**Scheme and Syllabus for UGC Sponsored**

# Bachelor of Vocation (B.Voc.)

# Software Quality Assurance & Quality Control

# REGULATION AND SCHEME FOR B.VOC. PROGRAMME UNDER MAHATMA GANDHI UNIVERSITY

(2018 admissions onwards)

We are facing unprecedented challenges – Skill and knowledge, the driving forces of economic growth and social development for any country. Presently, the country faces a demand – supply mismatch, as the economy needs more 'skilled' workforce than that is available. In the higher education sphere, knowledge and skills are required for diverse forms of employment in the sector of education, health care manufacturing and other services. Potentially, the target group for skill development comprises all those in the labour force, including those entering the labour market for the first time, those employed in the organized sector and also those working in the unorganized sector. Government of India, taking note of the requirement for skill development among students launched National Vocational Education Qualification Framework (NVEQF) which was later on assimilated into National Skills Qualifications Framework (NSQF). Various Sector Skill Councils (SSCs) are developing Qualification Packs (QPs), National Occupational Standards (NOSs) and assessment mechanisms in their respective domains, in alignment with the needs of the industry.

The University Grants Commission (UGC) has launched a scheme on skills development based higher education as a part of college/university education, leading to Bachelor of Vocation (B.Voc.) Degree with multiple exits such as Diploma/Advanced Diploma under the NSQF (National skill Qualification's framework). The B.Voc. programmed is focused on universities and colleges providing undergraduate studies which would also incorporate specific job roles along with broad based general education. This would enable the graduates completing B.Voc. to make a meaningful participation in accelerating India's economy by gaining appropriate employment, becoming entrepreneurs and creating appropriate knowledge. The proposed vocational programmed will be a judicious mix of skills, professional education related to concerned vocation and also appropriate content of general education.

The Mahatma Gandhi University gave a strong momentum to the initiatives of UGC-NSQF in the very beginning itself. This University provides opportunities to its affiliating colleges since Academic Year 2014-15 to start skill based vocational Graduate programmes strictly under the guidelines of UGC and NSQF.

## 1. TITLE

These regulations shall be called "**MAHATMA GANDHI UNIVERSITY REGULATIONS FOR B.VOC PROGRAMME 2018".**

## 2. SCOPE

Applicable to all regular B.Voc Programme conducted by the University with effect from 2018 admissions onwards, except for B.Voc. Programmes, having scheme and syllabus already approved by MGU under 2014 regulation and scheme.

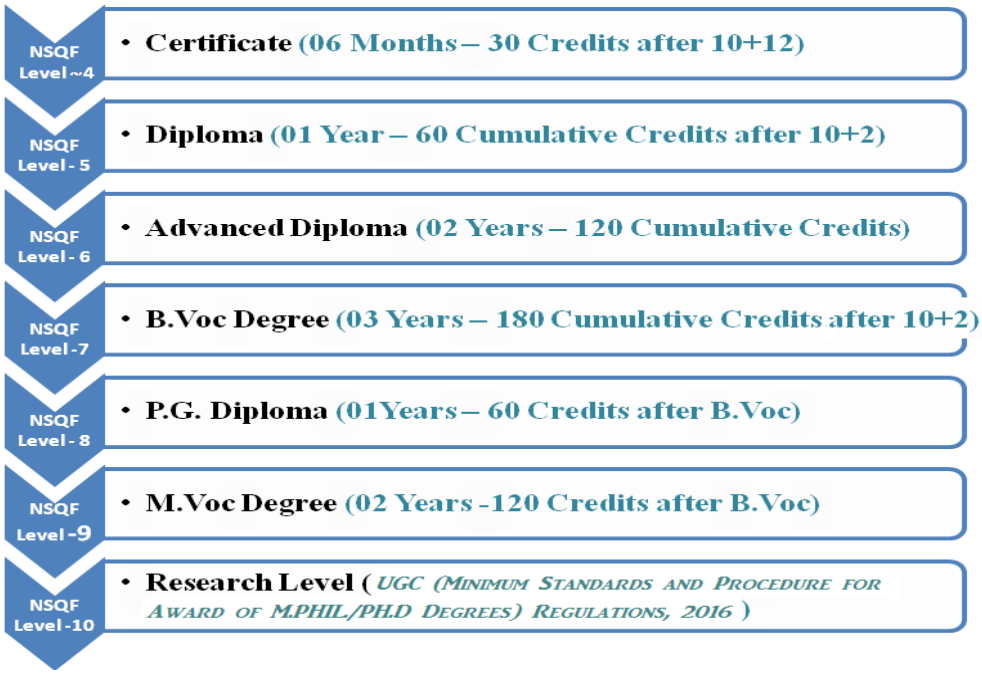
During the academic year 2019-20 admission onwards, all regular B.Voc Programme in affiliating colleges under MG University should strictly follow *Mahatma Gandhi University Regulations For B.Voc Programme 2018*.

## 3. ELIGIBILITY FOR ADMISSION AND RESERVATION OF SEATS

Eligibility for admissions and reservation of seats for various Undergraduate Programmes shall be according to the rules framed by the University and UGC in this regard, from time to time.

## 4. Type of Courses and Awards:

There will be fulltime credit-based modular programmes, where in banking of credits for skill and general education components shall be permitted so as to enable multiple exit and entry.




The multiple entry and exit enables the learner to seek employment after any level of Award and join back as and when feasible to upgrade qualifications / skill competencies either to move higher in the job profile or in the higher educational system. This will also provide the learner an opportunity for vertical mobility to second year of B.Voc degree programme after one year diploma and to third year of B.Voc degree programme after a two year advanced diploma. The students may further move to Masters and Research degree programmes mapped at NSQF Level 8 – 10.

## 5. Curricula and Credit System for Skill Based Courses

In order to make education more relevant and to create 'industry fit' skilled workforce, the institutions recognized under B.Voc Degree programme offering skill based courses will have to be in constant dialogue with the industry and respective Sector Skill Councils (SSC's) so that they remain updated on the requirements of the workforce for the local economy. These institutions should also preserve and promote the cultural heritage of the region, be it art, craft, handicraft, music, architecture or any such thing, through appropriately designed curriculum leading to gainful employment including self-employment and entrepreneurship development.

The curriculum in each of the semester/years of the programme(s) will be a suitable mix of general education and skill development components. The General Education Component shall have 40% of the total credits and balance 60% credits shall be of Skill Component.

The institution(s) shall prepare draft curriculum as per the UGC guidelines for Curricular Aspects Assessment Criteria and Credit System for Skill based Vocational Courses and place it for vetting by the UGC Advisory Committee constituted under these guidelines.

The Curriculum shall be finally approved by the Board of Studies (BoS) and Academic Council of the University / Autonomous College. The Universities where BoS for Vocational subjects has not yet been constituted, the curriculum may be considered by the BoS in allied subject area or an ad-hoc BoS may be constituted till the time regular BoS is notified in the university. The BoS should consider the programme wise curriculum based QP for skill component and relevant general education subjects i.e. the curricula for programmes in one broad subject area may vary from institution to institution in case the different progressive QPs are mapped with the programmes being offered. The choice of different progressive Job roles for a course may also be enabled under CBCS.

## 6. Structure of the Programme

### 6.1 Skill Development Components- 60%Weightage

### 6.2 General Education Component- 40%Weightage

The B.Voc Programme should comprise 60%SkillDevelopmentComponents(60 % of total Credit)and 40% General Education Component (40%total Credit) as per guidelines of UGC and NSQL.

As an illustration, awards shall be given at each stage as per Table 1 below for cumulative credits awarded to the learners in skill based vocational courses.

**Table 1**

| NSQF Level | Skill Component Credits | General Education Credits | Total Credits for Award | Normal Duration | Exit Points/ Awards |
|---|---|---|---|---|---|
| 7 | 108 | 72 | 180 | Six Semesters | B.Voc Degree |
| 6 | 72 | 48 | 120 | Four semesters | Advanced Diploma |
| 5 | 36 | 24 | 60 | Two semesters | Diploma |
| 4 | 18 | 12 | 30 | One semester | Certificate |

## 7. SCHEME AND SYLLABUS

7.1. B.Voc Programme should include (**a)** General Education Component, (**b**) Skill Education Component

7.2. The B.Voc Programme should followed Credit and Semester System of MGU.

7.3. A separate minimum of 30% marks each for internal and external (for both theory and AOC) and aggregate minimum of 40% are required for a pass for a course. For a pass in a programme, **Grade P** is required for all the individual courses. If a candidate secures **F Grade** for any one of the courses offered in a Semester/Programme, **only F grade** will be awarded for that Semester/Programme until he/she improves this to **P Grade** or above within the permitted period.

## 8. Assessment and Evaluation by MG University.

General Education Components and Skill Development Components shall be assessed and evaluated by MG University as per University Norms and UGC-NSQF guidelines.

## 9. Assessment and Certification by Sector Skill Council ( SSC)

The affiliated colleges should make necessary arrangements for the simultaneous assessments and certification of Skill Development Component by aligned SSC having the approval of National Skill Development Corporation of India (NSDC).

## 10. EXAMINATIONS

**10.1** The evaluation of each paper shall contain two parts:

(i) Internal or In-Semester Assessment (ISA)

(ii) External or End-Semester Assessment (ESA)

**10.2.** The internal to external assessment ratio shall be 1:4.

Both internal and external marks are to be rounded to the next integer.

All the courses (theory & AOC), grades are given **on a 7-point scale** based on the total percentage of marks, ***(ISA+ESA)*** as given below:-

| Percentage of Marks | Grade | Grade Point |
|---|---|---|
| 95 and above | O(Outstanding) | 10 |
| 90 to below 95 | A+(Excellent) | 9 |
| 80 to below 90 | A(VeryGood) | 8 |
| 70 to below 80 | B+(Good) | 7 |
| 60 to below 70 | B(AboveAverage) | 6 |
| 50 to below 60 | C (Average) | 5 |
| 40 to below 50 | P(Pass) | 4 |
| Below 40 | F(Fail) | 0 |
| | Ab(Absent) | 0 |

### 10.3 CREDIT POINT AND CREDIT POINT AVERAGE

**Credit Point (CP)** of a paper is calculated using the formula:-

*CP = C × GP, where C is the Credit and GP is the Grade point*

**Semester Grade Point Average (SGPA)** of a Semester is calculated using the formula:-

*SGPA = TCP/TC, where TCP is the Total Credit Point of that semester.*

**Cumulative Grade Point Average (CGPA)** is calculated using the formula:-

*CGPA = TCP/TC, where TCP is the Total Credit Point of that programme.*

**Grade Point Average (GPA)** of different category of courses viz. Common CourseI, Common Course II, Complementary Course I, Complementary Course II, Vocational course, Core Course is calculated using the formula:-

*GPA = TCP/TC, where TCP is the Total Credit Point of a category of course.*

*TC is the total credit of that category of course*

Grades for the different courses, semesters and overall programme are given based on the corresponding CPA as shown below:

| **GPA** | **Grade** |
|---|---|
| 9.5 and above | **O Outstanding** |
| 9 to below 9.5 | **A+ Excellent** |
| 8 to below 9 | **A Very Good** |
| 7 to below 8 | **B+ Good** |
| 6 to below 7 | **B Above Average** |
| 5 to below 6 | **C Average** |
| 4 to below 5 | **P Pass** |
| Below 4 | **F Failure** |

## 11. MARKS DISTRIBUTION FOR EXTERNAL AND INTERNAL EVALUATIONS

The external theory examination of all semesters shall be conducted by the University at the end of each semester. Internal evaluation is to be done by continuous assessment. For all

courses total marks of external examination is 80 and total marks of internal evaluation is 20. Marks distribution for external and internal assessments and the components for internal evaluation with their marks are shown below:

**For all Theory Courses**

**a) Marks of external Examination : 80**

**b) Marks of internal evaluation : 20**

| **Components of Internal Evaluation–Theory** | **Marks** |
|---|---|
| Attendance | 5 |
| Assignment/Seminar/Viva | 5 |
| Test paper(s)(1or2)<br>(1×10=10;2×5=10) | 10 |
| Total | 20 |

For all AOC Courses total marks for external evaluation is 80 and total marks for internal evaluation is 20.

**For all AOC Courses**

**a) Marks of external Examination : 80**

**b) Marks of internal evaluation : 20**

| **Components of Internal Evaluation–AOC** | **Marks** |
|---|---|
| Attendance | 5 |
| Record | 5 |
| Skill Test | 5 |
| Lab Performance / Punctuality | 5 |
| Total | 20 |

*Marks awarded for Record should be related to number of experiments recorded and duly signed by the teacher concerned in charge.

All three components of internal assessments are mandatory.

## 11.1 PROJECT EVALUATION

**a) Marks of external Examination : 80**

**b) Marks of internal evaluation : 20**

| Components of Internal Evaluation | Marks |
|---|---|
| Punctuality | 5 |
| Experimentation/Data Collection | 5 |
| Skill Acquired | 5 |
| Report | 5 |
| **Total** | **20** |

*****Marks for dissertation may include study tour report if proposed in the syllabus.

| Components of External Evaluation | Marks |
|---|---|
| Dissertation (External) | 50 |
| Viva-Voce (External) | 30 |
| **Total** | **80** |

(Decimals are to be rounded to the next higher whole number)

## 11.2 INTERNSHIP

After the completion of every even semester, the student will undergo a minimum of two weeks Internship Programme in an Industry, having a good exposure in the concerned skill (Established at least two years prior), capable of delivering the skill sets to the students.

At the end of the Internship, the students should prepare a comprehensive report.

### 11.3 Attendance Evaluation for all papers

| Attendance Percentage | Marks |
|---|---|
| 75% | 1Mark |
| Greater than 75%&lessthan80% | 2Marks |
| 80%&lessthan85% | 3Marks |
| 85%&lessthan90% | 4Marks |
| 90%&above | 5Marks |

(Decimals are to be rounded to the next higher whole number)

### 11.4 ASSIGNMENTS

Assignments are to be done from 1st to 4th Semesters. At least one assignment per course per semester should be submitted for evaluation.

### 11.5 INTERNAL ASSESSMENT TEST PAPERS

Two test papers are to be conducted in each semester for each course. The evaluations of all components are to be published and are to be acknowledged by the candidates. All documents of internal assessments are to be kept in the college for one year and shall be made available for verification by the University. The responsibility of evaluating the internal assessment is vested on the teacher(s), who teach the course.

### 11.6 GRIEVANCE REDRESSAL MECHANISM

Internal assessment shall not be used as a tool for personal or other type of vengeance. A student has all rights to know, how the teacher arrived at the marks. In order to address the grievance of students, a three-level Grievance Redressal mechanism is envisaged. A student can approach the upper level only if grievance is not addressed at the lower level.

**Level 1: Department Level**:

The Department cell chaired by the HOD, Department Coordinator, Faculty Advisor and Teacher in-charge as members.

**Level 2**: **College level**

A committee with the Principal as Chairman, College Coordinator, HOD of concerned Department and Department Coordinator as members.

**Level 3**: **University Level**

A Committee constituted by the Vice-Chancellor as Chairman, Pro-Vice-Chancellor, Convener - Syndicate Standing Committee on Students Discipline and Welfare, Chairman-Board of Examinations as members and the Controller of Examination as member-secretary.

The College Council shall nominate a Senior Teacher as coordinator of internal evaluations. This coordinator shall make arrangements for giving awareness of the internal evaluation components to students immediately after commencement of first semester

The internal evaluation marks/grades in the prescribed format should reach the University before the 4th week of October and March in every academic year.

## 11.7 EXTERNAL EXAMINATION

The external examination of all semesters shall be conducted by the University at the end of each semester.

- Students having a minimum of 75% average attendance for all the courses only can register for the examination. Condonation of shortage of attendance to a maximum of 10 days in a semester subject to a maximum of 2 times during the whole period of the programme may be granted by the University on valid grounds. This condonation shall not be counted for internal assessment. Benefit of attendance may be granted to students attending University/College union/Co-curricular activities by treating them as present for the days of absence, on production of participation/attendance certificates, within one week, from competent authorities and endorsed by the Head of the institution. This is limited to a maximum of 10 days per semester and this benefit shall be considered for internal assessment also. Those students who are not eligible even with condonation of shortage of attendance shall repeat the **semester** along with the next batch after obtaining readmission.
- Benefit of attendance may be granted to students attending University/College union/Co-curricular activities by treating them as present for the days of absence, on production of participation/attendance certificates, within one week, from competent authorities and endorsed by the Head of the institution. This is limited to a maximum of 10 days per semester and this benefit shall be considered for internal assessment also.
- Those students who are not eligible even with condonation of shortage of attendance shall repeat the course along with the next batch.

- There will be no supplementary exams. For reappearance/ improvement, the students can appear along with the next batch.
- Student who registers his/her name for the external exam for a semester will be eligible for promotion to the next semester.
- A student who has completed the entire curriculum requirement, but could not register for the Semester examination can register notionally, for getting eligibility for promotion to the next semester.
- A candidate who has not secured minimum marks/credits in internal examinations can re-do the same registering along with the University examination for the same semester, subsequently.

## 12. PATTERN OF QUESTIONS

Questions shall be set to assess knowledge acquired, standard and application of knowledge, application of knowledge in new situations, critical evaluation of knowledge and the ability to synthesize knowledge. The question setter shall ensure that questions covering all skills are set. She/he shall also submit a detailed scheme of evaluation along with the question paper. A question paper shall be a judicious mix of short answer type, short essay type /problem solving type and long essay type questions.

### 12.1 Pattern of questions for External examination–Theory paper

| Question Type | Total no. of questions | Number of questions to be answered | Marks of each question | Total marks |
|---|---|---|---|---|
| Very short answer type | 12 | 10 | 2 | 20 |
| Short answer (Nottoexceed60words) | 9 | 6 | 5 | 30 |
| Long essay | 4 | 2 | 15 | 30 |
| **TOTAL** | **25** | **18** | | **80** |

### 12.2 Pattern of questions for external examination–AOC

| Question Type | Total no. of questions | Number of questions to be answered | Marks of each question | Total marks |
|---|---|---|---|---|
| Theory Assessment- Short Answer Type | 8 | 5 | 4 | 20 |
| Skill Assessment- Practical | 1 | 1 | 60 | 60 |
| **TOTAL** | **9** | **6** | | **80** |

### 12.3 Mark division for external AOC/ LAB examination

| Record | Theory/ Procedure/ Design | Activity/ Neatness | Result | Viva | Total |
|---|---|---|---|---|---|
| 10 | 10 | 20 | 10 | 10 | 60 |

## 13. RANK CERTIFICATE

The University publishes rank list of top 10 candidates for each programme after the publication of 6$^{th}$ semester results. Rank certificate shall be issued to candidates who secure positions from 1$^{st}$ to 3$^{rd}$ in the rank list. Candidates who secure positions from fourth to tenth in the rank list shall be issued position certificate indicating their position in the rank list.

Candidates shall be ranked in the order of merit based on the CGPA scored by them. Grace marks awarded to the students should not be counted fixing the rank/position. Rank certificate and position certificate shall be signed by the Controller of Examinations.

