KALINGA UNIVERSITY

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SCHEME & SYLLABUS FOR

Bachelor of Vocational Studies (B.Voc.) Quality Management

NAAC GRADE B+ Accredited University

nirf RANKING 2024 Ranked in Top 151-200 Universities

Kalinga University, Naya Raipur, Chhattisgarh

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B.VOC IN QUALITY MANAGEMENT

Semester - I								
Course Code	**Course Title**	**Credits**	**L**	**T**	**P**	**Internal Marks**	**End Semester Exam Marks**	**Total**
BVQM101	Communication Skills	3	3	0	0	30	70	100
BVQM102	Fundamentals of Information Technology	3	3	0	0	30	70	100
BVQM103	Fundamentals of Testing -I	3	3	0	0	30	70	100
BVQM104	Introduction to Quality Management	3	3	0	0	30	70	100
BVQM105P	**Industrial Training/On Job Training/Workshop**	18	0	0	36	50	150	200
Total		**30**	**12**	**0**	**36**	**170**	**430**	**600**

Semester - II								
Course Code	**Course Title**	**Credits**	**L**	**T**	**P**	**Internal Marks**	**End Semester Exam Marks**	**Total**
BVQM201	Basics of Software Testing and Test Management	3	3	0	0	30	70	100
BVQM202	Environmental Studies	3	3	0	0	30	70	100
BVQM203	Fundamentals of Testing -II	3	3	0	0	30	70	100
BVQM204	Dimensional Metrology and Inspection	3	3	0	0	30	70	100
BVQM205P	**Industrial Training/On Job Training/Workshop**	18	0	0	36	50	150	200
Total		**30**	**12**	**0**	**36**	**170**	**430**	**600**

Semester - III								
Course Code	**Course Title**	**Credits**	**L**	**T**	**P**	**Internal Marks**	**End Semester Exam Marks**	**Total**
BVQM301	ISO 9001 and ISO 13485-I	3	3	0	0	30	70	100
BVQM302	Material Science and Materials	3	3	0	0	30	70	100
BVQM303	Software Quality Engineering	3	3	0	0	30	70	100
BVQM304	Performance Management and Systems	3	3	0	0	30	70	100
BVQM305P	**Industrial Training/On Job Training/Workshop**	18	0	0	36	50	150	200
Total		**30**	**12**	**0**	**36**	**170**	**430**	**600**

Semester - IV								
Course Code	**Course Title**	**Credits**	**L**	**T**	**P**	**Internal Marks**	**End Semester Exam Marks**	**Total**
BVQM401	ISO 9001 and ISO 13485-II	3	3	0	0	30	70	100
BVQM402	Quality by Design	3	3	0	0	30	70	100
BVQM403	Measurement System and Analysis	3	3	0	0	30	70	100
BVQM404	Statistical Procedures	3	3	0	0	30	70	100
BVQM405P	**Industrial Training/On Job Training/Workshop**	18	0	0	36	50	150	200
Total		**30**	**12**	**0**	**36**	**170**	**430**	**600**

Semester - V								
Course Code	**Course Title**	**Credits**	**L**	**T**	**P**	**Internal Marks**	**End Semester Exam Marks**	**Total**
BVQM501	ISO 27001	3	3	0	0	30	70	100
BVQM502	Production Technology	3	3	0	0	30	70	100
BVQM503	Quality Management Systems	3	3	0	0	30	70	100
BVQM504	Statistical Quality Control and Assurance	3	3	0	0	30	70	100
BVQM505P	**Industrial Training/On Job Training/Workshop**	18	0	0	36	50	150	200
Total		**30**	**12**	**0**	**36**	**170**	**430**	**600**

Semester - VI								
Course Code	**Course Title**	**Credits**	**L**	**T**	**P**	**Internal Marks**	**End Semester Exam Marks**	**Total**
BVQM601	ISO 20000 and Auditing	3	3	0	0	30	70	100
BVQM602	Quality Improvement Techniques: Tools and Methods	3	3	0	0	30	70	100
BVQM603	Total Quality Management	3	3	0	0	30	70	100
BVQM604	Lean and Six Sigma Quality Management	3	3	0	0	30	70	100
BVQM605P	**Industrial Training/On Job Training/Workshop**	18	0	0	36	50	150	200
Total		**30**	**12**	**0**	**36**	**170**	**430**	**600**

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SEMESTER-01

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BVQM101
COMMUNICATION SKILLS

Course Objective:

- The purpose of this course is to introduce students to the theory, fundamentals and tools of communication and to develop in them vital communication skills which should be integral to personal, social and professional interactions. One of the critical links among human beings and an important thread that binds society together is the ability to share thoughts, emotions and ideas through various means of communication: both verbal and non-verbal. In the context of rapid globalization and increasing recognition of social and cultural pluralities, the significance of clear and effective communication has substantially enhanced.

Course outcomes:

- The purpose of this course is to introduce students to the theory, fundamentals and tools of communication
- To develop vital communication skills which should be integral to personal, social and professional interactions.
- One of the critical links between human beings.
- An important thread that binds society together is the ability to share thoughts, emotions and ideas through various means of communication: both verbal and non-verbal.
- In the context of rapid globalization and increasing recognition of social and cultural pluralities, the significance of clear and effective communication has substantially enhanced.

Unit 1: **06**

- **Introduction:** Theory of communication, types and modes of communication, mediums and channels of communication, barriers to communication, English as a global language, the lingua franca, social influences on English

Unit 2: **06**

- **Language of Communication:** Verbal and non-verbal (spoken and written) personal, social and business barriers and strategies intra-personal, inter-personal and group communication, varieties of English, language, accent, dialect, colloquialism, historical influences on English

Unit 3: **06**

- **Speaking Skills:** Monologue dialogue group discussion effective communication/mis-communication interview public speech, regional influences on English, convergence and divergence, linguistic imperialism

Unit 4: **06**

- **Reading and Understanding** Close reading, reading analysis of a text - audience and purpose, content and theme, tone and mood, stylistic devices, structure comprehension- analysis and interpretation translation(from Indian language to English and vice-versa) literary/knowledge texts

Unit 5: **06**

- **Writing Skills**: Documenting report writing making notes letter writing, writing tabloids, diary entry, open letters, essays, newsletter and magazine articles, skits, short stories, impersonating characters it will enhance language of communication, various speaking skills such as personal communication, social interactions and communication in professional situations such as interviews, group discussions and office environments, important reading skills as well as writing skills such as report writing, note taking etc. while, to an extent, the art of communication is natural to all living beings, in today's world of complexities, it has also acquired some elements of science. it is hoped that after studying this course, students will find a difference in their personal and professional interactions.

