux)
3. Familiarization with

a. Networking cables (CAT5, UTP)

b. Connectors (RJ45, T-connector)

c. Hubs, Switches

4. TCP/UDP Socket Programming
5. Multicast Broadcast Sockets
6. Implementation of a Prototype Multithreaded Server
7. Implementation of

   a. Data Link Layer Flow Control Mechanism (Stop & Wait, Sliding Window)

   b. Data Link Layer Error Detection Mechanism (Cyclic Redundancy Check)

   **c.** Data Link Layer Error Control Mechanism (Selective Repeat, Go Back N)

# Rama University Uttar Pradesh, Kanpur

## Faculty of Engineering & Technology

### BCS-653: Compiler Lab

| L | T | P | Credit-1 |
|---|---|---|---|
| 0 | 0 | 3 | |

**Content:**

1. Design predictive parser for the given language.
2. Design a LALR bottom up parser for the given language.
3. Convert the BNF rules into YACC form and write code to generate abstract syntax tree. A program to generate machine code.
4. Design a lexical analyzer for given language and the lexical analyzer should ignore redundant
5. Spaces, tabs and new lines.
6. Implement the lexical analyzer using JLex, flex or other lexical analyzer generating tools.
7. Write a YACC program to check the validity of an arithmetic expression.

# Rama University Uttar Pradesh, Kanpur
## Faculty of Engineering & Technology
### BCS-655: .Net Lab

**L T P** **Credit-1**

**0 0 2**

**Content:**

1. Write a Program in C# to check whether a number is Palindrome or not.
2. Write a Program in C# to demonstrate Command line arguments processing.
3. Write a Program in C# to find the roots of Quadratic Equation.
4. Write a Program in C# to demonstrate Boxing and un Boxing.
5. Write a Program in C# to implement Stack operations.
6. Write a Program to demonstrate Operator overloading.
7. Write a Program in C# to find the second largest element in a single dimensional array.
8. Write a Program in C# to multiply to matrices using Rectangular arrays.
9. Find the sum of all the elements present in a jagged array of 3 inner arrays.
10. Write a Program to reverse a given string using C#.
11. Using Try, Catch and Finally blocks write a program in C# to demonstrate error handling.
12. Design a simple calculator using Switch Statement in C#.
13. Demonstrate Use Of Virtual and override keyword in C# with a simple Program.
14. Implement Linked Lists in C# using the existing collections name space.
15. Write a Program to demonstrate abstract class and abstract methods in C#.
16. Write a Program in C# to build a class which implements an interface which already exists.
17. Write a Program to illustrate the use of different properties in C#.
18. Demonstrate arrays of interface types with a C# program.

# Rama University Uttar Pradesh, Kanpur
## Faculty of Engineering & Technology
### BCS-701: Distributed Systems

**L T P** **Credit-4**

**3 1 0**

**Content:**

**Unit–I** **8 Hours**

**Characterization of Distributed Systems:** Introduction, Examples of distributed Systems, Resource

sharing and the Web Challenges. Architectural models, Fundamental Models.

**Theoretical Foundation for Distributed System:** Limitation of Distributed system, absence of global lock, shared memory, Logical clocks, Lamppost's& vectors logical clocks.

**Concepts in Message Passing Systems:** causal order, total order, total causal order, Techniques for Message Ordering, Causal ordering of messages, global state, and termination detection.

**Unit-II** **8 Hours**

**Distributed Mutual Exclusion:** Classification of distributed mutual exclusion, requirement of mutual exclusion theorem, Token based and non token based algorithms, performance metric for distributed mutual exclusion algorithms.

**Distributed Deadlock Detection:** system model, resource Vs communication deadlocks, deadlock prevention, avoidance, detection & resolution, centralized dead lock detection, distributed dead lock detection, path pushing algorithms, edge chasing algorithms.

**Unit-III** **8 Hours**

**Agreement Protocols:** Introduction, System models, classification of Agreement Problem, Byzantine agreement problem, Consensus problem, Interactive consistency Problem, Solution to Byzantine Agreement problem, Application of Agreement problem, Atomic Commit in Distributed Database system.

**Distributed Resource Management:** Issues in distributed File Systems, Mechanism for building distributed file systems, Design issues in Distributed Shared Memory, Algorithm for Implementation of Distributed Shared Memory.

**Unit-IV** **8 Hours**

**Failure Recovery in Distributed Systems:** Concepts in Backward and Forward recovery, Recovery in Concurrent systems, obtaining consistent Checkpoints, Recovery in Distributed Database Systems.

**Fault Tolerance:** Issues in Fault Tolerance, Commit Protocols, Voting protocols, Dynamic voting protocol

**Unit–V** **8 Hours**

**Transactions and Concurrency Control:** Transactions, Nested transactions, Locks, Optimistic Concurrency control, Timestamp ordering, Comparison of methods for concurrency control.

**Distributed Transactions:** Flat and nested distributed transactions, Atomic Commit protocols, Concurrency control in distributed transactions, Distributed deadlocks, Transaction recovery. Replication: System model and group communication, Fault - tolerant services, highly available services, Transactions with replicated data.

**Text & Reference Books:**


- Singhal & Shivaratri, "Advanced Concept in Operating Systems", McGraw Hill
- Ramakrishna,Gehrke," Database Management Systems", McGrawhill
- Coulouris, Dollimore, Kindberg, "Distributed System: Concepts and Design", Pearson Education
- Tenanuanbaum, Steen," Distributed Systems", PHI
- Gerald Tel, "Distributed Algorithms", Cambridge University Press

# Rama University Uttar Pradesh, Kanpur
## Faculty of Engineering & Technology
## BCS-702: DIGITAL IMAGE PROCESSING

**L T P** **Credit-4**

**3 1 0**

**Content:**

**UNIT-I** **8 Hours**

**Introduction and Fundamentals**

Motivation and Perspective, Applications, Components of Image Processing System, Element of Visual Perception, A Simple Image Model, Sampling and Quantization.