## 14. Mark cum Grade Card

The University shall issue to the student's grade/marks card (by online) on completion of each semester, which shall contain the following information:

- Name of University

- Name of the College
- Title & Model of the B. VOC Programme
- Semester concerned
- Name and Register Number of students
- Code, Title, Credits and Max. Marks (Int, Ext &Total) of each course opted in the semester
- Internal marks, External marks, total marks, Grade, Grade point (G) and Credit point in each course in the semester
- Institutional average of the Internal Exam and University Average of the External Exam in each course.
- The total credits, total marks (Max & Awarded) and total credit points in the semester (corrected to two decimal places)
- Semester Credit Point Average (SCPA) and corresponding Grade
- Cumulative Credit Point Average (CCPA)

The final Grade/mark Card issued at the end of the final semester shall contain the details of all courses taken during the entire programme and shall include the final grade/marks scored by the candidate from I$^{st}$ to 5$^{th}$ semester, and overall grade/marks for the total programme.

## 15. READMISSION

Readmission will be allowed as per the prevailing rules and regulations of the university.
There shall **be 3 level monitoring** committees for the successful conduct of the scheme. They are:

1. Department Level Monitoring Committee (DLMC), comprising HOD and two senior-most teachers as members.
2. College Level Monitoring Committee (CLMC), comprising Principal, Dept. – Co-Ordinator and A.O/Superintendent as members.
3. University Level Monitoring Committee (ULMC), headed by the Vice – Chancellor and Pro–Vice – Chancellor, Convenors of Syndicate subcommittees on Examination, Academic Affairs and Staff and Registrar as members and the Controller of Examinations as member-secretary.

## 16. TRANSITORY PROVISION

Notwithstanding anything contained in these regulations, the Vice Chancellor shall, for a period of one year from the date of coming into force of these regulations shall be applied to any programme with such modifications as may be necessary.

## PROGRAMME STRUCTURE

| Semester I | | | | | | |
|---|---|---|---|---|---|---|
| **Sl. No.** | **Course Code** | **Title** | **GC/SC** | **T/ AOC** | **Hours/ Week** | **Credits** |
| 1 | BOCG101 | Listening And Speaking Skills In English | GC | T | 4 | 4 |
| 2 | BOCG102 | Information Technology for Business(AOC) | GC | AOC | 3 | 4 |
| 3 | SQACG101 | BASIC MATHEMATICS – II | GC | T | 3 | 4 |
| 4 | SQACS102 | Software Development Life Cycles | SC | T | 5 | 6 |
| 5 | SQACS103 | Software Process Management and Seven Quality Control Tools | SC | T | 5 | 6 |
| 6 | SQACS104 | Methodology of Programming and programming in C (AOC) | SC | AOC | 5 | 6 |

| Semester II | | | | | | |
|---|---|---|---|---|---|---|
| **Sl. No.** | **Course Code** | **Title** | **GC/SC** | **T/ AOC** | **Hours/ Week** | **Credits** |
| 1 | BOCG201 | Writing and Presentation Skills in English | GC | T | 4 | 4 |
| 2 | SQACG201 | BASIC MATHEMATICS – II | GC | T | 3 | 4 |
| 3 | SQACG202 | Fundamentals of Digital Systems | GC | T | 3 | 4 |
| 4 | SQACS203 | ISO 9001 and ISO 13485 | SC | T | 5 | 5 |
| 5 | SQACS204 | Agile and Scrum Model and Introduction To Six Sigma | SC | T | 5 | 5 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 6 | SQACS205 | Object Oriented Programming and C++ (AOC) | SC | AOC | 5 | 5 |
| 7 | SQACS206 | Internship – I | SC | | | 3 |

| Semester III | | | | | | |
|---|---|---|---|---|---|---|
| **Sl. No.** | **Course Code** | **Title** | **GC/SC** | **T/ AOC** | **Hours/ Week** | **Credits** |
| 1 | BOCG301 | Principles of Management | GC | T | 4 | 4 |
| 2 | SQACG301 | Computer Organization & Architecture. | GC | T | 3 | 4 |
| 3 | SQACG302 | Capability Maturity Model Integration – I and Capability Maturity Model Integration – II | GC | T | 3 | 4 |
| 4 | SQACS303 | Basics of Software Testing and Test Management | SC | T | 5 | 6 |
| 5 | SQACS304 | ISO 27001 | SC | T | 5 | 6 |
| 6 | SQACS305 | Programming in Python(AOC) | SC | AOC | 5 | 6 |

| Semester IV | | | | | | |
|---|---|---|---|---|---|---|
| **Sl. No.** | **Course Code** | **Title** | **GC/SC** | **T/ AOC** | **Hours/ Week** | **Credits** |
| 1 | BOCG401 | Soft Skills and Personality Development | GC | T | 4 | 4 |
| 2 | SQACG401 | Operational Research | GC | T | 3 | 4 |
| 3 | SQACG402 | Operating Systems | GC | T | 3 | 4 |
| 4 | SQACS403 | Fundamentals of Testing – 1 And Fundamentals of Testing – 2 | SC | T | 5 | 5 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 5 | SQACS404 | Database Management Systems | SC | T | 5 | 5 |
| 6 | SQACS405 | Functional Testing (AOC) | SC | AOC | 5 | 5 |
| 7 | SQACS406 | Internship – II | SC | | | 3 |

| **Semester V** | | | | | | |
|---|---|---|---|---|---|---|
| **Sl. No.** | **Course Code** | **Title** | **GC/SC** | **T/ AOC** | **Total Hours** | **Credits** |
| 1 | BOCG501 | Environmental Studies | GC | T | 4 | 4 |
| 2 | SQACG501 | Data Structures | GC | T | 4 | 4 |
| 3 | SQACG502 | Project Management I and Project Management II | GC | T | 4 | 4 |
| 4 | SQACS503 | Basics of Performance Testing and Basics of Security Testing | SC | T | 5 | 6 |
| 5 | SQACS504 | Computer Networks | SC | T | 3 | 4 |
| 6 | SQACS505 | Non-Functional Testing (AOC) | SC | AOC | 5 | 6 |
| 7 | SQACG506 | Project | GC | | | 2 |

| Semester IV | | | | | | |
|---|---|---|---|---|---|---|
| **Sl. No.** | **Course Code** | **Title** | **GC/SC** | **T/ AOC** | **Total Hours** | **Credits** |
| 1 | BOCG601 | Entrepreneurship Development | GC | T | 4 | 4 |
| 2 | SQACG601 | ISO 20000 and Auditing | GC | T | 3 | 3 |
| 3 | SQACG602 | Design and Analysis of Algorithms | GC | T | 3 | 3 |
| 4 | SQACS603 | Java Programming | SC | T | 5 | 5 |
| 5 | SQACS604 | Introduction to Test Automation | SC | T | 5 | 5 |
| 6 | SQACS605 | Test Automation (AOC) | SC | AOC | 5 | 5 |
| 7 | SQACS606 | Internship – III | SC | | | 5 |

GC– General Component
SC– Skill Component

# SEMESTER – I

## BOCG101: LISTENING AND SPEAKING SKILLS IN ENGLISH

**Hours/week: 4 hrs** **Total Hours:72hrs** **Credits: 4**

**Objectives:**

To introduce the students to the speech sounds of English in order to enable them to listen to English and speak with global intelligibility. To enable the students to speak English confidently and effectively in a wide variety of situations. To help the students to improve their reading efficiency by refining their reading strategies.

**MODULE – I**

**Speech Sounds:** Phonemic symbols – Vowels – Consonants – Syllables – Word stress – Stress in polysyllabic words – Stress in words used as different parts of speech – Sentence stress –Weak forms and strong forms – Intonation

**Sample activities:**

1- *Practice reading aloud. Use a variety of texts including short stories, advertisement matter, brochures, etc*

2- *Read out a passage and ask the students to identify the stressed and unstressed syllables.*

**MODULE – II**

**Basic Grammar:** Articles - Nouns and prepositions - Subject-verb agreement - Phrasal verbs - Modals - Tenses - Conditionals – Prefixes and suffixes – Prepositions -Adverbs – Relative pronouns - Passives - Conjunctions - Embedded questions - Punctuation –Abbreviations-concord- collocations-phrasal verbs- idiomatic phrases

**Sample activities:**

*1- Ask students to write a story/report/brochure, paying attention to the grammar.*

**MODULE – III**

**Listening:** Active listening – Barriers to listening – Listening and note taking – Listening to announcements – Listening to news on the radio and television

**Sample activities:**

1- *Information gap activities (e.g. listen to a song and fill in the blanks in the lyrics given on a sheet)*

2- *Listen to BBC news/ a play (without visuals) and ask the students to report what they heard.*

**MODULE– IV**

**Speaking-** Fluency and pace of delivery – Art of small talk – Participating in conversations – Making a short formal speech – Describing people, place, events and things – Group discussion skills, interview skills and telephone skills.

**Sample activities:**

1- *Conduct group discussion on issues on contemporary relevance.*

2- *Ask students to go around the campus and talk to people in the canteen, labs, other departments etc. and make new acquaintances.*

3- *Conduct mock interviews in class.*

4- *Record real telephone conversations between students and ask them to listen to the recordings and make the corrections, if any are required.*

**MODULE – V**

**Reading:** Theory and Practice – Scanning – Surveying a textbook using an index – reading with a purpose – Making predictions – Understanding text structure – Locating main points – Making inferences – Reading graphics – Reading critically – Reading for research.

**Books for Reference:**


1. 1.V.Sasikumar, P Kiranmai Dutt and Geetha Rajeevan, .Communication Skills in English. Cambridge University Press and Mahatma Gandhi University.
2. Marilyn Anderson, Pramod K Nayar and Madhu chandra Sen. Critical Thinking, Academic Writing and Presentation Skills. Pearson Education and Mahatma Gandhi University.


**For Further Activities**


1.A Course in Listening and Speaking I & II, Sasikumar, V.,Kiranmai Dutt and Geetha Rajeevan, New Delhi: CUP,2007

2.Study Listening: A Course in Listening to Lectures and Note-taking Tony Lynch New Delhi: CUP,2007.

3.Study Speaking: A Course in Spoken English for Academic Purposes. Anderson, Kenneth, Joan New Delhi: OUP,2008

## BOCG102: Information Technology for Business (AOC)

**Hours/week: 3 hrs** **Total Hours:54hrs** **Credits: 4**

**OBJECTIVES**

- This course is designed to meet the basic computer requirements of everyone.
- To create a basic Word document and simple Excel spreadsheet with beginner edits and formatting and to start a text slide in PowerPoint.

**MODULE – I: Introduction to Information Technology:** Information and Communication Technology (ICT), Information systems E-World - Computer Architecture: Input Hardware - Processing & Memory Hardware, Storage Hardware, Output Hardware, Communication Hardware - Concept of operating system - Understanding your computer customization configuring screen, mouse, printer.

**MODULE – II: Word Processing Package:** Introduction - Features - Word User Interface Elements; Creating new Documents; Basic Editing, Saving a Document; Printing a Document; Print Preview, Page Orientation - Viewing Documents; Setting tabs - Page Margins; Indents; Ruler, Formatting Techniques; Font Formatting, Paragraph Formatting; Page Setup; Headers & Footers; Bullets and Numbered List; Borders and Shading; Find and Replace; Page Break & Page Numbers; Mail Merging-Spelling and Grammar Checking; Tables; Formatting Tables;

**MODULE – III: Spreadsheet Package:** Introduction, Excel User Interface, working with cell and cell addresses, Selecting a Range, Moving, Cutting, Copying with Paste, Inserting and Deleting cells, Freezing cells, Adding, Deleting and Copying Worksheet within a workbook, Renaming a Worksheet. Cell Formatting Options, formatting fonts, Aligning, Wrapping and Rotating text, Using Borders, Boxes and Colors, Centering a heading, Changing row/column height/width, Formatting a Worksheet Automatically, Insert Comments, Clear contents in a cell. Using print Preview, Margin and Orientation, Centering a Worksheet, Using header and footer.

**MODULE – IV: Advanced Features of Spreadsheet Package:** All Functions in Excel, Using Logical Functions, Statistical functions, Mathematical etc. Elements of Excel Charts, Categories, Create a Chart, Choosing chart type, Edit chart axis - Titles, Labels, Data series and legend, Adding a text box, Rotate text in a chart, Saving a chart.

**MODULE –V: Presentation Package:** Ms-PowerPoint: Advantages of Presentation Screen layout creating presentation inserting slides adding sounds & videos-formatting slides - slide layout views in presentation -slide transition Custom animation Managing slide shows - using pen Setting slide intervals

**REFERENCE:**


1. Foundations of Information Technology Coursebook 9: Windows 7 and MS Office 2007 (With MS Office 2010 Updates) Paperback – 2013 by Sangeeta Panchal (Author), Alka Sabharwal (Author)
2. Microsoft® Office Professional 2010 Step by Step 1st Edition by Joan Lambert (Author), Joyce Cox (Author), Frye D., Curtis (Author)
3. Practical Guide to PC and Microsoft Office 2010: Word, Excel, PowerPoint Paperback – August 9, 2012 by Sergey K Aityan.
4. Foundations of Information Technology Class 10: Windows 7 and MS Office 2013 Paperback – 2016 by Sangeeta Panchal (Author), Alka Sabharwal (Author)

## SQACG101: BASIC MATHEMMATICS

**Hours/week: 3 hrs** **Total Hours:54 hrs** **Credits: 4**

**Objectives:**

- Recognize that mathematics permeates the world around us
- Become confident in using mathematics to analyse and solve problems both in school and in real-life situations
- Appreciate the international dimension of mathematics and its multicultural and historical perspectives.

**Text Book:**

**Kenneth H Rosen; Discrete Mathematics And Its Applications; 6th Edition; Tata Mc Graw-Hill Publishing Company Limited**

**Module I: Logic**

Propositional Logic, Propositional Equivalence, Predicates and Quantifiers and Rules of Inference
Chapter 1 (Sections 1.1, 1.2, 1.3 and 1.5only)

**Module II: Basic Structures**

Sets, Set Operations, Functions
Chapter 2 (Sections 2.1, 2.2 and 2.3)

**Module III: Number Theory**

The Integers and Division, Primes and Greatest Common Divisors
Chapter 3 (Sections 3.4, 3.5 and 3.7 Only)

**Module IV: Relations**

Relations and Their Properties, Representing Relations, Equivalence Relations, Partial Orderings.
Chapter 7 (Sections 7.1, 7.3, 7.5 and 7.6)

**References**

1. Clifford Stien, Robert L Drysdale, KennethBogart ; Discrete Mathematics for Computer Scientists; Pearson Education; Dorling Kindersley India Pvt. Ltd
2. Kenneth A Ross; Charles R.B. Wright ; Discrete Mathematics; Pearson Education; Dorling Kindersley India Pvt.Ltd

## SQACS102: SOFTWARE DEVELOPMENT LIFE CYCLES

**Hours/week: 5hrs** **Total Hours: 90** **Credits: 6**

**OBJECTIVES**

- This course is to introduce to Software Development process
- To familiarize the process of software development

**Module I**

Software Engineering View, Why we need process, **Software Development Lifecycle**: What is SDLC? SDLC Stages

**SDLC Models**: Waterfall Model, Iterative Model, Spiral Model, V- Model, Big Bang Model, Agile Model, RAD Model.

**Software Prototyping**: What is Software Prototyping? Software Prototyping Types, Software Prototyping Applications, Software Prototyping Pros & Cons.

Text 1 Chapter 1 to 10

Text 2 Chapter 1

**Module II**

**Software Project Management**: Project Management for traditional Software Engineering, Project Estimation, Project Planning & Scheduling, Project Monitoring and Control, Risk Management, Managing Communication and Change and Managing Project Quality.

**Software Requirements**: Requirements Gathering, Requirements Elicitation, Requirements Analysis, Requirements Management, and Requirements Verification and Validation.

Software Design Basics: Architectural design, Detailed design, Function-oriented design, Object-oriented design, User interface design.

**Software Design Strategies**: Software Reuse, Customized-Off-The-Shelf software (COTS) and Open-Source Software Development.

Text 2 Chapter 2, 3 & 4

**Module III**

**Design Tools**: Microsoft Visio, IBM Rational Software Modeler, IBM Rational Rhapsody, IBM Rational Software Architect, Enterprise Architect.

**Analysis Tools**: LDRA Tools, Static Code Analysis Tools

**Software User Interface Design**: Importance of User Interface, Graphical User Interfaces (GUIs), User Interface Design Process, UI design principles, User- system interaction.

Text 2 Chapter 4 & 17

**Module IV**

**Software Implementation**: Architecture Design, Detailed Design and Development; Function-Oriented Design, Object- Oriented Design, User Interface Design, Open- Source Development, Customized Off-the-Shelf Software, Software Reuse, Object – Oriented Programming, Software Maintenance and Evolution.

**Software Testing Overview**: Test Process, Test Planning, Test Case Design and Definition, Test Execution, Test Reporting and Project Sign-Off, Testing and Quality Improvement.

Text 2 Chapter 4 & 7

**Textbook:**


1. Avinash: Software Development Lifecycle (SDLC) – tutorialspoint
2. Gerard O' Regan: Concise Guide to Software Engineering – From Fundamentals to Application Methods-1st Edition- Springer International Publishing


**References**


1. Gerardus Blokdyk: Software Development Lifecycle A Complete Guide - 2019 Edition-5StarCooks
2. Soren Lausen: User Interface Design – A software engineering perspective – 2005, Pearson Education UK Publisher

## SQACS103: SOFTWARE PROCESS MANAGEMENT AND SEVEN QUALITY CONTROL TOOLS

**Hours/week: 5hrs** **Total Hours:90 hrs** **Credits: 6**

**OBJECTIVES**

- To give an overview on software process in industries and quality models
- To understand the processes to be incorporated during software development

**Textbook:**

1. Ashfaque Ahmed: Software Project Management – A process driven approach
2. Michael M Bissonette: Project Risk Management – A Practical Implementation Approach
3. Tague, Nancy R: The Quality Toolbox – Second Edition, Infotech standards publication
4. Maharshi Samanta: Lean Problem Solving and QC tools for Industrial Engineers 2019, CRC Press Publication

**Module I: Software Maintenance**

Maintenance Introduction

**Maintenance Types**: Corrective, Adaptive, Perfective, and Preventive

Maintenance Cost, Maintenance Process , Maintenance Life Cycle

**Maintenance Techniques**: Reengineering, Reverse Engineering, Forward Engineering.

Text 2 Chapter 14

**Software Risk Management**

Practical Application of Project Risk Management; Portfolio Project Risk Management, Practical Project Risk Management.

Risk Definitions and General Categories; Causes versus Risks, Potential Impact of Risks to Major Project Objectives, Risk Categories and Groupings.

Project Risk Management Practices; Risk Management Plan, Roles and Responsibilities, Budgeting.

Risk Analysis: Determining Individual Project Risks, Project Risks Influenced by the Project Manager and Project Team, Project Risks Influenced by Organizational and External Factors, Determining and Planning Project Risk Responses

Text 1 Chapter 4

**Module II: Configuration Management**

Configuration Management: Definition of configuration management, why configuration management for projects, configuration management planning, configuration identification, configuration change management, configuration status accounting and metrics, configuration verification and audits

Configuration Management Techniques: Centralized configuration management system,Secured access mechanism with role-based access control, Continuous integration of software build with smoke test facility, Easy branching mechanism to branch out an entire software version, Audit facility.

Artifacts of Configuration Management

Text 2 Chapter 5

**Metrics and Measures**

Metrics selection and definition, monitoring and control, metric improvements

Project Monitoring: Monitor against Project Plan, Measure task progress and Status reports, Identify Deviations, Performance Indicators, Monitor against Project Schedule, Periodic Measurement, Earned Value Management, Measure Resource Utilization and Loading, Monitor Skills and Knowledge of Project Team, Monitor Risks and Issues.