References:

1. Fluency in English - Part II, Oxford University Press, 2006.
2. Business English, Pearson, 2008.
3. Language, Literature and Creativity, Orient Blackswan, 2013.
4. Language through Literature (forthcoming) ed. Dr. Gauri Mishra, Dr. Ranjana Kaul, Dr. Brati Biswas

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BVQM102
FUNDAMENTALS OF INFORMATION TECHNOLOGY

Course objective:

- This is a basic course for commerce students to familiarize with computer and it's applications in the relevant fields and exposes them to other related courses of IT.

Course Outcomes:

- Gain a foundational understanding of key IT concepts, including hardware, software, and networks.
- Develop proficiency in using common computer applications, such as word processing and spreadsheet software.
- Explore the ethical and security considerations in IT, emphasizing responsible digital behavior.
- Acquire problem-solving skills by applying IT knowledge to real world scenarios.
- Prepare for further studies in IT or related fields by establishing a strong IT knowledge base.

Unit-1: **06**

- **Computer characteristics:** Speed, storage, accuracy, diligence; digital signals, binary system, ASCII; historic evolution of computers;
- **Classification of computers:** microcomputer, minicomputer, mainframes, supercomputers;
- **Personal computers:** desktop, laptops, palmtop, tablet; hardware & software; von Neumann model.

Unit-2: **06**

- **Hardware:** CPU, memory, input devices, output devices.
- **Memory units:** RAM (SDRAM, DDR RAM, RDRAM etc. feature wise comparison only); ROM-different types: Flash memory;
- **Auxiliary storage:** Magnetic devices, optical devices; floppy, hard disk, memory stick, CD, DVD, CD/DVD-Writer**;**
- **Input devices -** keyboard, mouse, scanner, speech input devices, digital camera, touch screen voice input, joystick, optical readers, bar code reader;
- **Output devices:** Display device, size and resolution; CRT, LCD, LED;
- **Printers:** Dot-matrix, inkjet, laser; plotters, sound cards & speaker.

Unit-3: **06**

- **Software:** System software, application software; concepts of files and folders, introduction to operating systems, different types of operating systems: single user, multitasking, time-sharing multi-user; booting, POST;
- **Basic features of two GUI operating systems:** Windows & Linux (Basic desk top management); Programming Languages, Compiler, Interpreter, Databases;
- **Application software:** Generic features of word processors, spread sheets and presentation software; generic introduction to latex for scientific typesetting; utilities and their use; computer viruses & protection, free software, open source.

Unit-4: **06**

- **Computer Networks and Internet:** Connecting computers, requirements for a network: server, workstation, switch, router, network operating systems; internet: brief history, world wide web, websites, URL, browsers, search engines, search tips; internet connections: isp, dial-up, cable modem, well, dsl, leased line wireless and Wi-Fi connectivity ; email, email software features (send receive, filter, attach, forward, copy, blind copy); characteristics of web-based systems, web pages, web programming languages.

Unit-5: **06**

- **Information Technology and Society:** Indian IT Act, intellectual property rights, issues. application of information technology in railways, airlines, banking, insurance, inventory control, financial systems, hotel management, education, video games, telephone exchanges, mobile phones, information kiosks, special effects in movies.
- **Programming Concepts & Techniques:** Program concept, characteristics of programme, stages in program development, tips for program designing, programming aids, algorithms, pseudo code, notations, design, flowcharts, symbols, rules, compiler & interpreter. introduction to programming techniques, top-down & bottom-up approach, unstructured, & modular programming, cohesion, coupling, debugging, syntax & logical errors, linking and loading, testing and debugging, documentation.

References:

1. Programming in C, R.S. Salaria, Khanna Publishing House
2. Computer Concepts and Programming in C, R.S. Salaria, Khanna Publishing House
3. Handbook of Computer Fundamentals, N.S. Gill, Khanna Publishing House

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BVQM103
FUNDAMENTALS OF TESTING –I

Course Objective:

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

Unit 1: **08**

- **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

Unit 2: **08**

- **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

Unit 3: **07**

- **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

Unit 4: **07**

- **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

References:

- **Peter Morgan:** Software Testing An ISTQB Tester Foundation Guide, Second Edition
- **Aditya P Mathur :** Foundations of Software Testing, Second Edition

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BVQM104
INTRODUCTION TO QUALITY MANAGEMENT

Course Objectives:

- Be able to understand a strategic planning and deployment process for improvement, performing a SWOT analysis and reviewing current models/tools such as balanced scorecard, scenario planning and Hoshin planning/policy.
- Develop aligned goals, long-and short-term objectives and plans, for their functions.
- Understand current practices in customer and market requirement definition, satisfaction/ retention, and product and process design, including completing a QFD relationship matrix.
- Know when and how to use fundamental QC and QA elements to control, correct and improve processes and products. Includes the use of a problem solving process and quality tools, control plans and charts, process capability, audits, supplier quality management, documentation, calibration, and measurement quality.

Unit 1: **08**

Introduction and Basics:

- Focusing quality on getting business results
- Management systems (Baldrige and ISO 9001)
- Quality evolution
- QM goals and core values/principles
- Using a learning and action log to increase class value back on the job

Unit 2: **08**

Leadership, Organizational, and HR Issues:

- Communicating and learning styles
- Motivational concepts
- Management theories and styles
- Organizational structures
- Team evolution, roles, and making teams effective
- Mager's model for analyzing performance problems
- Training needs analysis, development, delivery, and improvement
- Kirkpatrick's four levels of evaluating training effectiveness

Strategic Planning:

- Strategic planning and deployment model
- Mission, vision, values
- SWOT, gap analysis, and benchmarking
- Long and short-term goals
- Setting and implementing plans
- Current examples - balanced scorecard, policy deployment, scenario planning

Unit 3: **07**

Customer and Market Focus:

- Market segmentation and customer knowledge
- Determining and deploying customer needs, including QFD
- Customer survey feedback process
- Methods to depict survey results graphically
- Customer relationship enhancement

Information and Analysis:

- Managing by facts - the foundations
- Assuring the reliability of measures
- Statistical thinking
- Process control with control charts and determining the capability of a process to meet specifications
- Analysis of data

Unit 4: **07**

Process Management:

- Maintaining the current state
- World class improvement process
- Supplier quality management
- Project management
- Getting improved results

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BVQM105P
INDUSTRIAL TRAINING/ON JOB TRAINING/ WORKSHOP

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SEMESTER-02

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BVQM201
BASICS OF SOFTWARE TESTING AND TEST MANAGEMENT

Course Objectives:

- 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.