**Image Enhancement in Frequency Domain**

Fourier Transform and the Frequency Domain, Basis of Filtering in Frequency Domain, Filters -Low-pass, High-pass; Correspondence Between Filtering in Spatial and Frequency Domain; Smoothing Frequency Domain Filters - Gaussian Low pass Filters; Sharpening Frequency Domain Filters - Gaussian High pass Filters; Homomorphic Filtering.

**UNIT-II** **8 Hours**

**Image Enhancement in Spatial Domain**

Introduction; Basic Gray Level Functions - Piecewise-Linear Transformation Functions: Contrast Stretching; Histogram Specification; Histogram Equalization; Local Enhancement; Enhancement using Arithmetic/Logic Operations - Image Subtraction, Image Averaging; Basics of Spatial Filtering; Smoothing - Mean filter, Ordered Statistic Filter; Sharpening - The Laplacian.

**UNIT-III** **8 Hours**

**Image Restoration**

A Model of Restoration Process, Noise Models, Restoration in the presence of Noise only-Spatial Filtering - Mean Filters: Arithmetic Mean filter, Geometric Mean Filter, Order Statistic Filters - Median Filter, Max and Min filters; Periodic Noise Reduction by Frequency Domain Filtering -Band pass Filters; Minimum Mean-square Error Restoration.

**UNIT-IV** **8 Hours**

**Morphological Image Processing**

Introduction, Logic Operations involving Binary Images, Dilation and Erosion, Opening and Closing, Morphological Algorithms- Boundary Extraction, Region Filling, Extraction of Connected Components, Convex Hull, Thinning, Thickening.

**UNIT-V** **8 Hours**

**Registration**

Introduction, Geometric Transformation - Plane to Plane transformation, Mapping, Stereo Imaging -Algorithms to Establish Correspondence, Algorithms to Recover Depth.

**Segmentation**

Introduction, Region Extraction, Pixel-Based Approach, Multi-level Thresholding, Local Thresholding, Region-based Approach, Edge and Line Detection: Edge Detection, Edge Operators, Pattern Fitting Approach, Edge Linking and Edge Following, Edge Elements Extraction by Thresholding, Edge Detector Performance, Line Detection, Corner Detection.

**Text & Reference Books:**

- Digital Image Processing 2nd Edition, Rafael C. Gonzalvez and Richard E. Woods. Published by: Pearson Education.
- Digital Image Processing and Computer Vision, R.J. Schalkoff. Published by: John Wiley and Sons, NY.
- Fundamentals of Digital Image Processing, A.K. Jain. Published by Prentice Hall, Upper Saddle River, NJ.

# Rama University Uttar Pradesh, Kanpur
## Faculty of Engineering & Technology
### BCS-703: Artificial Intelligence

| L | T | P | Credit-4 |
|---|---|---|---|
| 3 | 1 | 0 | |

**Content:**

**Unit-I** **8 Hours**

**Introduction** Artificial Intelligence, Foundations and History of Artificial Intelligence, Applications of Artificial Intelligence, Intelligent Agents, Structure of Intelligent Agents. Computer vision, Natural Language Possessing.

**Unit-II** **8 Hours**

**Introduction to Search :** Searching for solutions, Uniformed search strategies, Informed search strategies, Local search algorithms and optimistic problems, Adversarial Search, Search for games, Alpha - Beta pruning.

**Unit-III** **8 Hours**

Knowledge Representation & Reasoning: Propositional logic, Theory of first order logic, Inference in First order logic, Forward & Backward chaining, Resolution, Probabilistic reasoning, Utility theory, Hidden Markov Models (HMM), Bayesian Networks.

**Unit-IV** **8 Hours**

**Machine Learning :** Supervised and unsupervised learning, Decision trees, Statistical learning models, Learning with complete data - Naive Bayes models, Learning with hidden data – EM algorithm, Reinforcement learning.

**Unit-V** **8 Hours**

**Pattern Recognition :** Introduction, Design principles of pattern recognition system, Statistical Pattern recognition, Parameter estimation methods - Principle Component Analysis (PCA) and Linear Discriminant Analysis (LDA), Classification Techniques - Nearest Neighbor (NN) Rule, Bayes Classifier, Support Vector Machine (SVM), K - means clustering.

**Text & Reference Books:**


- Stuart Russell, Peter Norvig, "Artificial Intelligence - A Modern Approach", Pearson Education
- Elaine Rich and Kevin Knight, "Artificial Intelligence", McGraw-Hill
- E Charniak and D McDermott, "Introduction to Artificial Intelligence", Pearson Education
- Dan W. Patterson, "Artificial Intelligence and Expert Systems", Prentice Hall of India,

1. BCS-071 Neural Networks
2. BCS-072 Embedded Systems
3. BCS-073 Cloud Computing
4. BCS-074 Soft Computing

# Rama University Uttar Pradesh, Kanpur
## Faculty of Engineering & Technology
## Department Elective-IV

### BCS-071: Neural Networks

| L | T | P | Credit-4 |
|---|---|---|---|
| 3 | 1 | 0 | |

**Content**

**UNIT-I** **08 hours**

**Neurocomputing and Neuroscience**

Historical notes, human Brain, neuron Mode l, Knowledge representation, Al and NN. Learning process: Supervised and unsupervised learning, Error correction learning, competitive learning, adaptation, statistical nature of the learning process.

**UNIT-II** **08 hours**

**Data Processing :** Scaling, normalization, Transformation (FT/FFT), principal component analysis, regression, co- Variance matrix, Eigen values & Eigen vectors. Basic Models of Artificial neurons, activation Functions, aggregation function, single neuron computation, multilayer perception, least mean square algorithm, gradient descent rule, nonlinearly separable problems and bench mark Problems in NN.

**UNIT-III** **08 hours**

Multilayered network architecture, back propagation algorithm, heuristics for making BP-algorithm performs better. Accelerated learning BP (like recursive least square, quick prop, RPROP algorithm), approximation properties of RBF networks and comparison with multilayer perceptran.