Project Control Techniques: Resource Levelling, Schedule Optimization, Corrective Actions against Deviations & Issues, Resource Optimization.

Text 2 Chapter 7

**Module III: Control Chart & Histogram**

Definition of control chart, different types of control charts, how to use control charts, control chart diagrams, definition of histogram, patterns of histogram, problem solving exercises

Types of Control Charts: Variable Charts, Attribute Charts

Control Chart Diagrams: R Chart, X- Bar Chart, p- chart, c- chart etc.

Histogram: Definition, How to use Histograms.

Patterns of histogram: High frequency, Low frequency, Skewed frequency, Two- peak distribution, Edge- peaked, Truncated, Plateau, Combed etc.

How to draw control chart and histograms with the given data

Text 3 Chapter 5 (Page 155 to 196, 292 to 298)

Text 4 Chapter 7 (Page 147 to 153, 135 to 137)

**Check Sheet & Cause and Effect Diagram**

Definition of check sheet, how to use a check sheet, sample check sheets, check sheet of defects, check sheet for review, usage of check sheet.

Types of Check Sheets: Sample Check Sheets, Check Sheet of Defects, Check Sheet for Review.

Cause and Effect Analysis and Diagram: Definition, How to use Cause and Effect Diagram.

Types of Cause and Effect Analysis and Diagram: Root Cause Analysis, 5 Y Analysis.

Practical analysis of some root cause analysis case study

Text 3 Chapter 5 (Page 135 to 142, 247 to 250)

Text 4 Chapter 6 (Page 114 to 118), Chapter 5 (Page 101 to 105)

**Module IV: Pareto Chart and Scatter Diagram**

Pareto Chart: Definition, How to use Pareto Charts.

Types of Pareto Charts: Weighted Pareto Chart, Comparative Pareto Chart, 80-20 Principle

Pareto chart preparation with sample datapoints.

Scatter Diagram: Definition, How to use Scatter Diagrams.

Patterns of scatter diagram: Scatter plot having uniformly distributed data points with no degree of correlation, Scatter plot having distributed data points with low degree of correlation, Scatter plot having distributed data points with high degree of correlation etc.

Text 3 Chapter 5 (Page 376 to 380, 471 to 474)

Text 4 Chapter 7 (Page 130 to 132, 143 to 147)

**Stratification**

Definition of stratification, stratification diagram, pattern of stratification, Cautions when using Stratification for Data Analysis

Text 3 Chapter 5 (Page 485, 486)

Text 4 Chapter 7 (Page 137 to 141)

Reference


1. Metrics and Models in Software Quality Engineering by Stephen H Khan.
2. Alain April, Alain Abran: Software Maintenance Management- Evaluation and Continuous Improvement
3. Practice standard for configuration management – Project Management Institute publication
4. Christof Ebert, Reiner Dumke, Manfred Bundschuh, Andreas Schmietendorf, Rainer Dumke: Best practices in software measurement: how to use metrics to improve project and process performance – 2005, Springer publisher
5. BL Aggarwal: Basic Statistics – 2006, New Age International Publication

## SQACS104 : Methodology of Programming and Programming in C(AOC)

**Hours/week: 5hrs** **Total Hours:90 hrs** **Credits: 6**

**OBJECTIVES**

- Subject is designed to provide complete knowledge of C language.
- Students will be able to develop logics which will help them to create programs, applications in C.
- Also by learning the basic programming constructs they can easily switch over to any other language in future.

**Textbook:**

- Programming in ANSI C 4E , E. BalaGuruswamy, TMH
- Programming in C, Byron S Gottfried, Shaums Outline series. TMH

**Module I:** Program Concept, Characteristics of Programming, Various stages in Program Development Programming aids Algorithms, Flow Charts - Symbols, Rules for making Flow chart, Programming Techniques Top down, Bottom up, Modular, Structured - Features, Merits, Demerits, and their Comparative study. Programming LogicSimple, Branching, Looping, Recursion, Cohesion & Coupling, Programming Testing & Debugging & their Tools .

**Module II:**C language basics: C character set, Identifiers and keywords, Data types, Enumeration type, constants, variables, declarations, qualifiers long, short and unsigned declarations, expressions, symbolic constants, input/output functions, compound statements, arithmetic operators, unary operators, relational and logical operators, assignment operators, increment and decrement operators, Precedence and order of evaluation, conditional operators, bit operators, type casting, using library functions in math.

**Module III:**Control flow: If statement, if else statement, nested if ..else statement, switch statements, looping for loop , while loop, do while statements, nested loop structure, break, continue and go to statements. Arrays & Strings: Single dimensional arrays, multidimensional arrays, initializing array using static declaration, Searching and sorting of Arrays, Array of Characters, Character arrays and strings, String handling Functions.

**Module IV:** User Defined Functions: Function declaration, definition & scope, recursion, Arrays and functions, call by value, call by reference, Storage Classes: automatic, external (global), static & registers.

**Module V:** Structures: Definition of Structures, declaration, structure passing to functions, array of structures, arrays with in structures, unions, typedef statements. Pointers: Pointer Definition, pointer arithmetic, array & pointer relationship, pointer to array, pointer to structure, dynamic memory allocation.

**References:**

Computer Fundamentals By P K Sinha & Priti Sinha Fourth Edition.

B. Kernighan and D. Ritchie,

The ANSI C Programming Language, PHI

# SEMESTER – II

## BOCG201: WRITING AND PRESENTATION SKILLS IN ENGLISH

**Hours/week: 4hrs** **Total Hours:72** **Credits: 4**

**MODULE – I**

**Letter Writing:** Letters - letters to the editor - resume and covering letters -parts and layout of business letters-business enquiry letters offers, quotation-orders and execution-grievances and redressal-sales letters-follow-up letters-status enquiry-collection letters-preparation of power of attorney for partnership- job application letters-resume-CV-reference and recommendation letters-employment letters.

**MODULE II**

**Other types of Academic and business Communication(written):**Seminar papers- project reports - notices - filling application forms - minutes, agenda-reports-essays.

**MODULE – III**

**Presentation Skills:** Soft skills for academic presentations - effective communication skills – structuring the presentation - choosing appropriate medium – flip charts – OHP – Power Pointpresentation – clarity and brevity - interaction and persuasion.

****Compulsory activity: PowerPoint presentations to be conducted by each student in class***

**MODULE IV**

**Non-verbal communication**-Body language-Kinesics,Proxemics-Para language Channels-Barriers-Principles of effective communication

**MODULE V**

Online writing and Netiquette- Writing e-mails- use of language – writing for blogs – social media etiquette- professional networking online (LinkedIn, E-factor etc.)

***Compulsory activity:*** *Each student should create a blog and/or profile in LinkedIn.*

**Books for Reference:**


1. Marilyn Anderson, Pramod K Nayar and Madhucchandra Sen. *Critical Thinking,Academic Writing and Presentation Skills*. Pearson Education and Mahatma GandhiUniversity.
2. Antony Thomas,Business Communication and MIS, Pratibha Publications.Bhatia R.C.Business Communication
3. SaliniAgarwal Essential communication skill. Reddy P.N, and Apopannia, Essentials Business communication.
4. Sharma R.C,KRISHNA Mohan, Business Communication and Report writing
5. Leod,M.C.,Management Information system

## SQACG201: BASIC MATHEMATICS - II

**Hours/week: 3hrs** **Total Hours:54** **Credits: 4**

**OBJECTIVE**

- to introduces the concepts of mathematical logic methods of proofs, sets, functions, relations and partial orderings
- to introduce the basic concepts of matrices which have a wide application in software development

**Text Books:**

1. K.H. Rosen: Discrete Mathematics and its Applications (Sixth edition), Tata McGraw Hill Publishing Company, New Delhi.
2. Frank Ayres Jr - Matrices , Schaum's Outline Series, TMH Edition.

**Module I: Graphs**

Graphs and Graph Models, Graph Terminology and Special types of Graphs, Representing Graphs and Graph Isomorphism, Connectivity, Euler and Hamilton Paths.
Text 1 Chapter 8 (Sections 8.1, 8.2, 8.3, 8.4 and 8.5 only)

**Module II: Boolean Algebra**

Boolean Function, Representing Boolean Functions and Logic Gates
Text 1 Chapter 10 (Sections 10.1, 10.2 and 10.3 only)

**Module III: Matrices**

Definitions and examples of Symmetric, Skew-symmetric, Conjugate, Hermitian, Skew-Hermitian Matrices, Rank of Matrix , Determination of rank by Row Canonical form and Normal form

**Module IV: Matrices**

Linear Equations, Solution of non homogenous equations using Augmented matrix and by Cramers Rule, Homogenous Equations, Characteristic Equation, Characteristic roots and Characteristic vectors of matix , Cayley Hamilton theorem and applications.

**References:**


1. Lipschutz: Set Theory and related topics (Second Edition), Schaum Outline Series, Tata McGraw-Hill Publishing Company, New Delhi. (Reprint 2009).
2. P.R. Halmos : Naive Set Theory, Springer.
3. Ian Chiswell&Wifrid Hodges: Mathematical Logic, Oxford university press

## SQACG202: Fundamentals of Digital Systems

**Hours/week: 3 hrs** **Total Hours:54 hrs** **Credits: 4**

**Objectives**

Digital Electronics is very important in today's life because if digital circuits compared to analog circuits are that signals represented digitally can be transmitted without degradation due to noise. Digital logic courses or programs allow students to gain practical experience. Especially when building computer hardware using simple algorithms and inputs. They learn to use simple ones and zeroes to store information on computers, including documents, images, sounds, and movies.

**Text Books:**

Digital Logic and Computer design M.M.Mano First Edition

**Module I : Number Systems**

Base of a number system, Positional number system, Popular number systems(Decimal, Binary, Octal and Hexadecimal), Counting in binary number system, Conversion-Decimal to Binary, Binary to Decimal, Decimal to Octal, Octal to decimal and binary, Decimal to hexadecimal, Hexadecimal to decimal, Binary and octal, Concept of binary addition and subtraction, Complements in binary number systems,1s Complement, 2s Complement and their applications, Number representation in memory- bi-stable devices, Signed magnitude form, Representation of real numbers, BCD numbers- concept and addition, Concept of parity bit.

**Module II : Boolean Algebra and Gate Networks**

Logic gates- AND, OR, NOT, NAND and NOR Truth tables and graphical representation, Basic laws of Boolean Algebra, Simplification of Expressions, De Morgans theorems, Dual expressions, Canonical expressions, Min terms and Max terms, SOP and POS expressions, Simplification of expression using K-MAP (up to 4 variables), Representation of simplified expressions using NAND/NOR Gates, Dont care conditions, XOR and its applications, parity generator and checker.

**Module III : Sequential and Combinational Logic**

Flip flops- Latch, Clocked, RS, JK, T, D and Master slave , Triggering of flip flops , Counters- Synchronous and asynchronous , BCD, Ripple counters, Half adder, Full adder( need and circuit diagram), Encoders, Decodes, Multiplexers and Demultiplexers( working of each with diagram), Analog to digital and digital to analog converters (Diagram and working principle).

**Module IV : The Memory Elements**

Concept of Registers, Shift Registers, Flip flops as building blocks of memory, RAM, ROM, organization **.**

**REFERENCES**:

1 1. Thomas C Bartee- Digital computer Fundamentals

2. Floyd- Digital Electronics

3. Malvino & Leach- Digital Principles and Applications

## SQACS203: ISO 9001 and ISO 13485

**Hours/week: 5 hrs** **Total Hours:90** **Credits: 5**

**OBJECTIVES**

- To provide information on the Quality Management System aspects in the industry arena
- To provide the information on ISO 9001 clause requirements.
- To provide information on the practices to get a certification of ISO 9001
- Process and Standards has always been a key focus in medical industry. This course explains on the various processes.

**TEXT BOOKS**

1. Charles A Cianfrani: ISO 9001:2015 Explained, 4th Edition
2. ItayAbuhav: ISO 9001: 2015 A Complete Guide to Quality Management Systems, 1st Edition
3. ItayAbuhav: ISO 13485 - A Complete Guide to Quality Management in the Medical Device Industry

**Module I: PDCA & Context of the Organization**

Introduction: What is ISO?, Who creates the standards, Whats the frequency of update, How to read the standard, Process approach &PDCA concept, PDCA in ISO 9001, The possible benefits of ISO 9001

Context of the Organization: Understanding the Organization and its Context, Understanding the Needs and Expectations of Interested Parties, Organizational Knowledge, Determining the Scope of the Quality Management System, Quality Management System and its Processes.

Text 1 Chapter 1 to 3

Text 2 Chapter 3 & 4

**Support & Operations Planning**

Support: Resources - People, Infrastructure, Environment, how to define and implement work environment

Organizational Knowledge, Monitoring and Measuring Resources

Competence, Training and Awareness, Communication – Process and documentation required for competence and training

Documentation- Creating and Updating, Control of Documented Information How to manage the

usage of external origin documents & obsolete documents.
Operation: Operational Planning and Control, Requirements for Services and Products. How to get the operational areas of an organization

Text 1 Chapter 6, 7 (7.1 & 7.2 only)
Text 2 Chapter 7 & 8 (8.1 & 8.2 only)

**Module II: Implementation & Performance Evaluation**

Implementation: Design and Development of Services, Control of externally provided processes, Production and Service Provision, Release of products and services, control of non conformities.
Performance Evaluation: Monitoring customer satisfaction, analysis and evaluation, customer feedback collection process and analysis of data using sample date.
Internal Quality Audit: Planning and scheduling, how to apply the major areas of ISO 19011, impartiality during audit, reporting of non conformities
Management Review: Inputs during the meeting, how to record the outputs and discussions
Non conformity analysis, Improvement suggestions analysis

Text 1 Chapter 7 (7.3 onwards) to 9
Text 2 Chapter 8 (8.3 onwards) to 10

**Quality Management System**

Quality management system: Terms & Definitions, General requirements, Documentation requirements, Quality manual, Medical device file, Control of documents, Control of records
Text 3 Chapter 3 & 4

**Module III: Management Responsibility**

Management responsibility: Management commitment, Customer focus, Quality policy, Planning, Quality objectives, Quality management system planning, Responsibility, authority and communication, Responsibility and authority, Management representative, Internal communication, Management review: General, Review input, Review output
Text 3 Chapter 5

**Resource Management**

Resource management: Provision of resources, Human resources, Infrastructure, Work Environment and contamination control, Work environment, Contamination control

Text 3 Chapter 6

**Module IV: Product Realization**

Product realization: Planning of product realization, Customer-related processes, Design and development, Purchasing, Production and service provision, Control of monitoring and measuring equipment

Text 3 Chapter 7

**Measurement, Analysis and Improvement**

Measurement, analysis and improvement: General, Monitoring and measurement, Control of nonconforming product, Analysis of data, Improvement

Text 3 Chapter 8

**REFERENCE**


1. International Organization for Standardization: ISO 9001 Model
2. International Organization for Standardization: ISO 13485 Model

## SQACS204: Agile and Scrum Model and Introduction To Six Sigma

**Hours/week: 5 hrs** **Total Hours:90** **Credits: 5**

**OBJECTIVES**

- To get an idea about the concept of agile and scrum model of development in software.
- "Is Six Sigma the exclusive domain of manufacturing and service operations, or can excellence be achieve throughout an entire organization? This paper gives an overview to students on how to apply the quality assurance program across all departments and processes, creating a permanent Six Sigma culture.

**Textbook:**

1. Kenneth S Rubin: Essential Scrum: A Practical Guide to the Most Popular Agile Process-2012
2. Daniel J. Zrymiak, GovindarajanRamu, Roderick A. Munro: The Certified Six Sigma Green Belt Handbook, 2nd Edition
3. William Truscott :Six Sigma: Continual Improvement for Businesses, 1st Edition

**Module I: Introduction & Concept to Scrum**

Introduction: What is scrum, Origination of scrum, Why Scrum,
Concept to scrum: Scrum framework, scrum roles, scrum activities- sprint planning, sprint execution, daily scrum, sprint review and retrospective
Artefacts to prepare during the scrum activities – plan/ schedule, minutes

Text 1 Chapter 1 & 2, Part 4

**Agile principle**

Agile Principles: Variability and Uncertainty- Embrace Helpful Variability, Employ Iterative and Incremental Development.
Prediction and Adaptation- Favor an Adaptive, Exploratory Approach, Embrace Change.
Validated Learning- Validate Important Assumptions, Organize Workflow.
Work in Process (WIP), Progress- Adapt to Real- Time Information &Replan, Measure Progress.
Performance- Build in Quality.

Text 1 Chapter 3

**Module II: Requirements and User Stories**

Requirements and User Stories: Overview, Progressive Refinement. What are user stories- Knowledge Acquisition Stories, Story Mapping.
Product Backlog: Product Backlog Items, Backlog Characteristics.
Grooming- What is Grooming, Definition of Ready Flow Management.
Estimation and velocity – Product Backlog Estimates, Task Estimates, PBI Estimate Concepts, planning pocker
Velocity: What is Velocity, Forecasting Velocity, Affecting Velocity and Misusing Velocity.

Text 1 Chapter 5, 6 & 7

**Roles**

Agile roles: Product Owner- Principal Responsibilities, Characteristics or Skills, Product Owner Roles and Product Owner Team.
Scrum Master- Principal Responsibilities, Characteristics or Skills, Scrum Master Roles and Team.
Development team- Role specific Teams, Principal Responsibilities, Characteristics or Skills.
Scrum Team Structures – Feature Teams and Component Teams, Multiple Team Coordination.
Managers – Fashioning Teams, Nurturing Teams, Managing Value and Environment and Project Managers.

Text 1 Part II

**Module III: Six Sigma Introduction**

What is Six Sigma, Overview of Six Sigma - Six Sigma Philosophy, Project Management, Process Mapping, Overview of Distributions, Probability and Statistical Processes, Basic Data Acquisition Techniques, Variable Data, Attribute Data

Text 1 Chapter 1, 6, 11

Test 2 Chapter 1

**Analysis**

Strategy Development, Data Driven Management, Maximizing Resources, Basic Analysis Tools, Statistical Thinking, Measurement System Assessment, Cause and Effect Analysis ,Failure Modes and Effects Analysis (FMEA), Estimation and Confidence Intervals, Hypothesis Testing, Correlation and Simple Linear Regression, Analysis of Variance

Text 1 Chapter 3 (2 & 3 only), Chapter 7, 17

Text 2 Chapter 3 & 4

**Module IV: Evaluation**

Define Phase, Measurement Systems Evaluation, Analysis Phase, Improve and Design Phase Process Behavior, Control Phase, Statistical Process Control and Control Charts, Bench marking, Brainstorming, Customer Feedback, FMEA, Rational Subgrouping, Control charts.

Text 1 Chapter 7, 21

**: Lean six sigma**

Reliability Testing/Assessment, Control Plans and Poka-yoke, Lean and its Integration with Six Sigma, Principles of Lean, Theory of Constraints, Total Productive maintainance, Visual Factory, Waste Elimination, Cycle Time Reduction, Examples of lean tools.