Unit 1: **08**

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

Unit 2: **08**

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

Unit 3: **07**

- **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.
- **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

Unit 4: **07**

- **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.
- **Experience-Based Techniques:** Error Guessing, Checklist-Based Testing, Exploratory Testing, Applying the Best Technique Software Attacks: Effective Attacks, Other Attacks and Software Attacks.

References:

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

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BVQM202
ENVIRONMENTAL STUDIES

Course Outcomes:

- Master core concepts and methods from ecological and physical sciences and their application in environmental problem solving.
- Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.
- Apply systems concepts and methodologies to analyze and understand interactions between social and environmental processes.
- Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.
- Master core concepts and methods from economic, political, and social analysis as they pertain to the design and evaluation of environmental policies and institutions.

Unit 1: **06**

Introduction to Environmental Studies:

- Multidisciplinary nature of environmental studies, Scope and importance; concept of sustainability and sustainable development.

Ecosystems:

- What is an ecosystem? Structure and function of the ecosystem;
- **Energy flow in an ecosystem:** food chains, food webs and ecological succession.
- **Case studies of the following ecosystems**: Forest ecosystem, grassland ecosystem, desert ecosystem, aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Unit-2: **06**

Natural Resources:

- **Renewable and Non--renewable Resources:** Land resources and land use change; Land degradation, soil erosion and desertification.
- **Deforestation:** Causes and impacts due to mining, dam building on environment, forests, biodiversity and tribal populations.
- **Water:** Use and over--exploitation of surface and ground water, floods, droughts, conflicts over water (international & inter--state).
- **Energy resources:** Renewable and non-renewable energy sources, use of alternate energy sources, growing energy needs, case studies.

Unit-3: **06**

Biodiversity and Conservation:

- **Levels of biological diversity:** genetic, species and ecosystem diversity; Biogeographic zones of India; Biodiversity patterns and global biodiversity hot spots, India as a mega--biodiversity nation; Endangered and endemic species of India
- **Threats to biodiversity:** Habitat loss, poaching of wildlife, man--wildlife conflicts, biological invasions;
- **Conservation of biodiversity:** In--situ and Ex--situ conservation of biodiversity.
- **Ecosystem and biodiversity services:** Ecological, economic, social, ethical, aesthetic and Informational value.

Unit-4: **06**

Environmental Pollution:

- Types, causes, effects and controls; Air, water, soil and noise pollution, Nuclear hazards and human health risks
- **Solid waste management:** Control measures of urban and industrial waste. Pollution case studies.

Environmental Policies & Practices:

- Climate change, global warming, ozone layer depletion, acid rain and impacts on human communities and agriculture
- **Environment Laws:** Environment Protection Act; Air (Prevention & Control of Pollution) Act; Water (Prevention and control of Pollution) Act; Wildlife Protection Act; Forest Conservation Act. International agreements: Montreal and Kyoto protocols and Convention on Biological Diversity (CBD).
- Nature reserves, tribal populations and rights, and human wildlife conflicts in Indian context.

Unit-5:

06

Human Communities and the Environment:

- **Human population growth:** Impacts on environment, human health and welfare. Resettlement and rehabilitation of project affected persons; case studies.
- **Disaster management:** floods, earthquake, cyclones and landslides.
- **Environmental movements:** Chipko, Silent valley, Bishnois of Rajasthan.
- **Environmental ethics:** Role of Indian and other religions and cultures in environmental conservation. Environmental communication and public awareness, case studies (e.g., CNG vehicles in Delhi).

References:

1. Carson, R. 2002. *Silent Spring*. Houghton Mifflin Harcourt.
2. Gadgil, M., & Guha, R.1993. This Fissured Land: An Ecological History of India. Univ. of California Press.
3. Gleeson, B. and Low, N. (eds.) 1999.Global Ethics and Environment, London, Routledge.
4. Gleick, P. H. 1993. Water in Crisis. Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute, Oxford Univ. Press.
5. Groom, Martha J., Gary K. Meffe, and Carl Ronald Carroll.Principles of Conservation Biology. Sunderland: Sinauer Associates, 2006.
6. Grumbine, R. Edward, and Pandit, M.K. 2013. Threats from India's Himalaya dams. Science, 339: 36--37.
7. McCully, P. 1996. Rivers no more: the environmental effects of dams(pp. 29--64). Zed Books.
8. McNeill, John R. 2000. Something New Under the Sun: An Environmental History of the Twentieth Century.
9. Odum, E.P., Odum, H.T. & Andrews, J. 1971.Fundamentals of Ecology. Philadelphia: Saunders.
10. Pepper, I.L., Gerba, C.P. & Brusseau, M.L. 2011. Environmental and Pollution Science. Academic Press.
11. Rao, M.N. & Datta, A.K. 1987. Waste Water Treatment. Oxford and IBH Publishing Co. Pvt. Ltd.
12. Raven, P.H., Hassenzahl, D.M. & Berg, L.R. 2012.Environment. 8th edition. John Wiley & Sons.
13. Rosencranz, A., Divan, S., & Noble, M. L. 2001. Environmental law and policy in India. Tripathi 1992.
14. Sengupta, R. 2003. Ecology and economics: An approach to sustainable development. OUP.
15. Singh, J.S., Singh, S.P. and Gupta, S.R. 2014. Ecology, Environmental Science and Conservation. S. Chand Publishing, New Delhi.
16. Sodhi, N.S., Gibson, L. & Raven, P.H. (eds). 2013. Conservation Biology: Voices from the Tropics. John Wiley & Sons.
17. Thapar, V. 1998. Land of the Tiger: A Natural History of the Indian Subcontinent.
18. Warren, C. E. 1971. Biology and Water Pollution Control. WB Saunders.
19. Wilson, E. O. 2006.The Creation: An appeal to save life on earth. New York: Norton.
20. World Commission on Environment and Development. 1987.Our Common Future. Oxford University Press.