**UNIT-IV** **08 hours**

Recurrent network and temporal feed-forward network, implementation with BP, self-organizing map and SOM algorithm, properties of feature map and computer simulation. Principal component and Independent component analysis, application to image and signal processing.

**UNIT-V** **08 hours**

Complex valued NN and complex valued BP, analyticity of activation function, application in 2D information processing. Complexity analysis of network models. Soft computing. Euro-Fuzzy-genetic algorithm Integration.

**Text & Reference Books:**


- J.A. Anderson, An Introduction to Neural Networks, MIT
- Hagen Demuth Beale, Neural Network Design, Cengage Learning
- R.L. Harvey, Neural Network Principles, PHI

**L T P** **Credit-4**

**3 1 0**

**Content:**

**UNIT-I** **08 hours**

Introduction to embedded systems: Classification, Characteristics and requirements, Applications.

**UNIT-II** **08 hours**

Timing and clocks in embedded systems, Task Modeling and management, Real time operating system issues.

**UNIT-III** **08 hours**

Signals, frequency spectrum and sampling, digitization (ADC, DAC), Signal Conditioning and Processing. Modeling and Characterization of Embedded Computation System.

**UNIT-IV** **08 hours**

Embedded Control and Control Hierarchy, Communication strategies for embedded systems: Encoding and Flow control.

**UNIT-V** **08 hours**

Fault-Tolerance, Formal Verification. Trends in Embedded Processor, OS, Development Language

**Text & Reference Books:**


- H.Kopetz, "Real-Time Systems", Kluwer
- R.Gupta, "Co-synthesis of Hardware and Software for Embedded Systems",Kluwer
- Shibu K.V., "Introduction to Embedded Systems", TMH
- Marwedel, "Embedded System Design", Springer

**L T P** **Credit-4**

**3 1 0**

**Content:**

**UNIT-I** **08 hours**

Cloud Computing Fundamental: Cloud computing definition, private, public and hybrid cloud. Cloud types; IaaS, PaaS, SaaS. Benefits and challenges of cloud computing, public vs private clouds, role of virtualization in enabling the cloud; Business Agility: Benefits and challenges to Cloud architecture. Application availability, performance, security and disaster recovery; next generation Cloud Applications.

**UNIT-II** **08 hours**

Cloud Applications: Technologies and the processes required when deploying web services; Deploying

A web service from inside and outside a cloud architecture, advantages and disadvantages.

**UNIT-III** **08 hours**

Cloud Services Management: Reliability, availability and security of services deployed from the cloud. Performance and scalability of services, tools and technologies used to manage cloud services deployment; Cloud Economics: Cloud Computing infrastructures available for implementing cloud based services. Economics of choosing a Cloud platform for an organization, based on application requirements, economic Constraints and business needs (e.g Amazon, Microsoft and Google, Salesforce.com, Ubuntu and Redhat

**UNIT-IV** **08 hours**

Application Development: Service creation environments to develop cloud based applications. Development environments for service development; Amazon, Azure, Google App.

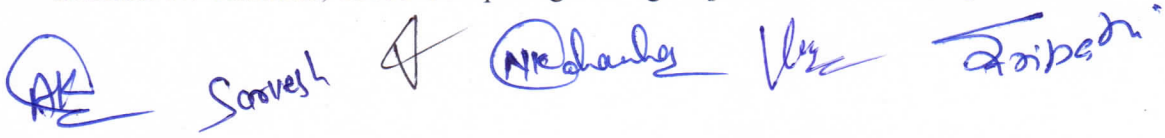
**UNIT-V** **08 hours**

Best Practice Cloud IT Model: Analysis of Case Studies when deciding to adopt cloud computing architecture. How to decide if the cloud is right for your requirements. Cloud

based service, applications and development platform deployment so as to improve the total cost of ownership (TCO).

**Text & Reference Books:**


- Gautam Shroff, Enterprise Cloud Computing Technology Architecture Applications [ISBN: 978-0521137355]
- Toby Velte, Anthony Velte, Robert Elsenpeter, Cloud Computing, A Practical Approach [ISBN: 0071626948]
- Dimitris N. Chorafas, Cloud Computing Strategies [ISBN: 1439834539]

# Rama University Uttar Pradesh, Kanpur
## Faculty of Engineering & Technology
### BCS-074: Soft Computing

| L | T | P |
|---|---|---|
| 3 | 1 | 0 |

**Credit-4**

**Content:**

**UNIT-I** **08 hours**

**Artificial Neural Networks:** Basic concepts - Single layer perception - Multilayer Perception - Supervised and Unsupervised learning - Back propagation networks - Kohnen's self-organizing networks - Hopfield network.

**UNIT-II** **08 hours**

**Fuzzy Systems:** Fuzzy sets, Fuzzy Relations and Fuzzy reasoning, Fuzzy functions Decomposition Fuzzy automata and languages - Fuzzy control methods - Fuzzy decision making.

**UNIT-III** **08 hours**

**Neuro- Fuzzy Modeling:** Adaptive networks based Fuzzy interface systems Classification and Regression Trees Data clustering algorithms - Rule based structure identification - Neuro-Fuzzy controls – Simulated annealing - Evolutionary computation.

**UNIT-IV** **08 hours**

**Genetic Algorithms:** Survival of the Fittest - Fitness Computations - Cross over Mutation - Reproduction - Rank method Rank space method.

**UNIT-V** **08 hours**

**Application of Soft Computing:** Optimization of traveling salesman problem using Genetic Algorithm, Genetic algorithm based Internet Search Techniques, Soft computing based hybrid fuzzy controller, Introduction to MATLAB Environment for Soft computing Techniques.