Text 1 Chapter 20, 23

Reference:


1. Chris Sims and Hilary Louise Johnson: Scrum – A breathtakingly brief and agile introduction
2. Six Sigma Handbook by Pyzdek
3. The Six Sigma Path to Leadership: Observations from the Trenches by David H. Treichler, Ronald D. Carmichael
4. Demystifying Six Sigma - A Company Wide Approach to Continuos Improvement by Larson

## SQACS205: Object Oriented Programming and C++ (AOC)

**Hours/week: 5hrs** **Total Hours:90** **Credits: 5**

**OBJECTIVES**

- Object-oriented programming aims to implement real-world entities like inheritance, hiding, polymorphism, etc in programming.
- The main aim of OOP is to bind together the data and the functions that operate on them so that no other part of the code can access this data except that function

**Textbook:**

1. 1.Object Oriented Modeling and Design with UML, Second Edition By James Rumbaugh, Michael Blaha
2. Object oriented Programming with C++, Fourth edition By E. Balaguruswamy

### Module I: Introduction

Object Orientation- object oriented development-Object oriented Methodology-Object oriented Models-Object oriented themes-Modeling-Objects and classes concepts-Links and association concepts-Generalization and Inheritance-state modeling-interaction modeling

### Module II: Object Oriented language C++

Basic concept of object oriented programming -benefits of oops-Structure of C++ Program-Basic, derived and user defined data types Symbolic constants-operators in C++ - Control Structures -Functions in C++-The main function, function prototyping-call by reference-return by reference- inline function-function overloading- friend and virtual functions,

### Module III: classes and objects

-specifying a class - Defining member functions - Nesting of member functions - Private member functions - arrays within a class - static data members - static member functions - Arrays of objects-objects as function arguments

### Module IV: Constructors and Destructors

Constructors- Parameterized Constructors-Multiple constructors - Copy constructor - Dynamic constructor-Destructors Operator overloading & Type conversions. Inheritance-Defining derived classes-Single, Multiple, Multilevel, Hierarchical and hybrid inheritance- private, public, protected inheritance-virtual base classes Abstract classes- Constructors in derived classes-nesting of classes.

Reference


- Let Us C++ ,Yashwant Kanetkar, Bpb Publications  John R Hubbard,
- Programming with C++, Shaums Outline series.
- Objected-Oriented Programming in C++ , Rajesh K Shukla, Wiley India.2008 Edition

Venugopal, Rajkumar, Ravishankar, Mastering C++, Mc Graw Hill

## SQACS206: INTERNSHIP - I

**Credits: 3**

**OBJECTIVE**

- To acquire industry based AOC training

The students will have to undergo an Internship in a software company for not less than 2 weeks in the second semester. The students would prepare individual reports after the internship and the same should be attested by the organization under which the student completed his internship. The students' comprehensive report will be submitted to the HOD for evaluation. Internship Report (IR) will be evaluated by the Board of Examiners comprising of an Internal Examiner and one External Examiner separately.

# SEMESTER – III

## BOCG301: PRINCIPLES OF MANAGEMENT

**Hours/week: 4hrs** **Total Hours:72** **Credits: 4**

**MODULE – I**

**Nature and Process of Management:** Schools of Management Thought – Management Process School, Human Behavioral School, Decision Theory School, Systems Management School, Contingency School – Managerial Role – Basics of Global Management.

**MODULE – II**

**Planning:** Objectives – Types of plans - single use plan and repeated plan – MBO, MBE– strategic planning and formulation. Decision making - types and process of decision making – forecasting.

**MODULE – III**

**Organizing:** Types of organization - formal and informal, line and staff, functional – organization structure and design – span of control, delegation and decentralization of authority and responsibility –organizational culture and group dynamics.

**MODULE – IV**

**Staffing:** Systems approach to HRM – Performance appraisal and career strategy – HRD -meaning and concept.

**MODULE – V**

**Directing:** Motivation – meaning - need for motivation. Theories of motivation - Herzberg and McGregor. Leadership- importance – styles of leadership, Managerial Grid by Blake and Mouton, Leadership as a Continuum by Tannenbaum and Schmidt, Path Goal Approach by Robert House (in brief) **Controlling -** Concept, Significance, Methods of establishing control.

**Books for Reference:**


1. Moshal.B.S . *Principles of Management,*Ane Books India,New Delhi.
2. Bhatia R.C. *Business Organization and Management,* Ane Books Pvt. Ltd., NewDelhi.
3. Richard Pettinger. *Introduction to Management* , Palgrave Macmillan, New York.
4. **Koontz and O'Donnel.** *Principles of Management* ,Tata McGraw-Hill PublishingCo.Ltd. New Delhi.
5. Terry G.R. *Principles of Management,*D.B.Taraporevala Sons &Co.Pvt.Ltd., Mumbai.
6. Govindarajan.M and Natarajan S. *Principles of Management,* PHI, New Delhi.
7. MeenakshiGupta .*Principles of Management,* PHI, New Delhi.

**SQACG301: Computer Organization and Architecture**

**Hours/week: 3 hrs** **Total Hours:54 hrs** **Credits: 4**

**OBJECTIVE**

- To understand the structure, function and characteristics of computer systems. To understand the structure, function and characteristics of computer systems.
- To understand the design of the various functional units and components of computers
- To identify the elements of modern instructions sets and their impact on processor design.

**TextBooks:-**

1. M.M Mano-Computer Systems Architecture
2. Kai Hwang and F A Briggs-Computer Architecture and parallel processing

**Module I**

Functional units of a computer, Basic operational concepts, Bus structure, Addressing methods, Memory locations and addresses, Instructions and instruction sequencing, Instruction execution.

**Module II:**

Central Processing Unit, General Register Organization, Stack Organization, Instruction Formats, Instruction Classification, Addressing modes.

**Module III:**

Main Memory, Organization of RAM, SRAM, DRAM,, Read Only Memory-ROM,PROM,EROM,EEPROM, Auxiliary memory, Cache memory, Virtual Memory, Memory mapping Techniques.

**Module IV:**

Parallel Computer Structures: Introduction to parallel processing, Pipeline computers, Multi processing systems, Architectural classification scheme-SISD, SIMD, MISD, MIMD.

**Module V:**

Pipelining and Vector processing, Introduction to pipelining, Instruction and Arithmetic pipelines(design) Vector processing, Array Processors.

**Reference Books:**

Hamachar-Computer Organization

## SQACG302: CAPABILITY MATURITY MODEL INTEGRATION

**Hours/week: 3 hrs** **Total Hours: 54** **Credits: 4**

**OBJECTIVE:**

The paper explains on the capable and matured process to be followed by Industries in software and product development. The topics also give an overview on the different maturity levels of process that can be implemented in companies.

**Textbook:**

1. Mukund Chaudhary, Abhishek Chopra: CMMI for Development : Implementation Guide

**Module I: Introduction of CMMI**

History of CMMI, CMMI Development, CMMI Services, CMMI Supplier Management, Improving Quality Performance, Successful Adoption of CMMI, Process, Persistence and Habit, Achieving High Maturity, Practice Areas and Implementation

Text 1 Chapter 1, Chapter 2.1

**Support Practice Areas**

Configuration Management – Configuration management planning, configuration item identification, configuration status accounting, configuration audit, Implementation Infrastructure, Peer Review – Types of reviews, planning of review, records of reviews.

Text 1 Chapter 2.3

**Module II: Project Practice Areas**

Estimation – Size, Effort and Schedule estimation, estimation review, Monitoring and Control – project meetings, tracking, status control, Risk management – risk identification and tracking, process asset development.

Text 1 Chapter 2.3

**Engineering Practice Areas**

Requirements Development and Management – Requirements gathering, requirements review, bidirectional traceability, Technical Solution – Design and development, Product Integration – Integration planning, planning strategy, integration testing

Text 1 Chapter 2.3

**Module III: Planning Practice Area**

Planning – Project plan, tailoring, quantitative goals planning, Supplier agreement management- Supplier selection, Agreement management, Integrated Project Management, Project monitoring and control, Requirements Management, Organizational Process Areas.

Text 1 Chapter 2.3

**Performance Monitoring & Analysis Practice Areas**

Managing Performance and Measurement – Metric identification, metric analysis, trend analysis, Causal analysis and resolution – Identification of problem, root cause analysis, correction and corrective action, Governance – Senior management reporting

Text 1 Chapter 2.3

**Module IV: Support Practice Areas**

Process Management – Process checking, improvement initiation and piloting, Decision Analysis and Resolution – decision criteria, selection of solution, risk assessment from the decision, Organization Training – Strategic training need identification, training planning and scheduling, training implementation, training records and evaluation, Process Quality Assurance – Auditing process, Verification and Validation

Text 1 Chapter 2.3

**Reference**

1. CMMI Institute: CMMI Dev Model

## SQACS303: BASICS OF SOFTWARE TESTING AND TEST MANAGEMENT

**Hours/week: 5hrs** **Total Hours: 90** **Credits: 6**

**OBJECTIVE**

- To give an introduction on Software Testing in industry
- To familiarize the concepts of Verification and Validation of products
- The paper gives detailed understanding on the advance levels of software testing.

**Textbook:**

1. Aditya P Mathur : Foundations of Software Testing, Second Edition
2. Dorothy Graham, Erik van Veenendaal, Isabel Evans, Rex Black: Foundations of Software Testing: ISTQB Certification, 1st Edition
3. Jamie L Mitchell and Rex Black: Advanced Software Testing - Guide to the ISTQB Advanced Certification as an Advanced Test Analyst, Vol. 3, 2nd Edition

**Module I: Introduction to Software Testing**

What is Testing, Who does testing, Why testing necessary, Software quality, Code of ethics What is Root cause Analysis, Fundamental Test Principles, Fundamental test process- test planning; test team management, test process, recording, , Psychology of Testing, Test generation strategies, The Saturation effect, Test Metrics.
Text 1 Chapter 1 (1.1, 1.2, 1.6, 1.10 & 1.14 only)
Text 2 Chapter 1 (1.1, 1.2, 1.3, 1.4 & 1.5 only)

**Verification & Validation**

Verification and Validation, Testing – Myths, Complementary Techniques, Incorrect assumption, 5ESS Switch software, Testing Principles, Test planning and control, Test implementation and execution.

Text 1 Chapter 1 (1.8 & 1.15 only)
Text 2 Chapter 1 (1.3 to 1.5 only)

**Module II: Types of Software Testing**
Overview on Different Types of Testing- Independent and Integrated Testing, Black box Testing, White box Testing, Reliability Testing, Unit testing, Test Organization, Independent and Integrated Testing, Test plans, estimates and strategies.

Text 1 Chapter 1 (1.13 only)
Text 2 Chapter 2, Chapter 5 (5.1 & 5.2 only)

**Software Testing Documentation**

Software Testing Documentation, preparation of test plan, test reports and other documents-A procedure for test adequacy assessment, A procedure for test minimization.

Text 1 Chapter 1 (1.5.1 only)

Text 2 Chapter 8& Chapter 9 (8.3.1 & 9.8.2 only)

**Module III: Testing Process**

Testing Process: Introduction, Test Process Models, Testing in the Software Development Lifecycle, Test Planning and Control, Test Analysis and Design, Test Implementation and Execution, Monitoring and Control, Evaluating Exit Criteria and Reporting, Test Closure Activities.

Text 3 Chapter 2 (2.1 to 2.3 only)

**Test Management**

Test Management: Introduction, Test Management Documentation, Test Estimation, Scheduling and Test Planning, Monitoring and Control.

Responsibilities for the Test Analyst: Introduction, Test Progress Monitoring and Control, Distributed, Outsourced and In-sourced Testing, The Test Analyst's Tasks in Risk-Based Testing, Overview, Risk Management

Text 3 Chapter 3

**Module IV: Test Techniques**

Test Techniques: Introduction, Specification-Based Techniques, Requirements based Techniques, Defect-Based Techniques, Using Defect-Based Techniques.

Defect Taxonomies: Functional Defects – Specification, Function, Test.

System Defects – Internal Interface, Hardware Devices, Operating System, Software Architecture and Resource Management.

Process Defects – Arithmetic, Initialization, Static and Logic.

Data Defects – Type, Structure and Initial Value.

Text 3 Chapter 4 (4.2, 4.4.1 only)

**Experience- Based Test Techniques**

Experience-Based Techniques: Error Guessing, Checklist-Based Testing, Exploratory Testing, Applying the Best Technique

Software Attacks: Effective Attacks, Other Attacks and Software Attacks.

Text 3 Chapter 4 (4.4.2 to 4.4.5 only)

**Reference**


1. Black Rex: Advanced Software Testing, Vol I, Second Edition
2. Peter Morgan: Software Testing An ISTQB Tester Foundation Guide, Second Edition
3. Advanced Software Testing - Vol. 1, 2nd Edition: Guide to the ISTQB Advanced Certification as an Advanced Test Analyst 2nd Edition, Kindle Edition by Rex Black
4. Software Testing Concepts by Balamurali L, Shajeena S, Samiya S

## SQACS304: ISO 27001

**Hours/week: 5hrs** **Total Hours: 90** **Credits: 6**

**OBJECTIVE**

- To provide information on the Information Security aspects to be followed in the industry arena and the practices to get a certification of ISO 27001.

**Textbook:**

1. Steve G Watkins: An Introduction to Information Security and ISO 27001: A Pocket Guide
2. Abhishek Chopra, Mukund Chaudhary: Implementing an Information Security Management System, Security standard based on ISO 27001 Guidelines

**Module I: Context of the Organization**

Context of the organization: Understanding the organization and its context, Understanding the needs and expectations of interested parties, Determining the scope of the information system management system, Information system management system, CIA

Text 1 Chapter 1 & 3

Text 2 Chapter 1

**Module II: Leadership**

Leadership: Leadership and commitment, Policy, Organizational roles, responsibilities and authorities, Project Kick-off- Presenting a high level plan, Setting up the project task force, Chief Information Security Officer (CISO), Getting Commitment.

Text 2 Chapter 3

**Module III: Planning**

Planning: Risk Components, Actions to address risks and opportunities, Information security objectives and planning to achieve them, Threats, Vulnerabilities, Security Risk, Risk Ranking, Risk Prioritization, Risk owner identification, Risk Treatment, Risk monitoring and Review.

Text 1 Chapter 4

Text 2 Chapter 5

**Module IV: Support**

Support: Resources, Competence, Awareness, Communication, Documented Information, Operations: Operation planning and control, Information security risk assessment, Information security risk treatment

Text 1 Chapter 5

Text 2 Chapter 3

**Module V: Operations & Improvement**

Performance Evaluation: Monitoring, measurement, analysis and evaluation, Internal audit, Management review, Improvement: Non conformity and corrective action, Continual improvement

Text 2 Chapter 7,8 & 10

**Module VI: ISMS Controls**

Information security controls – Management, human resource controls, supplier management, cryptographic control, BCP, incident management, emergency management, physical and environment security, network security, asset management, communication security, compliance management

Text 1 Chapter 5

Text 2 Chapter 4 & 6

**Reference**

1. International Organization for Standardization: ISO 27001 Model

## SQACS305: Python Programming(AOC)

**Hours/week: 5hrs** **Total Hours: 90** **Credits: 6**

**OBJECTIVE**

- provide Basic knowledge of Python
- Python programming is intended for software engineers, system analysts, program managers and user support personnel who wish to learn the Python programming language
- Learning Outcomes: Problem solving and programming capability.

**Textbook:**


1. Wesley J. Chun, "Core Python Applications Programming", 3rd Edition , Pearson Education, 2016
2. Charles Dierbach, "Introduction to Computer Science using Python", Wiley, 2015
3. Jeeva Jose &P.SojanLal, "Introduction to Computing and Problem Solving with PYTHON", Khanna Publishers, New Delhi, 2016


**Module I:**

Introduction to Python: Python variables, Python basic Operators, Understanding python blocks. Python Data Types, Declaring and using Numeric data types: int, float etc.

**Module II:**

Python Program Flow Control Conditional blocks: if, else and else if, Simple for loops in python, For loop using ranges, string, list and dictionaries. Use of while loops in python, Loop manipulation using pass, continue, break and else. Programming using Python conditional and loop blocks.

**Module III:**

Python Complex data types: Using string data type and string operations, Defining list and list slicing, Use of Tuple data type. String, List and Dictionary, Manipulations Building blocks of python programs, string manipulation methods, List manipulation. Dictionary manipulation,

Programming using string, list and dictionary in-built functions. Python Functions, Organizing python codes using functions

**Module IV**

Python File Operations: Reading files, Writing files in python, Understanding read functions, read(), readline(), readlines(). Understanding write functions, write() and writelines() Manipulating file pointer using seek Programming, using file operations. Database Programming: Connecting to a database, Creating Tables, INSERT, UPDATE, DELETE and READ operations, Transaction Control, Disconnecting from a database, Exception Handling in Databases.

**Module V:**

Python packages: Simple programs using the built-in functions of packages matplotlib, numpy, pandas etc. GUI Programming: Tkinter introduction, Tkinter and Python Programming, Tk Widgets, Tkinter examples. Python programming with IDE.

**Reference**


4. Downey, A. et al., "How to think like a Computer Scientist: Learning with Python", John Wiley, 2015
5. Mark Lutz, "Learning Python", 5th edition, Orelly Publication, 2013, ISBN 978- 1449355739
6. John Zelle, "Python Programming: An Introduction to Computer Science", Second edition, Course Technology Cengage Learning Publications, 2013, ISBN 978- 1590282410
7. Michel Dawson, "Python Programming for Absolute Beginers" , Third Edition, Course Technology Cengage Learning Publications, 2013, ISBN 978-1435455009
8. David Beazley, Brian Jones., "Python Cookbook", Third Edition, Orelly Publication, 2013, ISBN 978-1449340377

# SEMESTER – IV

## BOCG401: SOFT SKILLS AND PERSONALITY DEVELOPMENT

**Hours/week: 4 hrs** **Total Hours:72** **Credits: 4**

**Module – I**

**Personal Skills:** Knowing oneself- confidence building- defining strengths- thinking creatively-personal values-time and stress management.

**Module – II**

**Social Skills:** Appropriate and contextual use of language- non-verbal communication-interpersonal skills- problem solving.

**Module – III**

**Personality Development:** Personal grooming and business etiquettes, corporate etiquette, social etiquette and telephone etiquette, role play and body language.

**Module – IV**

**Presentation skills:** Group discussion- mock Group Discussion using video recording – public speaking.

**Module – V**

**Professional skills:** Organizational skills- team work- business and technical correspondence-job oriented skills-professional etiquettes.

**REFERENCE**


1. MatilaTreece: Successful communication: Allyun and Bacon Pubharkat.
2. Jon Lisa Interatid skills in Tourist Travel Industry Longman Group Ltd.
3. Robert T. Reilly – Effective communication in tourist travel Industry Dilnas
4. Publication.
5. Boves. Thill Business Communication Today Mcycans Hills Publication.
6. Dark Studying International Communication Sage Publication.

Murphy Hidderandt Thomas Effective Business Communication McGraw Hill.

## SQACG401: OPERATIONS RESEARCH

**Hours/week: 3 hrs** **Total Hours:54 hrs** **Credits: 4**

**OBJECTIVE**

- to introduce the basic concepts of differentiation, integration and trigonometry
- to understand and apply these theories

**Text Books:-**

1.J.K SHARMA-OPERATIONS RESEARCH- THEORY AND APPLICATIONS, MACMILLAN PUBLISHERS, INDIA Ltd.