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BVQM203
FUNDAMENTALS OF TESTING -II

Unit 1: **08**

- **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
- **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

Unit 2: **08**

- **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

Unit 3: **07**

- **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

Unit 4: **07**

- **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

References:

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

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BVQM204
DIMENSIONAL METROLOGY AND INSPECTION

Unit 1: **08**

- **Linear Measurement And Angular Measurement:** Accuracy, Precision, Readability, Sensitivity, Linear measuring instruments - vernier – micrometer Gauge blocks- dial indicator-comparators – Angle standards – vernier bevel protractor-sine bar – autocollimator.

Unit 2: **08**

- **Standards For Linear And Angular Measurements:** Shop floor standards and their calibration, light interference, Method of coincidence, Slip gauge calibration, Measurement errors, Limits, fits, Tolerance, Gauges, Gauge design.

Unit 3: **07**

- **Measurement Application:** Measurement of screw threads and gears – Radius measurement – surface finish measurement of straightness-flatness-parallelism – squareness-roundness – circularity

Unit 4: **07**

- **Modern Concepts:** Image processing and its application in Metrology, Co-ordinate measuring machine, Types of CMM, Probes used, Application, Non-contact CMM using Electro-optical sensors for dimensional metrology.
- **Measurement Systems:** System configuration, basic characteristics of measuring devices, Displacement, force and torque measurement, standards, Calibration, Sensors, Basic principles and concepts of temperature, Pressure and flow measurement, Destructive testing – Nondestructive testing.

References:

1. Galyer J.F. and Shotbolt C.R."Metrology for Engineers" ELBS, 1992.
2. Hune, K.J.Engineering Metrology, Kalyani Publishers, India, 1980.
3. Robinson, S.L. and Miller R.K. Automated Inspection and Quality Assurance, Marcel Dekker Inc.1989.
4. R.K.Jain ,Engineering metrology ,khanna publisher,2009.
5. M. Mahajan,Text book of Metrology, Dhanpat Rai & Co P Ltd ,2012

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BVQM205P
INDUSTRIAL TRAINING/ON JOB TRAINING/ WORKSHOP

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SEMESTER-03

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BVQM301
ISO 9001 AND ISO 13485-I

Course 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.

Unit 1: **08**

- **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.

Unit 2: **08**

- **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

Unit 3: **07**

- **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

Unit 4: **07**

- **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.

References:

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

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BVQM302
MATERIAL SCIENCE AND MATERIALS

Unit 1: **08**

- **General:** Brief introduction to the subject metallurgy and its scope in engineering field, classification of materials of industrial importance. Their chemical thermal, electrical, magnetic, mechanical and technological properties and their selection criteria for use in industry
- **Structure of Metals and Their Deformation:** Structure of metals and its relation to their physical, mechanical and technological Properties, Elementary idea of arrangement of atoms in metals, molecular structures, crystal structures and crystal imperfections, Deformation of metals, effects of cold and hot working operations over them. Recovery re-crystallization and grain growth, solid solutions, alloys and inter metallic compounds, effect of grain size on properties of metals.
- **Properties and Usage Of:**
  - **a) Metals:**
    - I. Ferrous Metals
    - II. Non Ferrous Metals
  - **b) Non-metallic Materials.**

Unit 2: **08**

Metals-Ferrous Metals:

- Classification of iron and steel.
- Cast iron types as per I.S. - White, malleable, Grey
- **Steels:** Classification of steels according to carbon content and according to use as per I.S. Mechanical properties of various steels and their uses. Availability of steel in market, Its forms and specifications
- **Alloy Steel:** Effect of alloying various elements, viz Cr, Hi, Co, V,W, Mo, Si, and Mn, on mechanical properties of steel, Common alloy steels, viz, Ni-steel, Ni-Cr-steel, Tungsten steel, Cobalt steel, Stainless Steel, Tool steel - High Carbon Steel, High Speed steel, Tungsten Carbide, Silicon manganese steel, Spring Steel, Heat Resisting alloy Steels etc.

Unit 3: **07**

Non-Metallic Materials:

- **Plastic and Other Synthetic Materials:** Plastics- Important sources-Natural and Synthetic, Classification, thermo-set and thermoplastic, Various trade names, Important Properties and engineering use of plastics. Market forms of Plastics
- **Paints, Enamels, Varnishes and Lacquers**: Paints and Enamels-types, its purpose, essential ingredients and their role, characteristics of a good paints and enamel, trade names of some important types of products. Varnishes-types purpose of varnish, essential ingredients and their role, characteristics, preparation, trade names storage of varnish, Lacquer- characteristics, preparation and uses

- **Heat Insulating Materials:** Classification of Heat Insulating material, properties and uses of China clay, Cork, Slag wool, Glass Wool, Thermocole, Puff, Properties and uses of asbestos as filler material.
- **Hardware:** General specification, uses and methods of storage of G.I. and C.I. steel, Copper, A.C. pressure conduits, R.C.C. spun, P.V.C. Pipes and their uses. General sheets specification (I.S.) and uses, Method of storage of G.I. sheets, M.S. sheets, General specification of pipe fitting

Unit 4: **07**

- **Identification and Testing of Metal Alloys:** Selection, specification forms and availability of materials.
- **Heat Treatment Of Metals:** Elementary concept, purpose, Iron-carbon equilibrium diagram. T.T.T. and `S' curve in steels and its significance, Hardening, Tempering, Annealing, Normalizing and case hardening.

References:

1. Material Science: RS Khurmi & RS Shedha

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BVQM303
SOFTWARE QUALITY ENGINEERING

Unit 1: **08**

- **Software Quality:** Definition of Software Quality, Quality Planning, Quality system – Quality Control Vs Quality Assurance – Product life cycle – Project life cycle models.

Unit 2: **08**

- **Software Engineering Activities:** Estimation, Software requirements gathering, Analysis, Architecture, Design, development, Testing and Maintenance.

Unit 3: **07**

- **Supporting Activities:** Metrics, Reviews –SCM – Software quality assurance and risk management.