**Text & Reference Books:**


- Sivanandam, Deepa, "Principles of Soft Computing", Wiley
- Jang J.S.R, Sun C.T. and Mizutani E, "Neuro-Fuzzy and soft computing", Prentice Hall
- Timothy J. Ross, "Fuzzy Logic with Engineering Applications", McGraw Hill
- Laurene Fausett, "Fundamentals of Neural Networks", Prentice Hall
- D.E. Goldberg, "Genetic Algorithms: Search, Optimization and Machine Learning", Addison Wesley

1. BOE-071 Non-Conventional Energy Resources
2. BOE-072 Disaster management
3. BOE-073 Engineering System Modeling and Simulation
4. BOE-074 Bioinformatics

# Rama University Uttar Pradesh, Kanpur

## Faculty of Engineering & Technology

### BOE-071 Non-Conventional Energy Recourse

| L | T | P |
|---|---|---|
| 3 | 1 | 0 |

**Credit-4**

**Content:**

**UNIT-I** **08 hours**

Introduction: Various non-conventional energy resources- Introduction, availability, Classification, relative merits and demerits.

**UNIT-II** **08 hours**

**Solar Cells:** Theory of solar cells. Solar cell materials, solar cell power plant, limitations.

**Solar Thermal Energy:** Solar radiation flat plate collectors and their materials, applications and performance, focusing of collectors and their materials, applications and performance; solar thermal power plants, thermal energy storage for solar heating and cooling, limitations.

**UNIT-III** **08 hours**

**Geothermal Energy:** Resources of geothermal energy, thermodynamics of geo-thermal energy conversion-electrical conversion, non-electrical conversion, environmental considerations.

**Magneto-hydrodynamics (MHD):** Principle of working of MHD Power plant, performance and limitations.

**UNIT-IV** **08 hours**

Fuel Cells: Principle of working of various types of fuel cells and their working, performance and limitations.

**Thermo-electrical and thermionic Conversions:** Principle of working, performance and limitations. **Wind Energy:** Wind power and its sources, site selection, criterion, momentum theory, classification of rotors, concentrations and augments, wind characteristics. performance and limitations of energy conversion systems.

**UNIT-V** **08 hours**

**Bio-mass:** Availability of bio-mass and its conversion theory.

**Ocean Thermal Energy Conversion (OTEC):** Availability, theory and working principle, performance and limitations.

**Wave and Tidal Wave:** Principle of working, performance and limitations. Waste Recycling Plants

**Text & Reference Books:**


- AndraGabdel, "A Handbook for Engineers and Economists".
- Mani, "Handbook of Solar radiation Data for India".
- Peter Auer, "Advances in Energy System and Technology". Vol. 1 & II Edited by Academic Press.
- F.R. the MITTRE, "Wind Machines" by Energy Resources and Environmental Series. 5. Frank Kreith, "Solar Energy Hand Book".

# Rama University Uttar Pradesh, Kanpur
## Faculty of Engineering & Technology
### BOE-072 Disaster Management

**Credit-4**

| L | T | P |
|---|---|---|
| 3 | 1 | 0 |

**Content:**

**UNIT-I** **08 hours**

**Understanding disaster-** Concept of disaster, Different approaches, **Concept** of Risk, Levels of disasters, Disaster phenomena and events *(Global, national and regional)*.

**UNIT-II** **08 hours**

**Hazards and Vulnerability-**Natural and man-made hazards; response time, frequency and forewarning levels of different hazards, Characteristics and damage potential of natural hazards; hazard assessment Dimensions of vulnerability factors; vulnerability assessment, Vulnerability and disaster risk, Vulnerabilities to flood and earthquake hazards.

**UNIT-III** **08 hours**

**Disaster management mechanism-**Concepts of risk management and crisis management, Disaster management cycle, **Response** and Recovery, **Development**, Prevention, Mitigation and Preparedness, Planning for relief.

**UNIT-IV** **08 hours**

**Capacity building** -Capacity building: Concept ,Structural and nonstructural measures, Capacity assessment; strengthening capacity for reducing risk ,Counter-disaster resources and their utility in disaster management, Legislative support at the state and national levels

**Coping with disaster-** Coping strategies; alternative adjustment processes, Changing concepts of disaster management, Industrial safety plan; safety norms and survival kits, Mass media and disaster management.

**UNIT-V** **08 hours**

**Planning for disaster management-** Strategies for disaster management planning, Steps for formulating a disaster risk reduction plan, Disaster management Act and Policy

in India, Organizational Structure for disaster management in India, Preparation of state and district disaster management plans.

**Text books**

- Alexander, D. Natural Disasters, ULC press Ltd, London, 1993.
- Carter, W. N. Disaster Management: A Disaster Management Handbook, Asian Development Bank, Bangkok, 1991.
- Chakraborty, U. K. Industrial Disaster Management and Emergency Response, Asian Books Pvt. Ltd., New Delhi 2007.

**References**

- Abarquez I. &Murshed Z. Community Based Disaster Risk Management: Field Practitioner's Handbook, ADPC, Bangkok, 2004.
- Goudie, A. Geomorphological Techniques, Unwin Hyman, London 1990.

# Rama University Uttar Pradesh, Kanpur
## Faculty of Engineering & Technology
## BOE-073 Engineering System Modeling and Simulation

**L T P** **Credit-4**

**3 1 0**

**Content:**

**UNIT-I** **08 hours**

Introduction-Systems, System types, System Modeling, Types of system modeling, Classification and comparison of simulation models, attributes of modeling, Comparison of physical and computer experiments, Application areas and Examples.

**UNIT-II** **08 hours**

Mathematical and Statistical Models- Probability concepts, Queuing Models, Methods for generating random variables and Validation of random numbers.

**UNIT-III** **08 hours**

Language-System modeling, programming languages, comparison of languages, Identifying and selection of programming language, feasibility study of programming language for the given application.

**UNIT-IV** **08 hours**

Experiments-Simulation of different systems, Analysis, validation and verification of input and output simulated data, study of alternate techniques.

**UNIT-V** **08 hours**

Case study-Developing simulation model for information centers, inventory systems and analysis of maintenance systems.