**Module I: Linear Programming:- Model formulation and solution by the Graphical Method and the Simplex method**

General Mathematical Model of LPP, Guidelines on linear Programming model formulation and examples of LP Model formulation. Introduction to graphical method, definitions, Graphical solution methods of LP Problems, Special cases in linear Programming, Introduction to simplex method, Standard form of an LPP, Simplex algorithm(Maximization case),Simplex algorithm ( Minimization case),The Big M Method, Some complications and their resolution, Types of linear Programming solutions.
Chapter 2: Sections 2.6 to 2.8 Chapter 3: Sections 3.1 to 3.4 Chapter 4: Sections 4.1 to 4.6

**Module II: Duality in Linear Programming**

Introduction, Formulation of Dual LPP, standard results on duality, Advantages of Duality,Theorems of duality with proof.
Chapter 5: Sections: 5.1 to 5.3, 5.5 with appendix.

**Module III: Transportation and Assignment Problems**

Introduction, Mathematical model of Transportation Problem, The Transportation Algorithm, Methods for finding Initial solution, Test for optimality, Variations in Transportation Problem, Maximization Transportation problem, Introduction and mathematical models of Assignment problem, Solution methods of Assignment problem, variations of the assignment problem.
Chapter9: Sections 9.1 to 9.7 Chapter 10 : sections 10.1 to 10.4

**Module IV**: **Theory of Games**

Introduction, Two-person zero sum games, pure strategic (Minimax and Maximin principles), Games with saddle point, mixed strategies, Games without saddle point, The rules of dominance, solution methods: Games without saddle point (Arithmetic method, Matrix method, Graphical method and Linear programming method)
Chapter 12: Section 12.1 to 12.6

**Reference Books:**

1. .Kanti Swarup, P.K Gupta and Man Mohan-Operations Research (Sultan Chand and sons).
2. Frederick S Hillier and Gerald J. Lieberman -Introduction to operations research (Seventh edition),Mc Graw Hill edition.
3. Hamdy A Taha-Operations Research-An introduction (seventh edition), Prentice Hall of India Pvt.Ltd.).

## SQACG401: Operating Systems

**Hours/week: 3 hrs** **Total Hours:54 hrs** **Credits: 4**

**OBJECTIVE**

- To understand the services provided by and the design of an operating system.
- To understand the structure and organization of the file system
- To understand what a process is and how processes are synchronized and scheduled.
- Students should understand the data structures and algorithms used to implement an OS.

**Text Books:-**

1.Operating System Principles, Seventh Edition, Abraham Silberschatz, Peter Galvin and Greg Gagne, John Wiley Operating Systems- By William Stallings

**Module I: Introduction:**

OS Definition, Functions, OS as a resource manager, types of OS Evolution of OS, Operating System Operations, Operating System Services, User Operating System Interface, System Calls, Types of System Calls.

**Module II: Process:**

Basic Concepts, Process Scheduling, Operations on Processes, Inter process communication, Process Scheduling - Scheduling Criteria, Scheduling Algorithms, Multiple Processor Scheduling.

**Module III: Process Coordination :**
Synchronization - The Critical Section problem, Synchronization Hardware, Semaphores, Classic Problems of Synchronization, Monitors. Dead Locks : System Model, Dead Lock Characterization, Methods of Handling Dead Locks, Dead Lock Prevention, Dead Lock Avoidance, Dead Lock Detection, Recovery from Dead Lock**.**

**Module IV**: **Memory Management:**
Memory Management Strategies -Swapping, Contiguous memory allocation, Paging, Segmentation. Virtual Memory Management- Demand paging, Page Replacement

**Module V: Storage Management :-**
File System :- File Concept, Access Methods, Directory Structure, protection , Implementing File Systems :-File System Structure, Directory Implementation, Allocation Methods, Free Space Management, Efficiency and Performance, Recovery.

**Reference Books:**

Operating Systems- By Milan Kovic (TMH )

## SQACS403: FUNDAMENTALS OF TESTING -

**Hours/week: 5hrs** **Total Hours: 90** **Credits: 5**

**OBJECTIVE:**

The paper is a detail study on Software Testing and its independence and techniques

**Textbook:**

1. Peter Morgan: Software Testing An ISTQB Tester Foundation Guide, Second Edition
2. Aditya P Mathur : Foundations of Software Testing, Second Edition

**Module I: Fundamentals of Testing**

Typical Objectives of Testing, Testing and Debugging, Testing's Contributions to Success, Quality Assurance and Testing, Errors, Defects, and Failures, Defects, Root Causes and Effects

Text 1 Chapter 1

Text 2 Chapter 1 (1.1.1 & 1.1.3 only)

**Test Process**

Test Process in Context, Test Activities and Tasks, Test Work Products, Traceability between the Test Basis and Test Work Products, Human Psychology and Testing, Tester's and Developer's Mindsets

Text 1 Chapter 1

**Module II: Testing Throughout the Software Development Lifecycle**

Software Development and Software Testing, Software Development Lifecycle Models in Context, Component Testing, Integration Testing, System Testing, Acceptance Testing, Test Types, Functional Testing, Non-functional Testing, White-box Testing, Change-related Testing, Test Types and Test Levels, Maintenance Testing, Triggers for Maintenance, Impact Analysis for Maintenance

Text 1 Chapter 2

**Static Testing Basics & Review Process**

Static Testing Basics: Work Products that Can Be Examined by Static Testing, Benefits of Static Testing, Differences between Static and Dynamic Testing

Review Process: Work Product Review Process, Roles and responsibilities in a formal review, Review Types, Applying Review Techniques, Success Factors for Reviews

Text 1 Chapter 3

**Module III: Test Techniques**

Test Techniques: Categories of Test Techniques, Choosing Test Techniques, Categories of Test Techniques and Their Characteristics, Black-box Test Techniques, Equivalence Partitioning, Boundary Value Analysis, Decision Table Testing, State Transition Testing, Use Case Testing

Text 1 Chapter 4

Text 2 Chapter 3 (3.3 to 3.5 only)

**White-box Test Techniques**

White-box Test Techniques: Statement Testing and Coverage, Decision Testing and Coverage, The Value of Statement and Decision Testing, Experience-based Test Techniques: Error Guessing, Exploratory Testing, Checklist-based Testing

Text 1 Chapter 4 (4.4 only)

**Module IV: Test Management**

Test Management: Test Organization, Independent Testing, Tasks of a Test Manager and Tester, Test Planning and Estimation, Purpose and Content of a Test Plan, Test Strategy and Test Approach, Entry Criteria and Exit Criteria (Definition of Ready and Definition of Done), Test Execution Schedule, Factors Influencing the Test Effort, Test Estimation Techniques

Text 1 Chapter 5 (5.1 & 5.2 only)

Text 2 Chapter 1 (1.5 only)

**Test Monitoring and Control**

Test Monitoring and Control: Metrics Used in Testing, Purposes, Contents, and Audiences for Test Reports, Configuration Management, Risks and Testing, Definition of Risk, Product and Project Risks, Risk-based Testing and Product Quality, Defect Management

Text 1 Chapter 5 (5.3 to 5.6)

Text 2 Chapter 1 (1.9 only)

**Module V: Tool Support for Testing**

Tool Support for Testing: Test Tool Considerations, Test Tool Classification, Benefits and Risks of Test Automation, Special Considerations for Test Execution and Test Management Tools, Effective Use of Tools: Main Principles for Tool Selection, Pilot Projects for Introducing a Tool into an Organization, Success Factors for Tools

Text 1 Chapter 6

## SQACS404: Data Base Management System

**Hours/week: 5hrs** **Total Hours: 90** **Credits: 5**

**OBJECTIVE:**

Process and Standards has always been a key focus in medical industry. This course explains on the various processes.

**Textbook:**

Ramez Elmasri and Shamkant B. Navathe, Fundamentals of Database Systems Pearson Education, 5th edition

**Module I: Introduction:**
Characteristics of database approach, Data base users-DBA, Data base designers and end users, Advantages of using DBMS, Data Modes Schemas and instances, DBMS architecture and data independence. DBMS language-DDL, DML,DCL Data Base system environment, DBMS Component and modules. ER Modeling- Introduction- Entity types, Entity sets, Attributes and Keys, Relationship Types, Relationship Sets relationship instances, Constraints on relationship types, Weak entity types, sample ER diagrams.

**Module II: Relational Data Model:**
Relational model concepts domains, attributes, tuples and relations, characteristics of relations. Relational Model constraints Relational Databases and relational data base schemas, entity integrity, referential integrity and foreign keys with examples. Relational algebra and Relational calculus: Relations Operations- SELECT, PROJECT, , UNION, INTERSECTION, The CARTESIAN PRODUCT, JOIN, EQUIJOIN, Aggregate functions. Examples of queries in Relations Algebra Tuple relations calculus, Domain relational calculus. Relational Data base design using ER-to-Relational mapping.

**Module III: SQL:**
Data definition commands- CREATE, ALTER,DROP, Adding constraints, Basic SQL queries- INSERT, SELECT,DELETE,UPDATE Ordering of rows UNION,EXCEPT,INTERSET Substring comparisons using LIKE operator, BETWEEN operator, Complex Queries-Nested queries, EXISTS and UNIQUE functions, NULL values, Renaming of attributes and joining of tables, Aggregate functions and grouping, Managing views.

**Module IV Data Normalization:-**
Informal Design Guide lines for relation schemas, functional dependencies, Normal forms- first, second and third normal form, Boyce Codd normal form. Indexing structures for files- types of single level ordered indexes.

**Module V: Transaction processing**: -

Introduction to transaction processing, Transaction and system concepts, Desirable properties of transactions. Concurrency Control: Locking techniques for concurrency control. Database Security and Authorization: - Types of security , control measures, database security and the DBA, Access protection, User accounts and database audits, Access Control based on granting and Revoking privileges.

**Reference Books:**

1. C.J Date, An Introduction to Database systems
2. Reghu Ramakrishnan, Data base Management Systems, Mc Graw Hill international Edition.
3. Bipin Desai, An Intriduction to Database Systems Galgoria Publications, 1991

## SQACS405: FUNCTIONAL TESTING (AOC)

**Hours/week: 5 hrs** **Total Hours:90** **Credits: 5**

**OBJECTIVE:**

- to give hands on training to software testing

AOC paper based on the syllabus of SQASC402: FUNDAMENTALS OF TESTING – 2

## SQACS406: INTERNSHIP - II

**Credits: 3**

**OBJECTIVE**

- To acquire industry based AOC training

The students will have to undergo an Internship in a software company for not less than 2 weeks in the fourth semester. The students would prepare individual reports after the internship and the same should be attested by the organization under which the student completed his internship. The students' comprehensive report will be submitted to the HOD for evaluation. Internship Report (IR) will be evaluated by the Board of Examiners comprising of an Internal Examiner and one External Examiner separately.

# SEMESTER – V

## BOCG501: ENVIRONMENT STUDIES

**Hours/week: 4hrs** **Total Hours:72** **Credits: 4**

**AIM**

To bring about an awareness of a variety of environmental concerns

**OBJECTIVES**

- To create a pro-environmental attitude and a behavioral pattern in society that is based on creating sustainable lifestyles
- To acquire knowledge of pollution and environmental degradation.

**MODULE I**

Multidisciplinary nature of environmental studies Definition, scope and importance-Need for public awareness. Natural Resources: Renewable and non-renewable resources: Natural resources and associated problems. Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people. Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems. Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies. Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources. Case studies. Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

**MODULE II**

Ecosystems Concept of an ecosystem-Structure and function of an ecosystem-Producers, Consumers and decomposers-Energy flow in the ecosystem-Ecological Succession-Food chains, food webs and ecological pyramids-Introduction, types, characteristic features, structure and function of the following ecosystem: Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Biodiversity and its conservation Introduction – Definition : genetic, species and ecosystem diversity, Biogeographically classification of India, Value of biodiversity : consumptive use, productive use, social, ethical, aesthetic and option values, Biodiversity at global, National and local levels, India as a mega-diversity nation Hot-spots of biodiversity, Threats to biodiversity : habitat loss, poaching of wildlife, man-wildlife conflicts., Endangered and endemic species of India, Conservation of biodiversity : In-situ and Ex-situ conservation of biodiversity.

**MODULE III**

Environmental Pollution Definition ,Cause, effects and control measures of :- Air pollution-Water pollution-Soil pollution Marine pollution-Noise pollution-Thermal pollution-Nuclear hazards Solid waste Management : Causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution, Pollution case studies, Disaster management: floods, earthquake, cyclone and landslides. Human Population and the Environment Population growth, variation among nations-Population explosion – Family Welfare Programme-Environment and human health-Human Rights-Value Education-HIV/AIDS-Women and Child Welfare- Role of Information Technology in Environment and human health-Case Studies.

**MODULE IV**

Social Issues and the Environment From Unsustainable to Sustainable development-Urban problems related to energy-Water conservation, rain water harvesting, watershed management-Resettlement and rehabilitation of people; its problems and concerns-Case Studies Environmental ethics : Issues and possible solutions. Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust-Case Studies. Wasteland reclamation-Consumerism and waste products-Environment Protection Act-Air (Prevention and Control of Pollution) Act-Water (Prevention and control of Pollution) Act-Wildlife Protection Act-Forest Conservation Act-Issues involved in enforcement of environmental legislation-Public awareness

TEXT BOOK:-

Textbook for Environmental Studies For Undergraduate Courses of all Branches of Higher Education Erach Bharucha for **University Grants Commission**

Further activities

- Field work
- Visit to a local area to document environmental assets river/forest/grassland/hill/mountain
- Visit to a local polluted site-Urban/Rural/Industrial/Agricultural
- Study of common plants, insects, birds.
- Study of simple ecosystems-pond, river, hill slopes, etc. (Field work Equal to 5 lecture hours)

## SQACG501: Data Structures

**Hours/week: 3hrs** **Total Hours: 108** **Credits: 4**

**OBJECTIVE:**

1. To provide the knowledge of basic data structures and their implementations.
2. To understand importance of data structures in context of writing efficient programs.

**Textbook:**

1. Data Structures Through C (A Practical Approach), G.S Baluja Danapat Rai & Co.
2. Fundamentals of Data Structures, Ellis Horowitz and Sartaj Sajni Galgotia Publications Vol. 3, 2nd Edition

**Module I: Concept of Structured data:**

Data structure definition, Different types and classification of data structures, Arrays representation of array in the memory, linear array operations, Bubble sort, Selection sort, linear search, binary search, sparse matrix.

**Module II: Stacks and Queues:**

organization and operation on stacks Conversion between infix to postfix & prefix representations- Expression Evaluation - Organization and operations on queues-circular queue-multiple stacks and queue -Applications of stacks and queues.

Module 3: Linked list: Concept of dynamic data structures, linked list, types of linked list, linked list using pointers, insertion and deletion examples, circular list doubly linked lists, garbage collection.

**Module III: Trees:**

Concept of recursion, definition of - trees, binary trees, strictly binary trees, complete binary tree and Binary search tree, Creation of binary search tree, traversing methods - examples.

**Module IV: File organization:**

File organizations- sequential, random files, linked organization, inverted files, cellular partitioning, hashing function

**References:**


1. Introduction to data structures in C , Ashok N. Kamthane, Person Education
2. Theory and Problems of Data Structures, Schaums Outline Series, Seymour Lipschutz
3. Data structures using c and C++ , Tanenbaum

## SQACG502: PROJECT MANAGEMENT

**Hours/week: 3hrs** **Total Hours:80 Hrs** **Credits: 4**

**OBJECTIVE:**

The paper gives detailed understanding on the project management activities to be carried out in an organization.

The paper gives detailed understanding on execution and closure activities during project management process.

**Textbook:**

1. Anna P. Murray: The complete software project manager- Mastering technology from planning to launch and beyond-2016
2. Ashfaque Ahmed: Software Project Management – A process driven approach

3.Adolfo Villafiorita: Introduction to Software Project Management

4.Ashfaque Ahmed: Software Project Management – A process driven approach

**Module I: Introduction to Project Management**

Software Project Management: What is a Project Management, What is Software Project Management, Importance of Software Projects, Problems in Project Management, Processes in Software Projects, Project Processes People and Technology.

Text 2 Chapter 1 (1.1 to 1.7 only)

**Team Management**

Managing people and organizing; Teams, roles and responsibilities, Project Leadership, Program Manager, Project Manager, Project Team, Business Analyst, Programmers and Systems Administrator.

Communication Methods – Planning Meeting, Daily Standup, Review Meetings, Well- Run Meetings and Timeliness; Tool management and planning.

Text 1 Chapter 4 & 9 only

Text 2 Chapter 1 (1.1 to 1.7 only)

**Module II: Project Initiation**

**(**Project Initiation: Definition of Scope, Project Charter, Objectives, Consideration, Stakeholders Planning and Influence/ Dependency Management, Project selection Techniques, SWOT Analysis, Formalizing Project Goals, Constraints Analysis, Project Roster.

Text 2 Chapter 2 only

**Project planning, scheduling and estimation**

Project Planning, Scheduling and Estimation: Deciding the work – Planning of Work Breakdown Structure, WBS Construction Methodologies; Scheduling of Activities – list of activities/ process, Identification of Dependencies, Lead and Lag Time Planning, Network Graphs, Critical Path and Resource Plan.

Estimation – Effort, Schedule, Defect, Cost, Resource Estimation, Review of Estimate, Estimation Methods.

Text 1 Chapter 6 only

Text 2 Chapter 3, 6 & 22

**Module III: Managing change, risk and quality**

Managing changes – traditional approach, agile approach, configuration management, versioning

Risk management – Identify and classify risk, analyze, categorize risks, causes of risks, risk monitoring and control

Quality management – Quality planning, quality assurance and control, metric analysis

Text 2 Chapter 4 only

Text 3 Chapter 4 & 5

**Project Execution & Monitoring**

Project execution – Kick off activities for each phase, requirements management, designing, coding and testing activities

Project Monitoring – monitoring time, work, cost, dates; monitoring against project plan, project control, resource monitoring, regular meetings, communication, status reporting

Text 2 Chapter 3 (3.8 & 3.9)

Text 3 Chapter 7, 9 & 13

**Module IV: Project closure & maintenance**

Closure – Client acceptance, delivery, documenting closure, staff releasing, lessons learned, metric collection, financial closure, closure audit

Maintenance – maintenance planning, user training, product implementation support, maintenance cost management

Text 2 Chapter 3 (3.10 only)

Text 3 Chapter 8 & 14

.

**Reference:**


1. Pankaj Jalote: Software project management in practice-2002
2. Adolfo Villafiorita: Introduction to Software Project Management

## SQACS503: BASICS OF PERFORMANCE TESTING AND SECURITY TESTING

**Hours/week: 5hrs** **Total Hours: 90** **Credits: 6**

**OBJECTIVES**

- To give an outline on how performance testing helps to ensure software applications will perform well under their expected workload.
- To give an overview on coverage of performance testing, how to ensure that applications are tested and perfect before send for production.
- The paper details on how security testing helps to identify the threats in the system and measure its potential vulnerabilities.
- It also explains to students how to detect all possible security risks in the system and fix them.

**Textbook:**

1. Jamie L Mitchell and Rex Black: Advanced Software Testing - Guide to the ISTQB Advanced Certification as an Advanced Test Analyst, Vol. 3, 2nd Edition
2. Ian Molyneaux: The Art of Application Performance Testing: Help for Programmers and Quality Assurance, 2nd Edition
3. Ari Takanen, Jared DeMott, Charlie Miller, AtteKettunen: Fuzzing for Software Security Testing andQuality Assurance, Second Edition
4. Stephen de Vries: Security Testing through Automated Software Tests, 1st Edition

**Module I: Performance Testing – Introduction**

Performance Testing: What is Performance Testing, Why do Performance Testing, Performance Measurement, Performance Standards and Performance Testing Maturity.