Unit 4: **07**

Software Quality Management Tools:

- **Seven basic Quality tools –** Checklist – Pareto diagram – Cause and effect diagram – Run chart –
- **Histogram – Control chart –** Scatter diagram – Poka Yoke – Statistical process control – Failure
- **Mode and Effect Analysis –** Quality Function deployment – Continuous improvement tools – Case study.
- **Quality Assurance Models:** Software Quality Standards, ISO 9000 series – CMM, CMMI – P-CMM – Case study.

References:

1. Software Engineering: A Practitioners Approach, 5th Edition Roger S. Pressman McGraw – Hill International Edition, 6th Edition, 2006.
2. Ramesh Gopalswamy, Managing global Projects ; Tata McGraw Hill, 2002.
3. Norman E – Fenton and Share Lawrence P flieger, Software metrics , International Thomson Computer press , 1997.
4. Gordan Schulmeyer. G. and James .L. Mc Hanus , Total Quality management for software, International Thomson Computer press , USA , 1990.
5. Dunn Robert M., Software Quality: Concepts and Plans, Englewood clifts, Prentice Hall Inc., 1990.
6. Metrics and Models in Software Quality Engineering, Stephen, Stephen H. Kan, Pearson education, 2006, Low price edition.

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BVQM304
PERFORMANCE MANAGEMENT AND SYSTEMS

Course Objective:

- The Metrics and KPI's (Key Performance indicators) are vital for performance management of any organization, system, operation, process, people etc. The metrics are designed and chased for Quality realization of relevant objectives.

Course Outcome:

- After the course the student to monitor and engineer the performance for desired product realization.

Unit 1: **08**

- **Introduction:** Performance Management (PM), Efficiency and effectiveness of processes, Organizations, Business Objectives, Human Resources, Metric, Key Performance indicators, Monitoring & Measurement; Step-by-step PM Process Checklist, Reporting, Dashboards
- **The KPI Family Dimension:** Internal Business Benchmarks, External Industry Benchmarks, Productivity and Efficiency Measurements, Quality Measurements, Profitability Effectiveness, Timeliness and Effective Resource Utilization, Innovation and Technology.

Unit 2: **08**

- **The Human Factor:** Metrics for an Engaged Workforce, Employee Engagement and Productivity, Performance enhancement. Synergizing people, Role, Benefits Strategic Plan Key Result Areas Results, Measures or KPIs, Real-World Improvements Using KPIs, Distributing Knowledge Management Responsibilities, Getting Cooperation and Buy-In to KPI Objectives
- **Human Competence:** Engineering Worthy Performance, Performance Appraisals Catalytic Coaching: The modern thoughts in Performance Review Abolishing, 360 Degree Feedback

Unit 3: **07**

- **Knowledge Management & Development Measurements:** Performance Indicators (KPI's) and Common Metrics , Balanced Scorecard Systems .Case Studies
- **Strategic Performance Management Systems:** Emerging Issues viz. Governance, Empowerment and the Strategic Audit, Performance measurement and control, The scope of performance measurement, Performance analysis in not-for-profit Organizations and the public sector, Make-or-buy and other decisions

Unit 4: **07**

- **Performance Assessment by Awards:** Deming Application Prize, Rajiv Gandhi National Quality award, Malcolm Baldrige National Quality Award. Tata Excellence model Case Studies

References:

1. Keeping Score: Using Right METRICS TO DRIVE World Class Performance: Brown PH1 Learning 1996.
2. Performance Management: Strategies, Interventions, Drivers Isbn:Kandula, Srinivas, PHI Learning, Delhi 2000
3. Strategic Human Resource Development: Srinivas Kandula PHI learning Jan 2001.
4. Performance Modeling Of Automated Manufacturing Systems Narahari, Y., Viswanadham, N, 2001
5. Performance Management: Concepts, Skills And Exercises Cardy, Robert L., Leonard, Brain Phi Learning, Delhi 2nd Edition. 2001

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BVQM305P
INDUSTRIAL TRAINING/ON JOB TRAINING/ WORKSHOP

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SEMESTER-04

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BVQM401
ISO 9001 AND ISO 13485-II

Course Objectives:

- To provide information on the Quality Management System aspects in the industry arena
- To provide the information on ISO 9001 and ISO 13485 clause requirements.
- To provide information on the practices to get a certification of ISO 9001 and ISO 13485

Unit 1: **08**

- **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
- **Quality management system:** Terms & Definitions, General requirements, Documentation requirements, Quality manual, Medical device file, Control of documents, Control of records

Unit 2: **08**

- **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

Unit 3: **07**

- **Resource management:** Provision of resources, Human resources, Infrastructure, Work Environment and contamination control, Work environment, Contamination control
- **Product realization:** Planning of product realization, Customer-related processes, Design and development, Purchasing, Production and service provision, Control of monitoring and measuring equipment

Unit 4: **07**

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

References:

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

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BVQM402
QUALITY BY DESIGN

Unit 1: **08**

- **Introduction:** Perception of quality, Taguchi's definition of quality – quality loss function, planning of experiments, design principles, terminology, normal probability plot, Analysis of variance, Linear regression models.

Unit 2: **08**

- **Factorial Experiments:** Design and analysis of single factor and multi-factor experiments, tests on means, EMS rules.
- **Special Designs:** 2K Factorial designs, Fractional factorial designs, Nested designs, Blocking and Confounding.

Unit 3: **07**

- **Orthogonal Experiments:** Selection of orthogonal arrays (OA's), OA designs, conduct of OA experiments, data collection and analysis of simple experiments, Modification of orthogonal arrays.

Unit 4: **07**

- **Robust Design:** Variability due to noise factors, Product and process design, Principles of robust design, objective functions in robust design - S/N ratios , Inner and outer OA experiments, optimization using S/N ratios, fraction defective analysis, case studies.

References:

1. Krishnaiah, K. and Shahabudeen, P. Applied Design of Experiments and Taguchi Methods, PHI learning private Ltd., 2012.
2. D.C.Montgomery, "Design and analysis of experiments", John Wiley, Eighth Edition, 2012.
3. Nicolo Belavendram, "Quality by design" Taguchi techniques for Industrial experimentation, Prentice Hall, 1999.

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BVQM403
MEASUREMENT SYSTEM AND ANALYSIS

Course Objective:

- Experimental Measurement Systems is the core of Quality implementation. Along with Measurement Systems Analysis (MSA) these are the core components of the Six Sigma approach. Many problems encountered with Statistical Process Control (SPC) and Design of Experiments (DOE) are caused by problems with measurement systems

Course Outcome:

- The students should integrate their role of a Quality technocrat with MSA Responsibilities and analysis using Gage R&R Studies SPC & DOE. By Applying the tools relational expertise generated.