**Text Books:**

- Geoffrey Gordon, "System Simulation", Second edition, Prentice Hall, India, 2002.
- Jerry Banks and John S.Carson, Barry L.Nelson, David M.Nicol, "Discrete Event System Simulation", Third edition, Prentice Hall, India, 2002.

# Rama University Uttar Pradesh, Kanpur
## Faculty of Engineering & Technology
### BOE-074 Bioinformatics

| L | T | P | Credit-4 |
|---|---|---|---|
| 3 | 1 | 0 | |

**Content:**

**UNIT-I** **08 hours**

Introductory Concepts: The Central Dogma - The Killer Application - Parallel Universes - Watson's Definition-Top Down Versus Bottom up-Information Flow-Convergence-Databases–Data Management-Data Life Cycle - Database Technology - Interfaces - Implementation - Networks-Geographical Scope - Communication Models - Transmissions Technology - Protocols - Bandwidth -Topology - Hardware - Contents - Security - Ownership - Implementation - Management.

**UNIT-II** **08 hours**

Search Engines and Data Visualization: The search process - Search Engine Technology – Searching and Information Theory - Computational methods - Search Engines and Knowledge Management –Data Visualization - sequence visualization - structure visualization - user Interface – Animation Versus simulation - General Purpose Technologies.

**UNIT-III** **08 hours**

Statistics and Data Mining: Statistical concepts -Microarrays - Imperfect Data - Randomness Variability - Approximation - Interface Noise -Assumptions -Sampling and Distributions Hypothesis Testing - Quantifying Randomness - Data Analysis - Tool selection statistics of Alignment Clustering and Classification - Data Mining - Methods - Selection and Sampling - Preprocessing and Cleaning Transformation and Reduction - Data Mining Methods - Evaluation - Visualization -Designing new queries - Pattern Recognition and Discovery - Machine Learning - Text Mining Tools.

**UNIT-IV** **08 hours**

Pattern Matching: Pairwise sequence alignment - Local versus global alignment - Multiple sequence alignment - Computational methods - Dot Matrix analysis - Substitution matrices – Dynamic Programming - Word methods - Bayesian methods -

Multiple sequence alignment – Dynamic Programming - Progressive strategies - Iterative strategies - Tools - Nucleotide Pattern Matching - Polypeptide pattern matching - Utilities - Sequence Databases.

**UNIT-V** **08 hours**

Modeling and Simulation: Drug Discovery - Components - Process - Perspectives – Numeric considerations - Algorithms - Hardware - Issues - Protein structure - AbInitio Methods – Heuristic methods - Systems Biology - Tools - Collaboration and Communications - Standards - Issues - Security - Intellectual property.

**Textbook :**

- Bryan Bergeron, "Bio Informatics Computing", Pearson Education, Second edition, 2003.

**References :**

- T..K. Attwood and D.J. Perry Smith, "Introduction to Bio Informatics", Longman Essen, 1999.

# Rama University Uttar Pradesh, Kanpur
## Faculty of Engineering & Technology
### BCS-751: Distributed System Lab

| L | T | P | Credit-1 |
|---|---|---|---|
| 0 | 0 | 2 | |

**Content:**

**List of Program**

1. Simulate the functioning of Lamport's Logical Clock in C.
2. Simulate the functioning of Vector Clock in C.
3. Implement a Distributed Chat Server using TCP Sockets.
4. Implement Remote Procedure Call (RPC) mechanism for a file transfer across a network in C.
5. Implement Java Remote Method Invocation (RMI) mechanism for accessing methods of remote systems.
6. Simulate Balanced Sliding Window Protocol in C.
7. Implement Common Object Request Broker Architecture (CORBA) mechanism by using Java program.

# Rama University Uttar Pradesh, Kanpur

## Faculty of Engineering & Technology

### BCS-752: Mini Project

**L T P** **Credit-1**

**0 0 2**

**Content:**

A group of students, not more than three, will be assigned a faculty guide who would be the supervisor of the student. The faculty would be identified in the starting of the VII semester.

The group will carry out the literature search and collect required material for carrying out the project.

The group will prepare a report not exceeding 15 pages at the end of semester. The assessment of performance of students should be made at least twice in each semester i.e. VII and VIII. In this semester the student shall present the progress of project live as also using overheads project or power point presentation on LCD to the internal committee as also the external examiner.

The evaluation committee shall consist of faculty members constituted by the college which would comprise of at-least three members comprising of the Department Coordinator, Class Coordinator and a nominee of the Director. The students guide would be a special invitee to the presentation.

The seminar session shall be an open house session. The internal marks would be the average of the marks given by each member of the committee separately in a sealed envelope to the Principal

A group of students have to make a latest technology based project in their respective stream. It may be hardware or software based.

# Rama University Uttar Pradesh, Kanpur
## Faculty of Engineering & Technology
### BCS-753 Seminar

**Credit-1**

| L | T | P |
|---|---|---|
| 0 | 0 | 3 |

**Content:**

1. Observance of dress code.
2. Participation in Conferences /Workshops / Seminars.
3. Attendance in guest lectures, invited talks and special technical sessions organized from time to time.
4. Participation in community projects including NSS.
5. Exhibiting team spirit in different Culture & extra curriculum activities, Department Club activities of the University and College organized from time to time.
6. Observance of rule & regulations in the College/University, Behavior in Campus Premises, Bus, hostel mess and hostel.
7. Performance and awards received in different events (sports/ co-curricular activities) organized at College / University and other level.
8. General behavior
9. Any extraordinary achievement.

# Rama University Uttar Pradesh, Kanpur

## Faculty of Engineering & Technology

### BCS-754: Industrial Training & Viva-voce

| L | T | P | Credit-1 |
|---|---|---|---|
| 0 | 0 | 2 | |

**Content:**

Students will attend Industrial training of six weeks in any industry or reputed organization after the IV semester examination in summer vacation. The evaluation of this training shall be included in the V semester evaluation.

The student will be assigned a faculty guide who would be the supervisor of the student. The faculty would be identified before the end of the IV semester and shall be the nodal officer for coordination of the training.