Performance Testing Tools.

Text 1 Chapter 9 (9.5 only)

Text 2 Chapter 1

**Performance Testing Process**

Performance Testing Process: Common Performance Testing Problems, Performance Testing Process, Introduces the building blocks of effective performance testing and their Importance.

Performance Testing Data Types – User Credentials, Search Criteria and Documents.

Text 1 Chapter 9 (9.5 only)

Text 2 Chapter 3

**Module II: Performance Test Metrics**

Performance Testing Metrics: Parameters Monitored, Tools used- Performance tools and Measuring Tools, Defining the Data to be Used, Example Performance Test Cases

Text 1 Chapter 9 (9.5 only)

**Performance Testing Tools**

Performance Testing Tools: How to use the Tools, How the Tools Work, Tools used for Linux or UNIX, Advantages and Disadvantages of the Tools.

Text 1 Chapter 9 (9.3.5 only)

**Module III: Software Security**

Software Security: Security Incident, Security Testing – Home, Security Testing – Overview, Security Testing – Process, Attack Surfaces and Attack Vectors, Security Mistakes, Proactive Security and Security Requirements.

Text 1 Chapter 1

**Network Security**

Network Security: System Software Security, Client Side Application Security. Server Side Application Security, Security Testing - Malicious Software, Limit Services and Authority Levels, Use Script Blocking Programs and Use Long Complex Passwords

Text 1 Chapter 32

**Module IV: Security Testing**

HTTP Protocol Basics: Encoding and Decoding, Security Testing – Cryptography, Hacking Web Applications. Security Testing – Injection, Testing Security Misconfiguration, Testing Sensitive Data, Components with Vulnerabilities

Text 1 Chapter 2

Text 2 Chapter 5 to 8

**Types of Security Testing**

Security Testing - Ajax Security, Testing Security - Web Service, Testing Malicious File Execution, Security Testing - Automation Goals and Automation Tools.

Text 1 Chapter 4 (4.4 only)

**References:**


1. Albert Witteveen: Performance testing - a AOC guide
2. Suryanarayana Raju Kosuri: Excellence in Performance Testing
3. Daniel J. Mosley and Bruce A. Posey: Just Enough Software Test Automation
4. Elfriede Dustin, Thom Garrett, and Bernie Gauf: Implementing Automated Software Testing: How to Save Time and Lower Costs While Raising Quality
5. Bondi, André B: Foundations of software and system performance engineering: process, performance modeling, requirements, testing, scalability, and practice, 2nd Edition
6. Basic Security Testing with Kali Linux, Daniel W Dieterle
7. Security Testing with Raspberry by Daniel W Dieterle
8. Software Test Automation by Mark Fewster, Dorothy Graham
9. Implementing Automated Software Testing by Elfriede Dustin, Thom Garrett, Bernie Gauf

## SQACS504: COMPUTER NETWORKS

**Hours/week: 3hrs** **Total Hours: 108** **Credits: 4**

**OBJECTIVE:**

Learning about computer network organization and implementation, obtaining a theoretical understanding of data communication and computer networks, and gaining practical experience in installation, monitoring, and troubleshooting of current LAN systems.

Textbook:

Data communication and Networking (fourth edition)-B. A. Forouzan

**Module I:**

Need of network. Network classifications-LAN, MAN , WAN, wireless networks & Internet. Data and signals-analog and digital, periodic analog signals, digital signals, bit rate, baud rate, bandwidth . Transmission impairments- attenuation distortion and noise. Data communication protocols and standards, Network models OSI model-layers and their functions. TCP/IP protocol suite.

**Module II:**

Bandwidth utilization Multiplexing: FDM, TDM, spread spectrum. Transmission Media- guided media and unguided media. Switching: message, Circuit and packet switched networks, datagram networks, virtual- circuit networks.

**MODULE III**

Hop to Hop Delivery. Error Detection and Correction Type of Errors, Redundancy, Detection ,Correction, Forward Error and Retransmission. Coding -Block Coding(Parity Chek Code and Hamming Code) and Cyclic Codes. Framing, flow and error control, Protocols - Noiseless channels (Simplest , Stop and Wait) and Noisy channels(Stop and Wait and Piggy Backing) .

**Module IV:**

Multiple Access Protocols . Random Access-ALOHA, CSMA. Wired LANs-IEEE standards, standard Ethernet, wireless LANs-Bluetooth, Wireless Lan- Cellular Telephony-Frequency Reuse Principle ,Transmitting, Receiving, Handoff, Hard Hand off, Soft Hand off, Roaming . Cellular Telephony Generations First, Second and Third generations. Satellite Networks Geo, Meo, Leo..

**Module V:**

Host- To-Host Communication . Network Level Logical addressing-IPv4 addresses, IPv6 addresses, Internet protocol-IPv4 andIPv6, Process to Process Delivery Connectionless and Connection Oriented Service : UDP, TCP. Congestion control, quality of service. Client Server Programs. Name space, domain name space, Remote logging, Electronic mail, file transfer.

**References:**

Computer Networking With Internet Protocols And Technology
Willium Stalling

## SQACS505: NON-FUNCTIONAL TESTING (AOC)

**Hours/week: 5hrs** **Total Hours:90** **Credits: 6**

**OBJECTIVE:**

- to give hands on training to software testing

AOC paper based on the syllabus of SQAC503: Basics of performance testing and SQAC504: Basics of Security Testing

## SQACG506: PROJECT

**Credit: 3**

Students will have to do projects related to software quality assurance and quality control and it will be an individual work in the sixth semester. This is a one month implant training and project study to be conducted in the month of December. Each individual student has to undergo one month implant training plus project study in a reputed organization (with established functional departments). 30 day implant training certificate is mandatory with the project report. Project study on an identified skill need to be conducted during this period in the contest of the organization. Project dissertation and report writing (minimum 50 pages) at the conclusion of the study. The project report should satisfy all the requisite of the research methodology theory. There will be two evaluations, one internal (20 marks) and another external (80 marks) based on the report.

# SEMESTER – VI

## BOCG601: ENTREPRENEURSHIP DEVELOPMENT

**Hours/week: 4hrs** **Total Hours: 72** **Credits: 4**

**Module – I:** To make the students understand about entrepreneurs and different classifications. Entrepreneur and etrepreneurship - Definition; traits and features; classification; Entrepreneurs; Women entrepreneurs; Role of entrepreneur in Entrepreneurs in India.

**Module – II:** Create an awareness about EDP. Entrepreneurial development programme concept; Need for training; phases of EDP; curriculum & contents of Training Programme; Support systems, Target Groups; Institutions conducting EDPs in India and Kerala.

**Module – III:** General awareness about identification of project financing new enterprises. Promotion of a venture; opportunity Analysis Project identification and selection; External environmental analysis economic, social, technological an competitive factors; Legal requirements for establishment of a new unit; loans; Overrum finance; Bridge finance; Venture capital; Providing finance in Approaching financing institutions for loans.

**Module – IV:** To identify different Discuss opportunities in small business. Small business Enterprise - Identifying the Business opportunity in various sectors - formalities for setting up of a small business enterprise - Institutions supporting small business enterprise - EDII (Entrepreneurship Development Institute of India), 0 SLDO (Small Industries Development Organization NSIC (National small Industries Corporation Ltd. (CNSIC) NIESBUD (National Institute for Entrepreneurship and small Business Development) Sickness in small business enterprise causes and remedies.

**Module – V:** To understand about a project report relating to a small business. Project formulation - Meaning of a project report significance contents formulation planning commissions guidelines for formulating a project report - specimen of a project report, problems of entrepreneur's case studies of entrepreneurs.

**REFERENCE:**


1. Cliffton, Davis S. and Fylie, David E., Project Feasibility Analysis, John Wiley, New York, 1977.
2. Desai A. N., Entrepreneur and Environment, Ashish, New Delhi, 1990.
3. Drucker, Peter, Innovation and Entrepreileurship, Heinemann, London, 1985
4. Jain Rajiv, Planning a Small Scale Industry: A guide to Entrepreneurs, S.S. Books, Delhi, 1984
5. Kumar S. A., Entrepreneurship in Small Industry, Discovery, New Delhi, 1990
6. McCleffand, D. C. and Winter, W. G., Motivating Economic Achievement, Free Press, New York, 1969

## SQACG601: ISO 20000 AND AUDITING

**Hours/week: 3hrs** **Total Hours: 55** **Credits: 3**

**OBJECTIVES**

- To provide the overview about the standard requirements and expectations of service management.
- To introduce the concepts of Software Auditing
- To understand how to conduct an audit and the good practices

**Textbook:**

1. Ivanka Menken, Gerard Blokdijk: ISO IEC 20000 Foundation Complete Certification Kit – Study Guide Book and Online Course
2. John W. Helgeson: The Software Audit Guide – 2009
3. Dennis R. Arter, Charles A. Cianfraniand John E. (Jack) West: How to Audit Proces – Based QMS, Second Edition

**Module I: Introduction to ISO 20000**

Introduction – What is IT service management, What is ISO 20000, History of ISO 20000, Future and benefits of ISO 20000, roles and responsibilities within ISO 20000, ISO 20000 process, auditing and certification, management process, documentation requirements, skills and competency

Text 1 Chapter 1 (1.1 to 1.8, 1.11 & 1.13 only), Chapter 11

**Service Delivery Process**

Service level management, service catalogue, service reporting, service continuity and availability management, budgeting and accounting for IT management services, capacity and information security management.

Text 1 Chapter 6 only

**Module II: Relationship& Resolution Process**

Business relationship management – interface with other process. Supplier management process-supplier contract, supplier management

Resolution process – incident management, problem management

Text 1 Chapter 7 & 8 only

**Control & Release process**

Control process – configuration management-Configuration Management Database, Interfaces with other processes, change management- The 7Rs of change management, Interfaces with other processes

Text 1 Chapter 9 & 10 only

**Module III: Audit Fundamentals**

Audit Fundamentals: Concepts, Principles and Requirements.

Adding value, Code of Conduct and Ethics, Cultural Aspects, Expected Outcomes, Impartiality, Scope of ISO 9001, Scope of Quality Management System and Scope of Certification, Technical Experts, Two stage initial certification audit

Text 1 Part 1

Text 2 Part 1 Chapter 1 & 6

**Audit Process**

Audit Process: Added Value Audits versus Consultancy, Audit Planning, Audit Reports, Audit Trail, Checklist, Deal with consultants, Demonstrate conformity to the standard, Effective use of ISO 19011, Effectiveness, Electronic documented information systems, Evidence collection, Nonconformity – Documenting, Nonconformity – Review and closing

Text 1 Part 2

Text 2 Chapter 9

**Module IV :Auditing to ISO 9001**

Auditing to ISO 9001:2015: Competence, Context, Customer Communications, Customer Complaints, Customer Feedback, Design and Development Process, External providers, Improvement, Internal audit, Internal communication, Measurement traceability, Monitoring and measuring resources, Organizational Knowledge, Policy, objectives and management review, Processes, Resources, Risk Based Thinking, Service organizations, Statutory and Regulatory requirements, Top management

Text 1 Part 4

Text 2 Chapter 3 & 4

**Audit Conduct**

Opening Meeting:Present Scope and Purpose of Audit, Review previous Audits, Quality Audit. Conducting of Audit: Consultancy, Managing Software Process, Characterization of Current State of Practice, Characterization of Desired State of Practice

Text 2 Chapter 4 & 5

**Module V: Audit Analysis**

Description of Organizational Structures, Operating under autonomous control ,Managing through centralized cooperation, Agreeing under collaboration, Team Building, Change Management, Principles of Process Change, Managing Requirements, Training Work Force, Building Process Capability, Properties of Matured Work Culture

Text 2 Chapter 6 to 10

**Reference:**


1. Claire Engle, Jackie Brewster, Gerard Blokdijk: ISO IEC 20000 Certification and Implementation Guide - Standard Introduction, Tips for Successful ISO IEC 20000 Certification, FAQs, Mapping Responsibilities, Terms, Definitions and ISO 20000 Acronyms- 2008
2. GerardusBlokdyk:Software Audits A Complete Guide, Fourth Edition

## SQACG602: Design and Analysis of Algorithms

**Hours/week: 3hrs** **Total Hours: 90** **Credits: 3**

**OBJECTIVES**

- To develop proficiency in problem solving and programming.
- To be able to carry out the Analysis of various Algorithms for mainly Time and Space Complexity.
- To get a good understanding of applications of Data Structures.
- To develop a base for advanced study in Computer Science.

**Textbook:**

Ellis Horowitz, Sartaj Sahni, Sanguthevan Rajasekharan Computer algorithms/C++ (Second Edition) Universities Press.

**Module I:** Introduction Definition of Algorithm, Areas of algorithm study, performance analysis space complexity, time complexity, asymptotic notations (Ore, W, q).

**Module II:** Divide and Conquer General method, Binary search, finding the maximum and minimum, merge sort, quick sort, performance measurement of quick sort, Selection, Saracens matrix multiplication.

**Module III:** Greedy method General method, Knapsack problem, Job sequencing with dead lines, Minimum cost spanning trees Prims algorithm, Kruskals algorithm, Optimal merge patterns, Single source shortest path, Optimal binary search trees.

**Module IV:** Dynamic programming The general method, multistage graphs, all-pairs shortest path, Single source shortest path, 0/1 Knapsack problem, Traveling Sales person problem.

**Module V:** Basic traversal and search techniques - BFS and traversal, DFS and traversal, Bi-connected components and DFS, Backtracking General method, 8-queens problem, Sum of subsets problem, Graph coloring, Hamiltonian cycles.

**References:**

1. Anany Levitin Introduction to design and analysis of algorithms Addison Wesley Low price edition.
2. Richard Neapolitan, Kumarss Naimipour Foundation of Algorithms using C++

## SQACS603: Java Programming

**Hours/week: 5hrs** **Total Hours: 90** **Credits: 5**

**OBJECTIVES**

"Is Six Sigma the exclusive domain of manufacturing and service operations, or can excellence be achieve throughout an entire organization? This paper gives an overview to students on how to apply the quality assurance program across all departments and processes, creating a permanent Six Sigma culture.

**Textbook:**

Java2 The Complete Reference Seventh Edition: Patrick Naughton

**MODULE I:-** Object oriented programming-Encapsulation-Inheritance-Polymorphism-Genesis of Java-characteristics of java- program structure-identifiers-operators-variablesliterals-data types-Arrays. Control Statements-selection statements-iterative statements-jump statements - Loops- while loop-do while loop- for loop

**MODULE II:-** Classes-declaration object references-instantiation- method declaration-method calling this operator- constructor- method overloading-constructor overloadingmethod overriding-inheritance-super class-dynamic method dispatch-final-static-abstract classes String Handling.

**MODULE III:-** Packages - creating packages-using packages-Interfaces-Exception Handling Techniques-try-catch-throw-throws-finally -Multithreading- creation of multithreaded program-Thread class-Runnable interface- thread priorities.

**MODULE IV:-** Event Handling-Delegation Event Model-Event Classes-Sources of Events-Event Listeners- AWT: Frame Class-AWT Controls: Label-Button-Checkbox-List-Choice control-Text Field-Text Area- Lay out Managers.

**Reference:**

1. Programming with java .E. Balagurusamy
2. Core Java Volume 1- Fundamentals eighth edition Cay S Horstmann & Gary Cornell
3. Java 6 Programming Black Book 2007 Edition Dreamtech press

## SQACS604: INTRODUCTION TO TEST AUTOMATION

**Hours/week: 5 hrs** **Total Hours: 90** **Credits: 5**

**OBJECTIVES**

- To introduce the concepts of test automation strategies to eliminate the errors e expected in manual testing.
- To give an overview on how a Test Automation framework works and cuts down the costs and efforts in the testing process and how to raise industry standards altogether.

**Textbook:**

1. Elfriede Dustin, Thom Garrett, and Bernie Gauf: Implementing Automated Software Testing: How to Save Time and Lower Costs While Raising Quality

**Module I: Intro to Automation Testing**

Introduction to Automation Testing, Why we need Automated Testing, Which Test Cases to Automate, Automated Software Testing Recipes, Advances in AST Technologies, Automating various software testing types, Providing AST based production support, Challenges of Testing software today.

Text 1 Chapter 1 & 2 (2.1 only)

**Module II: Automated testing process**

Automated Testing Process, Test tools selection, Define the scope of Automation, Estimating ROI, Overall Test Automation savings, Test Environment setup time savings, Test execution time savings, Test Evaluation/Diagnostics time savings.

Text 1 Chapter 3

**Module III: Automation Test Planning and Execution**

Planning, Design, and Development, Test Execution,Develop the automated test strategy-AST strategy document, Scope and Automated Test objectives, Automated Software Test framework, AST Environment, Automating the RTM, Automated Defect Tracking. Test the automated software test framework, Implement AST process.

Text 1 Chapter 6 to 9

**Module IV**

Framework for Automation, Automation Tool Best Practices, Benefits of Automation Testing Reducing the time and cost of software testing, Test data generation-test effort/schedule decrease, Test execution, Test result analysis, AST program tracking and Defect prevention.

Text 1 Chapter 2 (2.2 only), Appendix D, Chapter 8 (8.1 only

Different types of software testing for automation, How to Choose an Automation Tool, Automation Testing Tools, Definition of the business case, Identifying the business needs, Justifying automation in terms of costs and benefits, Risks.
Text 1 Chapter 3

**References:**


1. Mark Fewster, Dorothy Graham: Software Test Automation
2. Daniel J. Mosley and Bruce A. Posey: Just Enough Software Test Automation

## SQACS605: TEST AUTOMATION (AOC)

**Hours/week: 5hrs** **Total Hours:90** **Credits: 5**

**OBJECTIVE:**

- to give hands on training to test automation

AOC paper based on the syllabus of SQAC604: Introduction to test automation

## SQACS606: INTERNSHIP - III

**Credits: 3**

**OBJECTIVE**

- To acquire industry based AOC training

The students will have to undergo an Internship in a software company for not less than 2 weeks in the sixth semester. The students would prepare individual reports after the internship and the same should be attested by the organization under which the student completed his internship. The students' comprehensive report will be submitted to the HOD for evaluation. Internship Report (IR) will be evaluated by the Board of Examiners comprising of an Internal Examiner and one External Examiner separately.

# MODEL QUESTION PAPERS

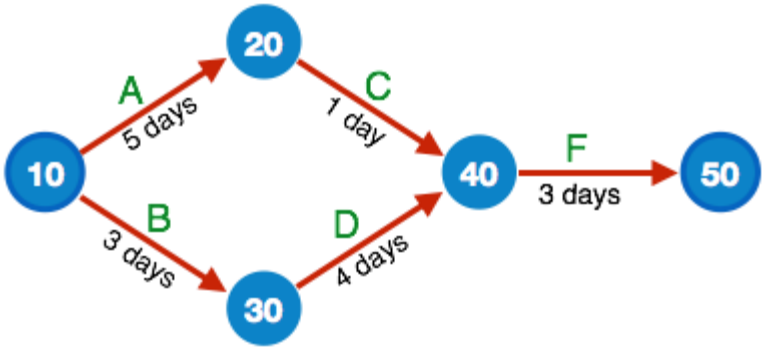
**B.VOC DEGREE SOFTWARE QUALITY ASSURANCE & QUALITY CONTROL**
**(CBSS)**
**SEMESTER ONE EXAMINATION**

**Model question Paper**

## SQACS102: Software Development Lifecycles

**A. Answer any 10 questions from the below. (Marks: 10x2=20)**

1. Which SDLC model is also known as verification and validation model? Why?
2. Which type of software evolution works closely as the requirement of real-world environment? Why?
3. True or False: "Command Prompt is text-based notifier that is mostly shows the context in which the user is not working." Justify your answer
4. What is a stamp coupling?
5. Mention the two types of acceptance testing?
6. True or False: "A software project manager is a person who undertakes the responsibility of executing the software project." Justify your answer
7. Which of the project management tool is given in the figure? Explain in brief.