Unit 1: **10**

- **Introduction and Estimation of Experimental Uncertainties:** Uncertainty analysis to specify the uncertainty for each instrument - method of equal effects. Instrument role in final uncertainty, Bias and the Tolerance, Confidence Limits and the Bias Linearity Gage R&R Studies, The Range Method, Range Exercise, Calculating the Repeatability & the Reproducibility, Percentage Error, Stability, Measurement Regions, Attribute Gage Study Short Method Long Method, Comparing Operators, Gage R & R Exercise.

Unit 2: **10**

- **Considerations for the Selection of Instruments:** Cost of new instruments and sensors for acceptable uncertainty and sensitivity with lack of sensitivity to other independent variables. Accuracy and precision are limited by the hysteresis transducer instrument

Unit 3: **10**

- **Test Matrix And Sequence Replications And Repetition:** Order of test sequence over range of variable, trends in data, correlation of data with time of day! Replicate or repeat in a different random order. Discussion of case studies.

References:

1. Measurement Systems Analysis, Manual, Third Edition, March 2002.
2. Doebelin, E. Engineering Experimentation: Planning, Execution, and Reporting, McGraw-Hill Book Co., NY. 1995
3. Wheeler, A. J. and Ganji, A. R. Guidelines for Planning and Documenting Experiments 1996.
4. Englewood Cliffs, N J. Introduction to Engineering Experimentation, Prentice Hall, 1999.
5. Holman, J. P. 2000 . Experimental Methods for Engineers. McGraw-Hill Book Co., NY.

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BVQM404
STATISTICAL PROCEDURES

Course Objectives:

- The fundamentals of probability theory and theorems.
- Probability distributions like normal, binomial, poisson etc; for help in quality control tools.
- Probability distributions like Exponential, Weibull, Raleigh, and Log-Normal for help in reliability engineering.
- Inference about population mean and variance.
- Understanding Different Data Distributions And Their Properties, Probability Theory, Probability Distributions, Sampling Distribution.

Course Outcome:

By the end of the course students are expected to be able:

- To distinguish between random and non-randoxperiments.
- To find the mean and variance of the population through sample.
- To construct Control chart, OC curve through knowledge of probability distributions
- To apply standard discrete probability distribution to different situations of operations.

Unit 1: **08**

- Data Representation and Frequency Distribution, Histogram, Box-Plots, Stem Leaf Diagram
- Measures of Central Tendency and Dispersion, Moments of a Frequency Distribution, Skewness and Kurtosis

Unit 2: **08**

- Concepts of Population Sample, Elements of Probability Theory
- Laws of Probability and Bayes Theorem, Random Variables and Probability Distributions

Unit 3: **07**

- Mathematical Expectation, Discrete Probability Distributions - Bernoulli, Binomial, Poisson, Geometric, and Hyper Geometric
- **Continuous Probability Distributions -** Normal, Exponential, Weibull, Raleigh, and Log Normal

Unit 4: **07**

- **Sampling Distributions-** Chi-Square, t and F– Distributions, Inter Relationships among various Probability Distributions

References:

1. Probability & Statistics for Engineers & Scientists, Ronald E. Walpole, Roanoke College, Raymond H. Myers, Sharon L. Myers, Keying Ye, Prentice Hall, 2010
2. Probability and statistics for Engineers, by I. R. Miller, J. E. Freund & R. Johnson, Prentice Hall of India, 2012
3. Quality Control and Improvement, Amitava Mitra, A John Wiley & Sons, Inc.,2003
4. Quality Control & Application, B. L. Hanson & P. M. Ghare, Prentice Hall of India, 2009

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BVQM405P
INDUSTRIAL TRAINING/ON JOB TRAINING/ WORKSHOP

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SEMESTER-05

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BVQM501
ISO27001

Course 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.

Unit 1: **08**

- **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
- **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.

Unit 2: **08**

- **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.

Unit 3: **07**

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

Unit 4: **07**

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

References:

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

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BVQM502
PRODUCTION TECHNOLOGY

Unit 1: **08**

- **Production Machine Tools:** Machine tools used for quantity production, semi-automatic multi tools centre lathe. Auto-lathes, sliding head types, Single spindle automatics, Multi-spindle automatics, Mechanical copying systems, Hydraulic servo copying systems for lathe, Electric copying systems.
- **Transfer Machines:** Types of productions. Types of layout, Economic justification of transfer machines, Inline transfer, drum type transfer machines. Automatic loading & Transferring methods, Machining heads, Automatic inspections, Tool servicing, Transfer press linked lines.

Unit 2: **08**

- **Generation of Forms:** Forming `V' generating. Thread chasing. Die heads. Thread rolling. Thread milling. Thread grinding. Gear planning, Gear shaping, Gear hobbing, Straight Bevel Gear Manufacture. Spiral bevel Gear Manufacture.

Unit 3: **07**

- **Surface Treatment & Finishing:** Meaning of the terms surface treatment and its purpose, Elements of surface treatment cleaning protecting, Colouring, Altering surface properties.
- **Surface Treatment Processes-** Wire brushing, Belt sanding, Alkaline cleaning, Vapour degreasing, Pickling, Latest trends in Surface preparation, Ultrasonic cleaning, Solvent cleaning, Painting application by dipping, Hand spraying, Automatic spraying, Electrostatic spray finishing. Electro-coating, Hot dip coating, phosphate coating- Packerising and bonderasing, Buffing, Blackening, Anodising. Electro Nickle Plating, Nickle carbide plating, Sputtering, Automation in Painting,
- **Auto Control of Size:** Auto sizing, Mechanical calliper for turning operation, Pneumatic sizing of external cylindrical ground work, Pneumatic slide position measuring device, Digital slide position measuring device, Auto sizing device for centre-less grinding operation. Friction rollers, Optical measurement