Students will also be required to prepare an exhaustive technical report of the training undertaken during the V semester which will be duly signed by the officer under whom training was taken in the industry/ organization. The covering format shall be signed by the concerned office in-charge of the training in the industry. The officer-in-charge of the trainee would also give his rating of the student in the standard University format in a sealed envelope to the Principal of the college.

The student at the end of the V semester will present his report about the training before a committee constituted by the Director of the College which would be comprised of at least three members comprising of the Department Coordinator, Class Coordinator and a nominee of the Director. The students guide would be a special invitee to the presentation. The seminar session shall be an open house session. The internal marks would be the average of the marks given by each member of the committee separately in a sealed envelope to the Director.

The marks by the external examiner would be based on the report submitted by the student which shall be evaluated by the external examiner and cross examination done of the student concerned. Not more than three students would form a group for such industrial training/ project submission.

## Eight Semesters

**Departmental Elective-V**

1. BCS-081 VLSI Design
2. BCS-082 Web service and service Oriented Architecture
3. BCS-083 Multimedia Computing
4. BCS-084 Information Security

# Rama University Uttar Pradesh, Kanpur
## Faculty of Engineering & Technology
### BCS-081 VLSI Design

| L | T | P |
|---|---|---|
| 3 | 1 | 0 |

**Credit-4**

**Content:**

**UNIT-I** **08 hours**

**Introduction:** Basic principle of MOS transistor, Introduction to large signal MOS models (long channel) for digital design. MOS Circuit Layout & Simulation: MOS SPICE model, device characterization, Circuit characterization, interconnects simulation. MOS device layout: Transistor Layout, Inverter layout, CMOS digital circuit layout & simulation.

**UNIT-II** **08 hours**

The MOS Inverter: Inverter principle, Depletion and enhancement load inverters, the basic CMOS inverter, transfer characteristics, logic threshold, Noise margins, and Dynamic behavior, Propagation Delay, Power Consumption.

**UNIT-III** **08 hours**

**Combinational MOS LogicDesign**

Static MOS design: Complementary MOS, Rationed logic, Pass Transistor logic, complex logic circuits. **Sequential MOS Logic Design**

Static latches, Flip flops & Registers, Dynamic Latches & Registers, CMOS Schmitt trigger, Mon stable sequential Circuits, A stable Circuit. Memory Design: ROM & RAM cells design.

**UNIT-IV** **08 hours**

Dynamic MOS design: Dynamic logic families and performances. Interconnect & Clock Distribution Interconnect delays, Cross Talks, Clock Distribution. Introduction to low power design, Input and Output Interface circuits. BiCMOS Logic Circuits Introduction, BJT Structure & operation, Basic BiCMOS Circuit behavior, Switching Delay in BiCMOS Logic circuits, BiCMOS Application.

**UNIT-V** **08 hours**

VLSI System Testing & Verification: Introduction, A walk through the Test Process, Reliability, Logic Verification Principles, Silicon Debug Principles, Manufacturing Test Principles, Design for Testability, Boundary Scan. VLSI Applications like RISC microcontroller, ATM Switch.

**Text Books**

- Kang &Leblebigi "CMOS Digital IC Circuit Analysis & Design"- McGraw Hill, 2003.
- Rabey, "Digital Integrated Circuits Design", Pearson Education, Second Edition, 2003.

**Reference Books**

- Weste and Eshraghian, "Principles of CMOS VLSI design" Addison-Wesley, 2002.

# Rama University Uttar Pradesh, Kanpur

## Faculty of Engineering & Technology

### BCS-082: Web Service and service Oriented Architecture

**L T P** **Credit-4**

**3 1 0**

**Content:**

**UNIT-I** **08 hours**

Introduction - Service Oriented Enterprise - Service Oriented Architecture (SOA) - SOA and Web Services - Multi-Channel Access - Business Process management - Extended Web Services Specifications - Overview of SOA - Concepts - Key Service Characteristics - Technical Benefits Business Benefits.

**UNIT-II** **08 hours**

SOA and Web Services - Web Services Platform - Service Contracts - Service-Level Data Model Service Discovery - Service-Level Security - Service-Level Interaction patterns - Atomic Services and Composite Services - Proxies and Skeletons - Communication - Integration Overview XML and Web Services - .NET and J2EE Interoperability - Service-Enabling Legacy Systems - Enterprise Service Bus Pattern.

**UNIT-III** **08 hours**

Multi-Channel Access - Business Benefits - SOA for Multi-Channel Access -Tiers - Business Process Management - Concepts - BPM, SOA and Web Services - WSBPEL - Web Services Composition.

**UNIT-IV** **08 hours**

Java Web Services - JAX APIs - JAXP - JAX-RPC - JAXM - JAXR – JAXB.

**UNIT-V** **08 hours**

Metadata Management - Web Services Security - Advanced Messaging - Transaction Management

Sarvesh

**Text Books:**

- Eric Newcomer, Greg Lomow, "Understanding SOA with Web Services", Pearson Education, 2005.
- James McGovern, Sameer Tyagi, Michael E Stevens, Sunil Mathew, "Java Web Services Architecture", Elsevier, 2003.

**Reference Books:**

- Thomas Erl, "Service Oriented Architecture", Pearson Education, 2005.
- Frank Cohen, "Fast SOA", Elsevier, 2007.

# Rama University Uttar Pradesh, Kanpur
## Faculty of Engineering & Technology
### BCS-083: Multimedia Computing

**L T P** **Credit-4**

**3 1 0**

**Content:**

**UNIT-I** **08 hours**

Introduction to Multimedia, Multimedia Information, Multimedia Objects, Multimedia in business and work. Convergence of Computer, Communication and Entertainment products and Stages of Multimedia Projects, Multimedia hardware, Memory & storage devices, Communication devices, Multimedia software's, presentation tools, tools for object generations, video, sound, image capturing, authoring tools, card and page based authoring tools.