8. What is a baseline?
9. True or False: "COCOMO is a decomposition technique used for the project estimation." Justify your answer.
10. If the feasibility report is positive towards undertaking the project, what will be next phase in software requirement?
11. Give an example for concurrency?
12. What is cohesion?

**B. Answer any 6 questions from the below. (Marks: 6 x 5 = 30)**

13.Explain in detail about the project estimation techniques?

14.What are the requirement elicitation techniques?

15.Which are the types of cohesion in software design basics?

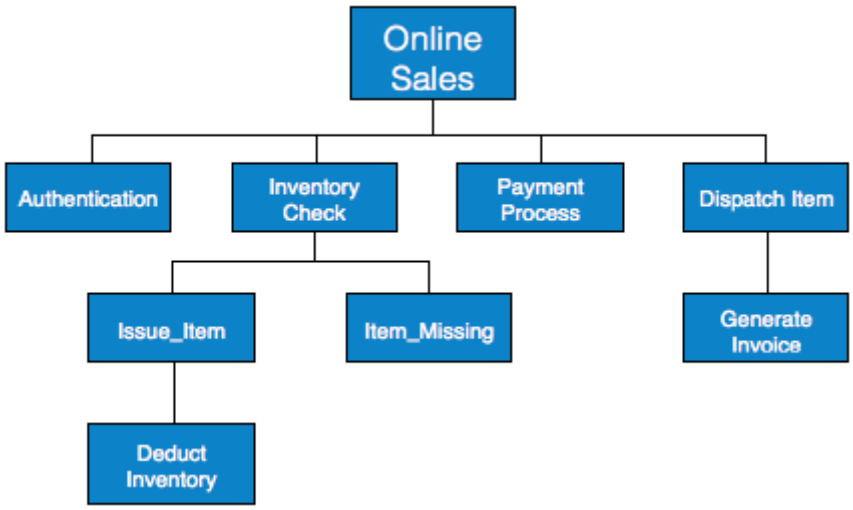
16.Which are the types and components of DFD?

17.What are black box testing techniques?

18.Which are the steps of SDLC activities?

19.What is the difference between waterfall model and iterative model?

20.Which software analysis and design tool used in the below example figure?




21.What is a pseudo code? Give an example?

**C. Answer any 2 questions from the below. (Marks: 2 x 15 =30)**

22. Explain in detail about the requirement engineering process?

23.Explain about the analysis and design tools used for SDLC?

24.What is software user interface design? Explain in detail?

25.What are testing approaches and testing levels used in SDLC? Explain in detail?

**B.VOC DEGREE SOFTWARE QUALITY ASSURANCE & QUALITY CONTROL**
**(CBSS)**
**SEMESTER ONE EXAMINATION**

**Model question Paper**

## SQACS103: Software Process Management and Seven Quality Control Tools

**A. Answer any 10 questions from the below. (Marks: 10 x 2 = 20)**

1. Define software maintenance.
2. What are the activities carried out while executing software maintenance?
3. Mention the situations at which software maintenance has to be carried out?
4. Define risk in software management?
5. What is the importance of carrying out risk management in software industry?
6. How the qualitative analysis of risk is carried out?
7. What is Software Configuration Management?
8. Who introduced histogram& what is histogram?
9. True or False: "Histogram helps in prioritizing factors and identifies which are the areas that need utmost attention immediately.". Justify your answer
10. Which of the QC tool represents the below figure? Explain about that tool

| Defect Types ? ( Major/ Minor ) | Defects in Supplied Items | | | | | | | Total Count |
|---|---|---|---|---|---|---|---|---|
| | Sun | Mon | Tue | Wed | Thu | Fri | Sat | |
| Rusted Items | | 4 | 2 | | 2 | 1 | | 9 |
| Items with Scratch | 1 | | | | | | | 1 |
| Dirty | | 1 | | 3 | | 2 | | 6 |
| Broken/ Cracks | | | 2 | | | | 1 | 3 |
| Main Body Dent | | | | | 3 | | | 3 |
| Missing Components | | 2 | | 2 | | | 1 | 5 |
| Labelling Error | | | | | 1 | 3 | | 4 |
| Damage in Packaging | | | 2 | | | | | 2 |
| Wrong Item Issued | | | | | 2 | | 1 | 3 |
| Film on Parts | | | 4 | | | | | 4 |
| Voids in Casting | 1 | | | | | 1 | 2 | 4 |
| Incorrect Dimensions | | | 2 | 1 | 2 | | | 5 |
| Failed to pass the quality test | | 2 | | | | 1 | | 3 |
| Total Count | 2 | 9 | 12 | 6 | 10 | 8 | 5 | 52 |

11. Which QC tool is also called as Ishikawa diagram? Explain about that.
12. What is vital few and trivial many?

**B. Answer any 6 questions from the below. (Marks: 6 x 5 = 30)**

13.Mention the type of risks in software process. Give some examples for each.

14.A new project is initiated in an organization and resource planning is carried out. As per the estimation, there shall be a licensed software tool for product integration process. But during planning, they found that the license is not active. Is it a risk or a problem? Describe why and mention any two possible actions for the risk or problem.

15.What is the importance of configuration management in an organization?

16.List the responsibilities of configuration management in charge in an organization.

17.What are the characteristics of software measurement?

18.What are the steps to be followed to construct a Pareto chart?

19.Why we are using the control chart as QC tool?

20.Stratify the given data:

An employee reached late to office on following days

5-Jan, 12-Jan,13-Jan, 19-Jan, 21-Jan, 26-Jan,27-Jan

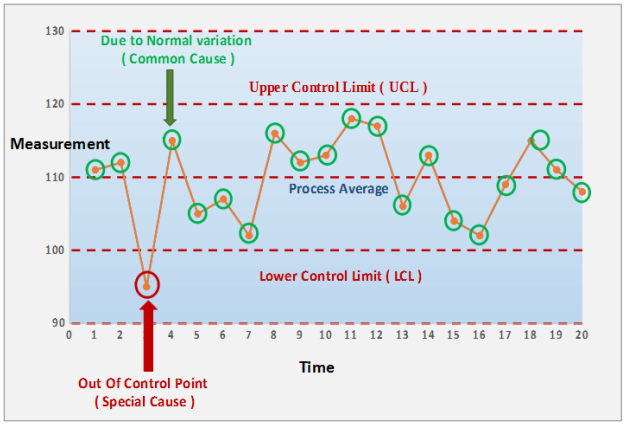
21.What are the advantages of fishbone diagram?

**C. Answer any 2 questions from the below. (Marks: 2 x 15 = 30)**

22.Explain the activities of software configuration management.

23.What are the types of factors affecting maintenance cost and explain each?

24.Which QC tool represent the below figure? Explain in detail with example.




25.What is a scatter diagram? Explain in detail about the tool.

**B.VOC DEGREE SOFTWARE QUALITY ASSURANCE & QUALITY CONTROL**
**(CBSS)**
**SEMESTER ONE EXAMINATION**

**Model question Paper**

**SQACS104: Methodology of Programming and programming in C**

Time: 3 Hours Maximum Marks :80

Part A

**A. Answer any 5 questions from the below (Marks: 5 x 4 = 20)**

1. List out the characteristics of a good programming language.
2. Create an algorithm to find the reverse of a number.
3. What is Debugging?
4. Define the term 'type casting'.
5. What is user defined function?
6. Compare Union and Structure in C
7. Explain how to pass array as argument to function with example.
8. Differentiate between call by value and call by reference with the help of an example.
9. Explain different storage classes in C with example
10. What is structure in C?

{Skill assessment} 1*60=60 marks

**B.VOC DEGREE SOFTWARE QUALITY ASSURANCE & QUALITY CONTROL**
**(CBSS)**
**SEMESTER TWO EXAMINATION**

**Model question Paper**

## SQACG202: Fundamentals of Digital Systems

Part A

Answer any 10 questions (1 mark each)

**(Marks: 10 x 2 = 20)**

1. What is the basic component of a first generation computer?
2. Write the difference between bit and byte.
3. What is the unit of speed used for a super computer?
4. What is ASCII stands for?
5. (86)10 = (----------)2
6. What is the octal equivalent of 1110101?
7. Draw the block diagram symbol of the NOR gate?
8. Write one Universal gate.
9. What is the dual of the Boolean expression AB + AB
10. Write one example of system software.
11. Draw the logic circuit diagram of the Boolean expression A(B+C)
12. Name the operating system that allows only one program to run at a time

Part B

Answer any 6 questions (5 marks each)

**(Marks: 6 x 5 = 30)**

13. Explain the Analog, Digital and Hybrid computers
14. Explain briefly a) Light Pen b) Plotter
15. a) Differentiate between RAM and ROM. b) What is a Cache memory?
16. a) Write the 4-bit BCD code for the numbers- 25,64,128,1024 b) Why was BCD code extended to EBCDIC?
17. What is a logic gate? Explain the NAND and NOR gates with truth table and block diagram.
18. What are language translators? Explain the differences between compiler, interpreter and assembler.
19. Distinguish between hardware and software.
20. Explain the functions of an operating system.
21. List the features of Linux Operating system.

Part C

Answer any two questions (10 marks each)

**(Marks: 2 x 15 = 30)**

22. Explain the logical organization of a digital computer with diagram.
23. a) Explain briefly the binary, octal and hexadecimal number system.

b) Do the following conversions

i. (127)10 to binary

ii. (10110011)2 to decimal
iii. (5112)10 to hexadecimal
iv. (FA8)16 to binary
v. (562)8 to hexadecimal

24. a) Write the postulates of Boolean Algebra b) Write and prove the theorems of Boolean Algebra
25. What is an Operating System? Explain the different types of operating systems

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**SEMESTER TWO EXAMINATION**

**Model question Paper**

# SQACS203: ISO 9001 and ISO 13485

**A. Answer any 10 questions from the below. (Marks: 10 x 2 = 20)**

1. What are the factors an organization should consider when determining its scope?
2. Give examples for interested parties of a College?
3. ISO 9001:2015 standard consists of how many clauses? Which are they?
4. Determine the following statement is true or false and justify

   "All ISO Standards including ISO 9001 will be revised every 5 years to maintain relevant and adapt to a changing word".
5. Mention any 4 responsibilities of a top management as per ISO 9001 standard?
6. Define purpose of Design and development files?
7. Define sterile barrier systems?
8. Define particular requirements for implantable medical devices?
9. Describe about customer property?
10. Describe about preservation of product?
11. Define provision of resources?
12. Describe about monitoring and measurement of processes?

**B. Answer any 6 questions from the below. (Marks: 6 x 5 = 30)**

13.Explain the methods and details required for deriving, measuring and controlling quality objectives in an organization?

14.What are the key considerations for developing and communicating a Quality Policy in an organization?

15.Mention the steps for selection and evaluation of a supplier?

16.What are factors to be considered while performing review of requirements related to products and services?

17.Describe about human resources and work environment?

18. Explain about management review process?

19. Explain about responsibility, authority and communication?

20. Describe about Internal Audit process?

21. Explain about Complaint handling?

**C. Answer any 2 questions from the below. (Marks: 2 x 15 = 30)**

22.How many sub clauses are there under Clause 6? Mention with an example for each.

23.There is an issue occurred in an organization – the code review defects are high for the type "deviation from coding standard". What should the organization do? What are the activities to be carried out to fix the issue?

24.Explain briefly about the purchasing process?

25.Explain about design and development process?

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**SEMESTER TWO EXAMINATION**

**Model question Paper**

# SQACS204: Agile and Scrum Model and Introduction To Six Sigma

**A. Answer any 10 questions from the below. (Marks: 10 x 2 = 20)**

1. What is Six Sigma?
2. What is a project charter?
3. SIPOC stands for? Explain with one example.
4. True or false: "A Six Sigma defect is defined as anything outside of customer specifications."
5. Which are the 3 steps to the root cause analysis?
6. How to identify improvement breakthrough?
7. What is the control limits in a control chart?
8. What is lean six sigma?
9. Give some examples for constraints?
10. What is FMEA? Why is it used?
11. True or false: "Theory of constraints means that a process that flows continuously and does not stop adding value to the product and the customer."
12. What is Poka-yoke?

**B. Answer any 6 questions from the below. (Marks: 6 x 5 = 30)**

13. Which are the activities involved in define phase?
14. What are the 3 ways of rating possible defects in FMEA?
15. Which are the steps involved in theory of constraints?
16. What is six sigma green belt practice test?

17.Calculate Defects per Million Opportunities (DPMO) for the food ordering delivery project team examines 50 deliveries and finds out the following:

- Delivery is not on time (13)
- Ordered food is not according to the order (3)
- Food is not fresh (0)

18.Which are the tools used for analysis?

19.Which roles are required to implement Six sigma?

20.What are the activities involved in identifying high gain alternatives?

21.Which are the 3 primary sources of data collection?

**C. Answer any 2 questions from the below. (Marks: 2 x 15 = 30)**

22. Explain in detail about the Define phase of sixsigma?
23. What is Analysis phase? Explain in detail about the types of analysis?
24. Explain the SIPOC process map?
25. Explain about the lean six sigma principle?

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**Model question Paper**

# SQACS205: Object Oriented Programming and C++ (AOC)

Time:3 hours Maximum Marks: 80

**SECTION A (Answer any 5 questions. Each question carries 4mark)**

**(5*4=20 marks)**

1. Explain array of objects.
2. How are friend functions different from member functions?
3. What is Operator overloading?
4. What is pure virtual function?
5. What are the functions used for the manipulation of file pointers?
6. Explain the different OOPs concepts.
7. What are the benefits of using OOP?
8. Explain Constructor Overloading.
9. What is a stream? Explain the different file stream classes.
10. What is inheritance? What are the different variations of inheritance?

{Skill assessment} 1*60=60 marks

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**SEMESTER TWO EXAMINATION**

**Model question Paper**

# SQACG301: Computer Organization & Architecture

Part A Answer any ten questions. Each question carries 2 marks.

1. What is an instruction register?
2. Which are the different fields in Instruction Formats?
3. What is byte addressability?
4. What is a bus?
5. What is the purpose of using status registers?
6. Write the classification of computer instructions.
7. What is the use of condition code bits?
8. Differentiate between RAM and ROM
9. Compare Static and dynamic RAM
10. What are the features of PROM?
11. What are multiprocessor systems?
12. How the efficiency of a pipeline can be measured?

Part B Answer any six questions. Each question carries 5 marks.

13. Explain the basic operational concept between processor and memory. 20101288 Page 1/2 Turn Over
14. How micro processor differentiates between data and instruction?Explain.
15. Explain the use of timing and control signals. Give example.
16. Explain register addressing mode with example
17. Explain memory hierarchy.
18. Distinguish between associative memory and cache memory.
19. What is virtual memory? How is it useful?
20. What is parallel processing?
21. List and explain some techniques to prevent pipeline conflicts.

Part C Answer any two questions. Each question carries 15 marks.

22. Explain stack organization in detail.
23. Explain and distinguish magnetic storage devices and optical storage devices.
24. Explain Flynn's architectural classification scheme.
25. What is an array processor? Explain with the help of neat diagrams.

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**SEMESTER THREE EXAMINATION**

**Model question Paper**

## SQACG302: Capability Maturity Model Integration

**A. Answer any 10 questions from the below. (Marks: 10 x 2 = 20)**

1. What is CMMI? Who developed CMMI?
2. True or false: "A baseline is a work product that has been formally reviewed and agreed on, that thereafter serves as the basis for further development and delivery."
3. What is the purpose of risk management?
4. Which process area addresses the acquisition of products, services, and product and service components that can be delivered to the project's customer or included in a product or service system?
5. What is Ishikawa diagram?
6. What is quantitatively managed level?
7. Which practice area ensures that selected work products meet their specified requirements? How is it ensured?
8. Give 4 examples for Configuration Management tool?
9. True or false: "The practices in Process Quality Assurance practice area ensure that planned processes are implemented."
10. What is bidirectional traceability?
11. What is story point estimation?
12. What is Product Integration?

**B. Answer any 6 questions from the below. (Marks: 6 x 5 = 30)**

13. Which are the types of review?
14. What are the steps involved in monitoring and control?
15. Which are the maturity levels in CMMI? Describe.
16. What is the difference between CMMI services and CMMI supplier management?

17.Which are the different estimation techniques?

18.Which are the tools used for Risk and opportunity management?

19.What is Process Asset Library? What are the benefits?

20.Which are activities involve in Organisational Training practice area?

21.Differentiate between the mitigation and contingency plan?

**C. Answer any 2 questions from the below. (Marks: 2 x 15 = 30)**

22.Explain the practice area Causal Analysis and Resolution?

23.Explain various models in CMMI?

24.Explain different maturity levels of CMMI in detail?

25.Explain the practice area Planning?

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**SEMESTER THREE EXAMINATION**

**Model question Paper**

# SQACS303: Basics of Software Testing

**A. Answer any 10 questions from the below. (Marks: 10 x 2 = 20)**

1. What is software testing?
2. What is the reality of the myth –"Tested software is bug free"?
3. True or False: "In SDLC, testing can be started from the Requirements Gathering phase and continued till the deployment of the software." Justify.
4. Which ISO standard is commonly known as the standard that provides the guidelines for Software Quality Requirements and Evaluation (SQuaRE)? Why?
5. True or false: "IEEE 1061 is a standard for software quality metrics and methodology." Explain/ Justify.
6. In which type of testing, tester writes script and use software to test the product? Explain briefly about that type of testing.
7. Give 2 examples for software testing tools?
8. True or false: "Verification done by developers and validation done by testers." Justify.
9. What is a test scenario?
10. ------- is a table that is used to trace the requirements during the Software Development Life Cycle. How is it used?
11. True or false: "Testing is a never-ending process and no one can claim that software is 100% tested." Justify.
12. True or false: "ISO-25000 replaces the two old ISO standards, i.e. ISO-9126 and ISO-14598." Explain/ Justify.

**B. Answer any 6 questions from the below. (Marks: 6 x 5 = 30)**

13. Which are the aspects to be considered for stop testing?
14. Differentiate between verification and validation of software testing?
15. Which are the quality attributes presented by ISO/IEC 9126?
16. Which are the factors to be considered for doing automation testing?
17. Explain the process for automation testing?
18. Which are the software testing tools?
19. Which are the components to be included in the test case?
20. Differentiate between test scenario and test cases?
21. What are the benefits of test documentation?

**C. Answer any 2 questions from the below. (Marks: 2 x 15 = 30)**

22.Which are types of software testing and testing tools? Explain in detail?

23.Explain in detail about the common myths of software testing?

24.What is testing documentation? Explain in detail?

25.Which are the ISO standards related to QA and Testing? Explain?