Unit 4: **07**

- **Cutting Tools for Machining:** Elements of machining process, Single point tools - Basic angles, Chip formation, Effect of manipulating factors such as velocity, size of cut, effect of tool geometry, Tool material, Cutting fluids and contamination in them, Work piece material, Tool life model, Machining economics, Specific power consumption Basic principles of multipoint tools, Linear travel tools, Broaches, Gear shaper cutters, Axial feed rotary tools-Twist drill, Reamers, Core drills, Counter bores and counter sinks, Multiple diameter tools, Hobs, Characteristics of tools materials,. Tool materials, Tool steels, High speed steel, Cast cobalt alloys. Carbides or cintered carbide, Ceramics, Carbide tools

- **Surface treatment of cutting tools**- Its advantage, Tin coated high speed steel diamonds. Cubic boron nitrides, Specialised knowledge of steel cutting
- **Press Tools:** Factors affecting press tool design, Shearing, Bending, Drawing, combination tools, Progression tools, Rubber die formatting, high energy forming, Explosive forming
- **Specification of Quality & Reliability:** Quality, Specification Designing for production Standardisation, Preferred numbers, Limits and fits, Tolerance build up, geometric tolerances. Limit gauging

References:

1. Production Engineering: PC Sharma
2. Production Technology: CK Singh

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BVQM503
QUALITY MANAGEMENT SYSTEMS

Course Objectives:

- To learn about QMS standards ,
- To learn about management systems audits,
- To know about principles of "The Plan, Do, Check, Act (PDCA) cycle.

Course Outcomes:

- Able to have Thorough Knowledge of Various ISO Standards for manufacturing/service Industry,
- Able to understand Quality System Of Telecom Industry And Environment Management Systems,
- Able to implement of Quality Systems in Various Fields as in Food and Drinks Industry.

Unit 1: **08**

- Introduction to Modern Quality Management System
- Historical Development of Quality Standards
- ISO 9001:2000 Quality Management System Standards, Documentation,
- Implementation of ISO 9000:2000, Quality Management Systems

Unit 2: **08**

- **Accreditation/Certification Quality Audit -** Internal, Second Party, Third Party, and Surveillance Audit, Failure, Non-Conformance Analysis and Corrective Action
- **Environment Management System -** ISO 14000, ISO 14001, QS-9000 Quality Standards, Quality System for Automotive Supplier - TS 16949, Quality System for Telecom Industries - TL 9000

Unit 3: **07**

- Guidelines for Processed Material, Guidelines for Safety and Hazard (OHSAS),Quality Assurance Requirement for Measurement Equipment - Meteorological Confirmation System - ISO 10012-1

Unit 4: **07**

- **Guidelines for Control and Measurement Processes -** ISO 10012-3 Quality Management - Guidelines for Training - ISO 10015, Hazard and Critical Control Points (HACCP)
- Good Manufacturing Practices (GMP),Good Laboratory Practices (GLP) in Pharmaceutical Industries, Guidelines on Application in Food and Drink Industry

References:

1. Arora K C ,ISO 9001 to OHAS 18001, Katson Ludhiana, 2013
2. Bagchi T P ISO 9001 and Auditing, 2006
3. Quality Control & Application by B. L. Hanson & P. M. Ghare, Prentice Hall of India, 1998
4. Singhal and Singhal ISO 9001:2012(PH1 Learning System), 2e,2012
5. Juran's Quality Handbook by Joseph Juran , A. Blanton Godfrey, McGraw Hill, 1999

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BVQM504
STATISTICAL QUALITY CONTROL AND ASSURANCE

Course Objectives:

- Statistical basis for control charts, Causes of variation,
- To construct Control chart for a manufacturing process/service activities,
- To evaluate the Process capability of machines.
- To design the single and double sampling plans for given producer and consumer risk.

Course Outcome:

- Students should be able to draw variable and attribute control charts for different types of manufacturing processes and service activities.
- Students should be able to evaluate process capability and its various indicis Cp, Cpk , Cpm for different machines.
- For a given Producer and consumer risk, Students should be able to design a single and double sampling plan.

Unit 1: **08**

- Concepts of Reliability, Maintainability and Product Life Cycle, Statistical Basis for Control Charts, Causes of Variation - Special Causes and Common Causes, Concepts of Statistical Process Control, Use of Control Charts for Statistical Process Control
- Concepts of Testing of Hypothesis, Type I and Type II Errors, Analysis of Patterns in Control Charts, Operating Characteristics (OC) Curves - Producer's Risk and Consumer's Risk, Operating Characteristics (OC) Curves for Attribute control Charts
- **Control Charts for Variables -** X Bar-R Charts, X Bar-s Charts, Individual Item (MR) Charts, Control Charts for Attributes - p-Charts, np-Charts, c-Charts, u-Charts, U Bar Charts

Unit 2: **08**

- **Process Capability Analysis -** Specification Limits, control Limits, Natural Tolerance Limits, Statistical Tolerance Limits, Cp, Cpk, CPU, CPL, Cpm Indices, Setting Tolerances for Assembly and Components
- Statistical Tolerance Limits for Normal Distributions, Concepts of Sampling, Producer's Risk and Consumer's Risk.

Unit 3: **07**

- **Acceptance Sampling Plans for Attributes** - Single, Double and Multiple Sampling Plans, Chain, Sequential and Skip Lot Sampling Plans, Switching Rules, Acceptance Sampling Plan for Variable - Sampling Plans for Process Parameters and Sampling Plans for Acceptance of Lots

Unit 4: **07**

- **Evaluating Sampling Plans -** AQL, AOQ, and AOQL, Taguchi's Loss Function

References:

1. Quality Control and Improvement ,Amitava mitra,A John Wiley & Sons, Inc., Publication,2001
2. Total Quality Management by Dale H. Besterfield, Carol Besterfield-Michna, Glen H. Besterfield and Mary Besterfield-Sacre, Pearson Education, 2005
3. Probability and statistics for Engineers, by I. R. Miller, J. E. Freund & R. Johnson, Prentice Hall of India, 2002
4. Juran's Quality Handbook by Joseph Juran , A. Blanton Godfrey, McGraw Hill, 1999
5. Quality Control & Application by B. L. Hanson & P. M. Ghare, Prentice Hall of India, 2007

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BVQM505P
INDUSTRIAL TRAINING/ON JOB TRAINING/ WORKSHOP

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SEMSTER-06

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BVQM601
ISO 20000 AND AUDITING

Course 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

Unit 1: **08**

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
- **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.