**UNIT-II** **08 hours**

Multimedia Building Blocks Text, Sound MIDI, Digital Audio, audio file formats, MIDI under windows environment Audio & Video Capture.

**UNIT-III** **08 hours**

Data Compression Huffman Coding, Shannon Fano Algorithm, Huffman Algorithms, Adaptive Coding, Arithmetic Coding Higher Order Modeling. Finite Context Modeling, Dictionary based Compression, Sliding Window Compression, LZ77, LZW compression, Compression, Compression ratio loss less & lossy compression.

**UNIT-IV** **08 hours**

Speech Compression & Synthesis Digital Audio concepts, Sampling Variables, Loss less compression of sound, loss compression & silence compression.

**UNIT-V** **08 hours**

Images: Multiple monitors, bitmaps, Vector drawing, lossy graphic compression, image file formatted Animations Images standards, JPEG Compression, ZigZag Coding, Multimedia Database. Content based retrieval for text and images. Video: Video representation, Colors, Video Compression, MPEG standards, MHEG Standard Video

Streaming on net, Video Conferencing, Multimedia Broadcast Services, Indexing and retrieval of Video Database, recent development in Multimedia

**Text Books:**

- "Multimedia Computing Communications & Applications" by Ralf Steinmetz, Klara Nahrstedt, Pearson Education (2004)
- Principles of Multimedia by Parekh Ranjan,Tata McGraw-Hill(2007)

**Reference Books:**

- Multimedia Systems, By John E Koegal, Buford, IIBK. (1994)
- Virtual Reality Systems, John Vince, ACM Press (1995)

# Rama University Uttar Pradesh, Kanpur
## Faculty of Engineering & Technology
### BCS 084: Information Security

| L | T | P | Credit-4 |
|---|---|---|---|
| 3 | 1 | 0 | |

**Content:**

**UNIT 1** **08 hours**

**Introduction and Security Trends**:

Threats to security: Viruses and Worms, Intruders, Insiders. Avenues of attack, steps in attack,

Types of attack: Denial of service, backdoors and trapdoors, sniffing, spoofing, man in the middle, replay, Malware: Viruses, Logic bombs.

**UNIT 2** **08 hours**

**Security Basics** – Confidentiality, Integrity, Availability, Operational model of Computer Security, Layers of security. Access control: Discretionary, Mandatory, Role based

**Organizational/ Operational security**: Role of people in security: Password selection, Piggybacking, Shoulder surfing, Dumpster diving, Installing unauthorized software / hardware.

**UNIT 3** **08 hours**

Access by non employees, Security, awareness, Individual user responsibilities. Security policies, standards, procedures and guidelines. Physical security: Access controls Biometrics: finger prints, signature and writing patterns, Physical barriers.

**UNIT 4** **08 hours**

Cryptography and Public key Infrastructure Encryption algorithm/Cipher, Caesar's cipher, shift

cipher, substitution software, Vigenere cipher, Transposition techniques, Steganography, Symmetric encryption DES (Data encryption standard). Asymmetric encryption, Digital signature.

**UNIT 5** **08 hours**

Hashing, SHA, Public key infrastructures : basics, digital certificates, certificate authorities, registration authorities, steps for obtaining a digital certificate, steps for verifying authenticity and integrity of a certificate. Centralized or decentralized infrastructure, private key protection.

**Text & Reference Books:**


- Wayne L. Winston,"Operations Research" Thomson Learning, 2003.
- Hamdy H. Taha, "Operations Research-An Introduction" Pearson Education, 2003.
- R. Panneer Seevam, "Operations Research" PHI Learning, 2008

**Departmental Elective-VI**

- BCS-085 Computational Geometry
- BCS-086 Computational Complexity
- BCS-087 Parallel Algorithms
- BCS-088 Pattern Recognition

# Rama University Uttar Pradesh, Kanpur
## Faculty of Engineering & Technology
### BCS-085: Computational Geometry

| L | T | P | Credit-4 |
|---|---|---|---|
| 3 | 1 | 0 | |

**Content:**

**UNIT-I** **08 hours**

**Convex hulls:** construction in 2d and 3d, lower bounds; Triangulations: polygon triangulations, representations, point-set triangulations, planar graphs.

**UNIT-II** **08 hours**

**Voronoi diagrams:** construction and applicant ions, variants; Delaney triangulations: divide-and- conquer, flip and incremental algorithms, duality of Voronoi diagrams, min-max angle properties.

**UNIT-III** **08 hours**

**Geometric searching:** point-location, fractional cascading, linear programming with prune and search, finger trees, concatenable queues, segment trees, interval trees; Visibility: algorithms for weak and strong visibility, visibility with reflections, art-gallery problems.

**UNIT-IV** **08 hours**

**Arrangements of lines:** arrangements of hyper planes, zone theorems, many-faces complexity and algorithms; Combinatorial geometry: Ham-sandwich cuts.

**UNIT-V** **08 hours**

**Sweep techniques:** plane sweep for segment intersections, Fortune's sweep for Voronoi diagrams, topological sweep for line arrangements; Randomization in computational geometry: algorithms, techniques for counting; Robust geometric computing, Applications of computational geometry.

**Text & Reference Books:**


- Computational Geometry: An Introduction by Franco P. Preparata and Michael Ian Shamos; SpringerVerlag
- Mark de Berg , Marc van Kreveld , Mark Overmars , and Otfried Schwarzkopf, Computational Geometry, Algorithms and Applications , Springer-Verlag,
- KetanMulmuley, Computational Geometry: An Introduction Through Randomized Algorithms, Prentice-Hall
- Joseph O'Rourke, Computational Geometry in C, Cambridge University Press

# Rama University Uttar Pradesh, Kanpur
## Faculty of Engineering & Technology
### BCS-086: Computational Complexity

| L | T | P |
|---|---|---|
| 3 | 1 | 0 |

**Credit-4**

**Content:**

**UNIT-I** **08 hours**

Models of Computation, resources (time and space), algorithms, computability, complexity.