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**SEMESTER THREE EXAMINATION**

**Model question Paper**

# SQACS304: ISO 27001

**A. Answer any 10 questions from the below. (Marks: 10 x 2 = 20)**

1. Describe the factors to determine the scope of the ISO 27001 in an organization?
2. Who is an interested party in the context of ISO 27001?
3. Which clauses are under the ACT of PDCA cycle?
4. Define the responsibilities and authorities of an information security head/ lead in an organization?
5. What is ISMS risk? Explain with example.
6. What are the key things in which the employees in an organization should be aware of?
7. Define the areas of documented information needed in ISO 27001?
8. Define ISMS Objectives?
9. What is meant by impartial in an audit?
10. Define the activities required to perform the section context of the organization in a software company?
11. Define the steps need to be performed by an organization to improve ISMS practices?
12. How many clauses are there in ISO 27001:2013? List the main clauses.

**B. Answer any 6 questions from the below. (Marks: 6 x 5 = 30)**

13.Describe the steps to consider while developing an Information security policy in an organization?

14.Describe about five ways to perform communication effectively in an Organization?

15.Describe about how to maintain control of documented information?

16.Describe about nonconformity and corrective action?

17.Describe about the resource management process of an organization in terms of ISMS?

18.List the mandatory inputs for a management review meeting in the context of ISO 27001?

19.List the outputs that will be generated as part of management review meeting.

20.What is C, I and A in ISMS? Explain.

21.Describe about Operational Planning and Control.

**C. Answer any 2 questions from the below. (Marks: 2 x 15 = 30)**

22.List down the responsibilities and authorities of top management for information security management in an organization. Mention if any documented information maintained for the same.

23.Explain detail about the steps to be taken to conduct the internal audit effectively in an Organization. List the documented information used and generated as part of internal audit.

24.Explain briefly about the Information Security Risk Assessment process with minimum 3 examples.

25.Explain the steps to define Information security objectives in an organization. What are the activities to be conducted on ISMS Objectives defining, monitoring, measurement etc.?

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**SEMESTER THREE EXAMINATION**

**Model question Paper**

**SQACS305: Programming in Python(AOC)**

Time:3 hours Maximum Marks: 80

**SECTION A (Answer any 5 questions. Each question carries 4mark) (5*4=20 marks)**

1 What is list comprehension? Write an example.

2 What are lambda functions?

3 Write a python program to compare two files.

4 What is data hiding?

5 Write a python program to retrieve all lines containing ' the' with lower or upper case letters.

6 How to connect MySQL from python?

7 What are Web Services?

8 What advantages do NumPy arrays offer over Python lists?

9.What are the characteristics of a good test plan?

10. What is list?

{Skill assessment} 1*60=60 marks

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**SEMESTER FOUR EXAMINATION**

**Model question Paper**

# SQACG402: Operating Systems

**A.Answer any 10 questions from the below. (Marks: 10 x 2 = 20)**

1. What are the two fundamental approaches to interface with the OS?
2. List the Device management system calls
3. What is context switching?
4. What you mean by interprocess communication?
5. Differentiate turn around time and waiting time
6. What is critical section of a process?
7. Write the syntax of a monitor
8. What is Dynamic Linking?
9. What is segmentation ?
10. What is meant by page replacement ?
11. What is meant by sequential access ?
12. What is meant by disk scheduling ?

**B.Answer any 6 questions from the below. (Marks: 6 x 5 = 30)**

13.Briefly explain about the evolution of OS What are the steps involved in monitoring and control?
14. Discuss about OS Operations
15. With a neat diagram explain process states
16. Explain process creation and process termination
17. Define Semaphore. How Semaphore is implemented?
18. Explain resource-allocation graph with an example
19. How deadlock can be prevented?
20. Explain the concept of virtual memory
21. Explain file system structure with the help of a diagram

**D. Answer any 2 questions from the below. (Marks: 2 x 15 = 30)**

22. Explain the functions of OS
23. Briefly explain the types of Scheduling Algorithm with example
24. What are the different classic problems of synchronization? Explain
25. Explain paging hardware

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**SEMESTER FOUR EXAMINATION**

**Model question Paper**

# SQACS403: Fundamentals of Testing

**A. Answer any 10 questions from the below. (Marks: 10 x 2 = 20)**

1. Define categories of Test techniques?
2. Define Equivalence Partitioning?
3. What is Independent Testing?
4. Define the purpose if Test Plan?
5. Define Configuration Management?
6. What is testing?
7. Define Use Case Testing?
8. What is Defect?
9. What are the success factors for Test tool?
10. What are the factors influencing the Test effort?
11. Define Test Strategy?
12. What are the characteristics of Test Technique.

**B. Answer any 6 questions from the below. (Marks: 6 x 5 = 30)**

13. Describe about Decision table testing and State transition testing?
14. Describe about the tasks of Test manager and Tester?
15. Describe the factors influencing the Test effort?
16. Describe about test Estimation techniques?
17. Explain about the Benefits and Risks of Test Automation?
18. Explain about the main principles for Tool selection?
19. Explain about Risk-based testing and Product quality?
20. Describe about Experience-based Test Techniques?
21. Describe about the Pilot projects for introducing a tool into an organization?

**C. Answer any 2 questions from the below. (Marks: 2 x 15 = 30)**

22. Explain White-box test techniques in detail?

23. Explain the Metrics used in Testing?
24. Explain the process of Entry criteria and Exit criteria for testing?
25. Explain Black-box test techniques in details?

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**SEMESTER FOUR EXAMINATION**

**Model question Paper**

# SQACS404 :DATA BASE MANAGEMENT SYSTEMS

**A.Answer any 10 questions from the below. (Marks: 10 x 2 = 20)**

1. What do mean by data and information?

2. List different type of data models used?

3. Differentiate DDL and DML

4. Explain the difference among an entity, an entity type and an entity set?

5. Why tuples in a relation are not ordered?

6. Explain EXCEPT operator

7. List out different types of join operation?

8. Give the syntax of any two aggregate functions

9. Why should we avoid Null values in a relation?

10. What is clustering index?

11. What is rollback?

12. What you mean by Revoking a Privilege?

B.**Answer any 6 questions from the below. (Marks: 6 x 5 = 30)**

13. Explain data independence 20101087 Page 1/2 Turn Over

14. Explain the uses of Query Evaluation Engine.

15. Explain structural constraints.

16. Compare implicit and explicit constraints

17. Explain different forms of SELECT command

18. What is the purpose of order by clause with an example?

19. Discuss the general anomalies and functional dependency in a relation

20. Explain 2NF with example?

21. Explain the control measures that are used to provide security of data in databases?

**C.Answer any 2 questions from the below. (Marks: 2 x 15 = 30)**

22. Explain database users and how they interact with the database
23. Discuss the naming and displaying conventions used for ER diagrams.
24. Write short notes on (a) DDL commands used in SQL (b)Give SQL statement which creates a STUDENT table consisting of name and mark
25. Summarize normal forms based on primary keys and the corresponding normalization process.

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**SEMESTER FOUR EXAMINATION**

**Model question Paper**

# SQACS405: Functional Testing (AOC)

Time:3 hours Maximum Marks: 80

**B. Answer any 5 questions from the below (Marks: 5 x 4 = 20)**

1. Describe about experience-based test techniquest?
2. Describe Black box and White box testing
3. What are the important steps that are covered in Functional testing?
4. What is known as Data-Driven Testing? Explain.
5. What are the important points that should be considered while writing Test Cases?
6. What are the different Test Techniques used in Functional testing? Explain
7. What is Equivalence Partitioning?
8. What do you understand by Exploratory Testing? When is it Performed?

{Skill assessment} 1*60=60 marks

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**SEMESTER ONE EXAMINATION**

**Model question Paper**

# SQACG501: DATA STRUCTURES

**C. Answer any 10 questions from the below. (Marks: 10 x 2 = 20)**

1. What you meant by non-primitive data structure? Give example.
2. What is difference between linear and binary search?
3. Define infix, prefix, postfix expressions?
4. What are double ended queues?
5. What is the significance of NULL pointer in a linked list?
6. What are the steps involved in deleting the first node from a linked list
7. What is garbage value?
8. Write a note on binary tree?
9. How will you represent a binary tree using (A>B)||(C
10. What is cellular partitioning?
11. Define file organization
12. What are the two classes of collision resolution techniques?

**B.Answer any 6 questions from the below. (Marks: 6 x 5 = 30)**

13. Explain memory allocation and implementation of arrays in memory.
14. Explain the working of selection sort
15. Explain the concept of stacks along with their implementation in memory
16. What is circular queue? Describe briefly the different operations can be performed on circular queues?
17. Briefly explain doubly linked list? Write an algorithm or program for inserting a new node into a doubly linked list.
18. How can we dynamically implement stack and queue?
19. Explain complete binary tree with an example ?

20. Create a binary search tree using given elements through step by step procedure :

10,12,5,4,20,8,7,15,13

21. What is hashing? Explain with suitable example?

**C.Answer any 2 questions from the below. (Marks: 2 x 15 = 30)**

22. Explain sparse matrix representation with operations.
23. Explain organization and operations on queue with example
24. Explain trees and tree terminologies with an example diagram of degree 3.
25. Explain the following : 1) Linked File Organization 2) Inverted File Organization

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**SEMESTER FIVE EXAMINATION**

**Model question Paper**

## SQACS503: Basics of Performance Testing AND Basics of Security Testing

**A. Answer any 10 questions from the below. (Marks: 10 x 2 = 20)**

1. What is Performance Testing?
2. What are the different types of Performance Testing?
3. What are the common performance problems faced by users?
4. List out some common Performance bottlenecks.
5. What are the factors for selecting Performance Testing Tools?
6. What is the full form of HTTP? How is it used for security testing?
7. What is Cryptography?
8. Give examples for components with vulnerabilities?
9. What is mean by Protocol?
10. Define Decoding?
11. Define about Injection Security T2esting?
12. What is System Software security?

**B. Answer any 6 questions from the below. (Marks: 6 x 5 = 30)**

13.Differentiate between JMeter and SOAPUI. What is concurrent user load in Performance Testing?

14.What is the need for Performance Testing? What are the reasons behind the discontinuation of manual load testing?

15.What is profiling in Performance Testing? What are the entering & exiting criteria for Performance Testing?

16.Describe about Client Side Application Security?

17.Explain briefly about the process of Security Testing?

18.Explain how to perform Security Testing in cryptography?

19.Describe about Server Side Application Security?

20.Describe about the methods for Testing Sensitive Data?

21.What is Testing Senstivite?

**C. Answer any 2 questions from the below. (Marks: 2 x 15 = 30)**

22. Name some of the common Performance Testing Tools. What are the benefits of LoadRunner in testing tools?How to perform Spike Testing in JMeter? Explain the steps required in JMeter to create a performance test plan
23. Give the generic process on how to carry out performance testing in detail.
24. Explain about how to perform Security Testing of Malicious Software.
25. Explain briefly about the Security Testing of Automation tools.

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**SEMESTER FIVE EXAMINATION**

**Model question Paper**

## SQACS504: Computer Networks

**A.Answer any 10 questions from the below. (Marks: 10 x 2 = 20)**

1. what is Cryptography?
2.What is datagram?
3. What is peak amplitude?
4.What is Bluetooth?
5.What is Roaming?
6. What is DNS?
7. What is FTP ?
8.What is Hard Hands-off?
9. What is public and private key?
10.What is unicast addressing?
11. What is bitrate and baudrate?
12. What is NAT?

**B.Answer any 6 questions from the below. (Marks: 6 x 5 = 30)**

13.Explain twisted pair cable?
14. Explain transmission impairments.
15.Explain ALOHA Protocol?
16. Explain Variable size framing
17.Explain Multiplexing?
18. Explain different topologies
19.Explain unguided media?
20.Explain TCP/IP protocol Suit
21.Explain IPV4?

**C. Answer any 2 questions from the below. (Marks: 2 x 15 = 30)**

22. Explain various layers of ISO OSI reference model.

23. Explain guided and unguided transmission media.

24.Explain different multiple  access protocols

25.Explain simple parity check code and hamming code.

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**SEMESTER FIVE EXAMINATION**

**Model question Paper**

# SQACS505: Non Functional Testing (AOC)

Time:3 hours Maximum Marks: 80

**A. Answer any 5 questions from the below. (Marks: 5 x 4 = 20)**

1. Explain non functional testing
2. When do we perform Smoke testing?
3. Differentiate between Regression testing and Re-testing
4. Explain the term Stress Testing and Load testing.
5. What are the different levels of testing of a software? Explain
6. What are the characteristics of non functional testing?
7. List and briefly explain atleast 4 non functional testing parameters
8. What is compliance testing?

{Skill assessment} 1*60=60 marks

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**SEMESTER SIX EXAMINATION**

**Model question Paper**

# SQACG601: ISO 20000 and Auditing

**Answer any 10 questions from the below. (Marks: 10 x 2 = 20)**

1. Determine the following statement is true or false and provide justification details? "Compliance audits evaluate the efficiency and effectiveness of any part of an organization's operating procedures and methods".
2. Define the advantages of using checklists for auditing?
3. Define scope of Quality Management System and Scope of Certification?
4. What are the steps to achieve Continual Improvement in an organization?
5. What are the advantages of conducting an audit trail before the external audit?
6. Define the advantages of having the presence ofTechnical expert in the Audit?
7. What are the differences between major nonconformity and minor nonconformity?
8. Define aboutISO 19011?
9. What are the actions need to be taken to acquire competence?
10. Define about process capability?
11. Define the process of Risk based thinking?
12. Define Change management process?

**A. Answer any 6 questions from the below. (Marks: 6 x 5 = 30)**

13. Explain steps for conducting internal audit process effectively?
14. Describe steps for reviewing and closing of Nonconformity?
15. Explain about Added Value Audits versus Consultancy?
16. Explain about the steps for performing team building effectively?
17. Describe about the steps for managing software process?
18. Describe about Code of Conduct and Ethics?
19. Explain the role of top management for conducting the audit process?

20. State differences between desired state of practice and current state of practice?
21. Describe about the steps for operating under autonomous control?

**B. Answer any 2 questions from the below. (Marks: 2 x 15 = 30)**

22. Explain how to monitor the measurement traceability?
23. Explain Principles of Process change?
24. Explain about how to achieve control of external providers?
25. Explain about design and development process?

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**(CBSS)**
**SEMESTER SIX EXAMINATION**

**Model question Paper**
## SQACG602: Design and Analysis Of Algorithms

**A** *Answer any 10 questions. Each question carries 2 marks.*

1. What is an algorithm design technique?
2. What is worst case efficiency of an algorithm?
3. Define Omega notation.
4. Define the general concept of Divide and Conquer method.
5. Write any two characteristics of greedy algorithm.
6. What is the use of Dijkstra's algorithm?
7. What is meant by n-queen problem?
8. Define Travelling salesman problem.
9. Define Hamiltonian circuit.
10. What are a feasible solution and an optimal solution?
11. What is knapsack problem?
12. Define an algorithm. 10 x 2 = 20

**B** Answer any six of the following. Each question carries 5 marks.

13. Write the algorithm of binary search.
14. Briefly explain Strassen's matrix multiplication method with an example.
15. Explain graph coloring in detail.
16. Explain asymptotic notations in detail.
17. Explain the properties of an algorithm with an example each.
18. What is backtracking? Write any one algorithm which follows backtracking.
19. State the Greedy Knapsack? Find an optimal solution to the Knapsack instance n=3, m=20, (P1, P2, P3) = (25, 24, 15) and (W1, W2, W3) = (18, 15, 10).
20. What is a Hamiltonian Cycle? Explain how to find Hamiltonian path and cycle using backtracking algorithm.

21. Write the algorithm of Kruskal.

(6x5=30)

**C.**Answer any two of the following.Each question carries 15 marks

22. Explain Prim's algorithm in detail.

23. Apply merge sort algorithm to the list {14, 33, 27, 10, 35, 19, 42, and 44}.

24. Write and explain the algorithm of Sum of Subsets.

25. What is dynamic programming? Write any algorithm which uses dynamic programming concept.

**B.VOC DEGREE SOFTWARE QUALITY ASSURANCE & QUALITY CONTROL**
**(CBSS)**
**SEMESTER SIX EXAMINATION**

**Model question Paper**

# SQACS603: JAVA PROGRAMMING

**A.Answer any 10 questions from the below. (Marks: 10 x 2 = 20)**

1. Write a short note on commmand line argument.
2. List out the different branching statements used in Java.
3. Define a class.
4. How will you access class members using objects?
5. What is the use of protected keyword in java?
6. What is Array?
7. Explain newborn state of a thread?
8. Why exception handling is done?

B.**Answer any 6 questions from the below. (Marks: 6 x 5 = 30)**

13. Explain the datatypes used in Java.
14. Write a Java program to print prime numbers between two limits.
15. How will you implement multilevel inheritance in Java?
16. Write a note on dynamic method dispatch.
17. Difference between String and StringBuffer?
18. Explain different types of built-in exceptions.
19. Define Swing and its architecture.
20. Write an applet that receives to integer values as input and display the sum
21. Describe various ways of drawing polygons.

**C.Answer any 2 questions from the below. (Marks: 2 x 15 = 30)**

22. Differentiate between object oriented and procedure oriented programming. Expalin the OOP concepts.
23. What is constructor overloading? Write a Java program to implement the constructor overloading mechanism.
24. Define user defined packages. What are te steps involved in creating & using packages with example?
25. Discuss various Layout managers.

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**SEMESTER SIX EXAMINATION**

**Model question Paper**

## SQACS604: Introduction to Test Automation

**A. Answer any 10 questions from the below. (Marks: 10 x 2 = 20)**

1. Define Test Automation?
2. What are the advantages of using test tools?
3. Define framework?
4. Define Test Cases?
5. Define the scope of Automation?
6. Define Manual Testing?
7. Why Automation testing is necessary?
8. Define the Planning process in Automation?
9. What are the benefits of using Automation Tools?
10. Namethe types of Software Testing?
11. What is Automation Testing?
12. What are the criteria's for Test tools selection?

**B. Answer any 6 questions from the below. (Marks: 6 x 5 = 30)**

13. Describe about Automation Tool Best Practices?
14. Explain briefly about different types of Automation Testing tools?
15. Describe about the methods for choosing an Automation tool?
16. Explain briefly about the Test Cases for Automation?
17. When is the Automation Testing useful?
18. Describe about Test Execution Process?
19. Describe about the Structure of a Framework?
20. When to use Manual Testing over Automation Testing?
21. List some advantages and disadvantages of Automation Testing?

**C. Answer any 2 questions from the below. (Marks: 2 x 15 = 30)**

22. Explain in detail about the Automated Testing Process?

23. Explain briefly about Design and Development?

24. Explain briefly about Software Testing for Automation?

25. Explain briefly about the important modules of an Automation Testing Framework?

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**(CBSS)**
**SEMESTER SIX EXAMINATION**

**Model question Paper**

# SQACS605: Test Automation (AOC)

Time:3 hours Maximum Marks: 80

**A. Answer any 5 questions from the below. (Marks: 5 x 4 = 20)**

1. Explain briefly about different types of Automation Testing tools?
2. Describe about the methods for choosing an Automation tool?
3. Describe about Automation Tool Best Practices?
4. Describe about Test Execution Process?
5. When to use Manual Testing over Automation Testing?
6. List some advantages and disadvantages of Automation Testing?
7. What do you mean by regression and confirmation testing?
8. What are the benefits of test automation?

{Skill assessment} 1*60=60 marks