Unit 2: **08**

Relationship& Resolution Process:

- **Business relationship management –** interface with other process. Supplier management process-supplier contract, supplier management
- **Resolution process –** incident management, problem management
- **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

Unit 3: **08**

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
- **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

Unit 4: **08**

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
- **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

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

References:

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

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BVQM602
QUALITY IMPROVEMENT TECHNIQUES: TOOLS AND METHODS

Unit 1: **08**

- **Guidelines for Quality Improvement (ISO 9004-4), Classification of Tools:** Based on what it will achieve and According to Type, Basic (Old) Quality Tools and Practices: Tally Sheets, Check sheet, Check List, Bar Chart, Gantt Chart, Histogram, Pareto Analysis, Cause and Effect Diagram, Scatter Diagram, Flow Chart

Unit 2: **08**

- Advanced (New) Quality Tools and Practices, Data Gathering: Brain Storming, Questionnaire, Suggestion Scheme, Supplier Survey, Relation Diagram, Tree Diagram, Affinity Diagram, Matrix Diagram, Responsibility Matrix, Matrix Data Analysis Diagram, Process Decision Program Chart

Unit 3: **07**

- **Concepts of Off-line and On-line Quality, Planning and Preventative Tools:** Quality Function Deployment (QFD), Fault Tree Analysis, FMEA (Design), FMEA (Process), Progravaluation and Review Technique (PERT), Critical Path Analysis (CPA) and Critical Path Method (CPM) and Why-How Chart, Balanced Score Card

Unit 4: **07**

- **Japanese Tools and Practices:** JIT, ANDON, KAIZEN, JIDOKA, KANBAN, HOSHIN KANRI, POKA-YOKE, 5S
- Quality Circles, Business Process Re-engineering (BPR), Bench-Marking, Zero Defect Taguchi Loss Function, Orthogonal Arrays Overview of Six Sigma Quality Management

Reference:

1. Juran's Quality Handbook by Joseph Juran , A. Blanton Godfrey, McGraw Hill, 1999

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BVQM603
TOTAL QUALITY MANAGEMENT

Course Outcomes:
On successful completion of the module students will be able to:
- To get familiarized with the basic concept and framework of Total Quality management
- To Understand the contribution of Quality Gurus in TQM Journey
- To grasp the nature and importance of various components that constitute TQM
- To describe and discuss the role of techniques used in TQM

Unit 1: **08**
Introduction to TQM:
- What is Quality? - What is Total Quality?
- Difference between Quality Management and Total Quality Management
- Indian perspective of quality (value for money)
- Need for TQM-
- Principles of TQM

Unit 2: **08**
Philosophy of TQM:
- Gurus of TQM- Quality Management Philosophy of Deming and Juran
- Deming's Fourteen Points of Quality Management-
- Ten steps of quality Management of Juran
- Crosby's "Absolutes of Quality" and his Fourteen Steps of Quality Management
- Integration of Deming, Juran and Crosby's Quality Management Philosophies to TQM
- Taguchi's Philosophy of Quality Engineering

Unity 3: **07**
Components of TQM:
- **Internal Components:**
  - » Leadership
  - » Quality Policy and Statements
  - » Organizational Structure
  - » Role of HR in TQM
- **External Components:**
  - » Customers' Satisfaction
  - » Impact on/of- Suppliers, Investors and Society
- Contextual application of TQM

Unit 4: **07**

Introduction to techniques used in TQM

- Six Sigma
- Kaizen
- 7 Habits of Highly Effective People

Case Studies in TQM:

- TQM Applications : Successful implications and Failures

References:

1. Total Quality Management - By Besterfield Dale H.
2. Out of Crisis W. Edwards Deming
3. Total Quality Management – Principles and Practice – By S. k. Mandal
4. The seven habits of highly effective people – By Stephen Covey
5. Getting started and achieving results with TQM – by William Winchell

KALINGA UNIVERSITY
RAIPUR INDIA

BVQM604
LEAN AND SIX SIGMA QUALITY MANAGEMENT

Course Objectives:

- This course acquaints the students with the concepts on productivity, the tools and techniques of total quality management and six sigma to improve productivity in manufacturing, service and i.t areas.

Course Outcomes:

Students of this course will develop a broad:

- Understanding of Lean/Six Sigma principles and practices,
- Build capability to implement Lean/Six Sigma initiatives in manufacturing operations, and learn to operate with awareness of Lean/Six Sigma at the enterprise level.
- Understand how to apply Six Sigma and Lean tools to achieve higher quality and greater speed in Health Care Processes.
- Understand the Six Sigma DMAIC processes and tools at a fundamental level.
- Understand basic Lean and Design for Six Sigma tools and concepts.

Unit 1: **08**

- **Overview of Six Sigma Methodology, Cultural Imperatives to Six Sigma, Six Sigma**: The Power of Culture
- **Strategies for Effectively Implementing Six Sigma in an Organization, Understanding of Deployment Strategies –** Business goals/ dashboards/ balance, business score card or customer goals including linkages with financial goals, linkage of six sigma methodology with other initiatives like lean concepts etc., roles and responsibilities in six sigma implementation, six sigma project selection-linkage to strategy

Unit 2: **08**

- Over View of Six Sigma Project Execution (DMAIC or DFSS/ DMADV) (Define- measure-analyze-improve & control), design for six sigma, define measure analyze design and validate)
- Project review, guidelines and selection of belts for the projects, process of closing the project, work through a sample six sigma project

Unit 3: **07**

- **Lean Means Speed, Lean Six Sigma:** Creating breakthrough, creating competitive advantage with lean six sigma
- **Infrastructure and Deployment Planning, Establishing the Vision Company-**Wide, Selecting the Right People and the Right Projects, Predicting and Improving Team Performance

Unit 4: **07**

- **Implementation:** The DMAIC Improvement Process, Implementation: The DMAIC Tools, Institutionalizing lean six sigma, total supply chain acceleration, lean six sigma Logistics, design for lean six sigma

References:

1. The Certified 6 Sigma Green belt Handbook Roderick A Munro, Mathew J Maio, Mohamed B. Nawaz, Govindrajan Ramu, 2005
2. The Six Sigma Way Peter Pande, Robert Neuman, Roland Cavanagh, McGraw Hills ,2006
3. An Introduction to Six Sigma and Process Improvement by James Evans, William Lindsay, Cengage Learning, 2010
4. Simplified Six Sigma Methodology, Tools and Implementation N. Gopalakrishnan, 2012

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