**UNIT-II** **08 hours**

Complexity classes, P/NP/PSPACE, reduction s, hardness, completeness, hierarchy, relationships between complexity classes.

**UNIT-III** **08 hours**

Randomized computation and complexity; Logical characterizations, incompleteness; Approximability.

**UNIT-IV** **08 hours**

Circuit complexity, lower bounds; Parallel computation and complexity; counting problems Interactive proofs.

**UNIT-V** **08 hours**

Probabilistically checkable proofs; Communication complexity; Quantum computation.

**Text & Reference Books:**


- Christos H. Papadimitriou., Combinatorial Optimization: Algorithms and Complexity, Prentice-Hall
- SanjeevArora and Boaz Barak , Complexity Theory: A Modern Approach, Cambridge University Press
- Steven Homer , Alan L. Selman , Computability and Complexity Theory , Springer

# Rama University Uttar Pradesh, Kanpur
## Faculty of Engineering & Technology
### BCS-087: Parallel Algorithms

| L | T | P | Credit-4 |
|---|---|---|---|
| 3 | 1 | 0 | |

**Content:**

**UNIT-I** **08 hours**

Sequential model, need of alternative model, parallel computational models such as PRAM, LMCC, Hypercube, Cube Connected Cycle, Butterfly, Perfect Shuffle Computers, Tree model, Pyramid model, fully Connected model, PRAM-CREW, EREW models, simulation of one model from another one.

**UNIT-II** **08 hours**

Performance Measures of Parallel Algorithms, speed-up and efficiency of PA, Cost-optimality, an example of illustrate Cost- optimal algorithms- such as summation, Min/Max on various models.

**UNIT-III** **08 hours**

Parallel Sorting Networks, Parallel Merging Algorithms on CREW/EREW/MCC, Parallel Sorting Networks on CREW/EREW/MCC/, linear array.

**UNIT-IV** **08 hours**

Parallel Searching Algorithm, Kth element, Kth element in X+Y on PRAM, Parallel Matrix Transportation and Multiplication Algorithm on PRAM, MCC, Vector-Matrix Multiplication, Solution of Linear Equation, Root finding.

**UNIT-V** **08 hours**

Graph Algorithms - Connected Graphs, search and traversal, Combinatorial Algorithms Permutation, Combinations, Derangements.

**Text & Reference Books:**


- M.J. Quinn, "Designing Efficient Algorithms for Parallel Computer", McGrawHill
- S.G. Akl, "Design and Analysis of Parallel Algorithms"
- S.G. Akl, "Parallel Sorting Algorithm" by Academic Press

# Rama University Uttar Pradesh, Kanpur
## Faculty of Engineering & Technology
### BCS-088: Pattern Recognition

| L | T | P |
|---|---|---|
| 3 | 1 | 0 |

**Credit : 4**

**Content:**

**UNIT-I** **08 hours**

**Introduction:** Basics of pattern recognition, Design principles of pattern recognition system, Learning and adaptation, Pattern recognition approaches, Mathematical foundations - Linear algebra, Probability Theory, Expectation, mean and covariance, Normal distribution, multivariate normal densities, Chi squared test.

**UNIT-II** **08 hours**

**Statistical Patten Recognition:** Bayesian Decision Theory, Classifiers, Normal density and discriminant functions,

**UNIT-III** **08 hours**

**Parameter estimation methods:** Maximum-Likelihood estimation, Bayesian Parameter estimation, Dimension reduction methods - Principal Component Analysis (PCA), Fisher Linear discriminant analysis, Expectation-maximization (EM), Hidden Markov Models (HMM), Gaussian mixture models.

**UNIT-IV** **08 hours**

**Nonparametric Techniques:** Density Estimation, Parzen Windows, K-Nearest Neighbor Estimation, Nearest Neighbor Rule, Fuzzy classification.

**UNIT-V** **08 hours**

**Unsupervised Learning & Clustering:** Criterion functions for clustering, Clustering Techniques: Iterative square - error partitioned clustering - K means, agglomerative hierarchical clustering, Cluster validation.

**Text & Reference Books:**


- Richard O. Duda, Peter E. Hart and David G. Stork, "Pattern Classification", 2nd Edition, John Wiley, 2006.
- C. M. Bishop, "Pattern Recognition and Machine Learning", Springer, 2009.
- S. Theodoridis and K. Koutroumbas, "Pattern Recognition", 4th Edition, Academic Press, 2009.

# Rama University Uttar Pradesh, Kanpur
## Faculty of Engineering & Technology
### BCS-851: Major Project

**Credit: 16**

| L | T | P |
|---|---|---|
| 0 | 0 | 21 |

**Content:**

A group of students have to make a latest technology based project in their respective stream. It may be hardware or software based.

Students should devote themselves to prepare something tangible, which could be a working model of their thoughts based on their subject of choice.

The project shall be finalized by the students based on the VII semester project work report and shall be completed and submitted at least one month before the last teaching day of the VIII semester, date of which shall be notified in the academic calendar.

The assessment of performance of students should be made at least twice in each semester i.e. VII and VIII. In this semester student shall present the final project live as also using overheads project or power point presentation on LCD to the internal committee as also the external examiner.

The evaluation committee shall consist of faculty members constituted by the college which would comprise of at-least three members comprising of the Department Coordinator, Class Coordinator and a nominee of the Director. The students guide would be a special invitee to the presentation. The seminar session shall be an open house session. The internal marks would be the average of the marks given by each member of the committee separately in a sealed envelope to the Principal.

**Chairperson**

Signature: .....

Name : Dr. Vivek Srivastava

Date :

**Internal Members**

Signature:

1..... Sarvesh .....

Name: Mr. Sarvesh Kumar

Date:

2..... Tripathi .....

Mr. Somendra Tripathi

Signature: 3.....

Name: Ms. Neelu Kushwaha

Date:

**External Members**

Signature:

1..... 2.....

Name: Dr. Amod Tiwari Mr. Vishal Nagar

Date: