From-Pre-Page:

Reference approval of the Vice-Chancellor at NP-1 regarding allowing the Directorate of Distance Education for applying the Online Programmes and ODL Programmes for the session 2020-21 and onwards in a phased manner. A Committee was constituted under the Chairmanship of Vice-Chancellor regarding Online programmes in its meeting was held on 09.10.2020 and it was decided to offer the following 04 programmes in ODL and Online mode w.e.f. February-March, 2020-21 in first phase.

Online mode

1. Master of Business Administration (MBA)
2. M.Sc. (Mass Communication)
3. Bachelor of Commerce (B.Com).

ODL mode:

4. Bachelor of Computer Applications (BCA)

In addition to above the following 03 programmes through online mode was also approved at NP-1 for academic session 2021-22 in second phase:

1. M.Sc. Mathematics
2. B.A. Mass Communication
3. MCA

Therefore, as per the University Grants Commission (Open and Distance Learning Programmes and Online Programmes) Regulations, 2020 as the mandatory requirement the programme Coordinators and Director, DE have prepared the PPRs of the following four programmes placed at F/ 'A'.

Online mode

1. Master of Business Administration (MBA)
2. M.Sc. (Mass Communication)
3. Bachelor of Commerce (B.Com).

ODL mode:

4. Bachelor of Computer Applications (BCA)

The last date for applying the online proposal of all above said programme is 15.10.2020. The PPRs of all above said proposed programme is required to be approved by the statutory body of University. Further, the above said PPRs were also approved by CIQA in its meeting held on 13.10.2020 under the Chairmanship of Vice-Chancellor.

Therefore, keeping in view of above, the Vice-Chancellor is requested to approve the following:

1. To approve the PPRs of the following programmes under section 11 (5) in anticipation approval of the A.C.

Online mode

1. Master of Business Administration (MBA)
2. M.Sc. (Mass Communication)
3. Bachelor of Commerce (B.Com).

GURU JAMBHESHWAR UNIVERSITY OF SCIENCE & TECHNOLOGY, HISAR

From-Pre-Page:

ODL mode:

4. Bachelor of Computer Applications (BCA)

2. If point No. 1 is approved accordingly draft A.C. item is attached at F/ 'B'.
3. Draft agenda item regarding permission for offering the Online and ODL programmes through Directorate of Distance Education from academic session 2020-21 and onwards in phased manner.(F/ ' C')

Submitted, please.

VC-7695
13/10/20

Sh. Vinay Gupta Joined 13/10/2020

13/10/2020

DDE

13/X/20

Registrar

13.10.2020

VC

IK
14/10/2020

Regr.

14.10.2020

DDE

14/10/20

Suptd-I 14/10/2020

Regr-10653
13/10/20

D-3

GURU JAMBHESHWAR UNIVERSITY OF SCIENCE & TECHNOLOGY, HISAR

Subject: Minutes of the 56th Meeting of the Academic Council held on 14.10.2020 at 12.00 Noon through video conferencing.

Sir/Madam,

I am sending herewith a copy of the minutes for the 56th meeting of the Academic Council held on 14.06.2020 at 12.00 Noon through Video Conferencing. Discrepancies, if any, in recording of minutes may kindly be conveyed to the undersigned within a week on its receipt.

DA/As above

Sd/-
REGISTRAR

Endst. No. Acad./AC-II/AC-56/2020/5837 Dated: 04.11.2020

A copy of above along with a copy of the minutes is forwarded to the Secretary to Governor, Haryana (for kind information of the Hon'ble Governor-Chancellor, Guru Jambheshwar University of Science & Technology, Hisar), Haryana Raj Bhawan, Chandigarh.

Sd/-
REGISTRAR

Endst. No. Acad./AC-II/AC-56/2020/5838-39 Dated: 04.11.2020

A copy of above along with a copy of the minutes is forwarded to the following: -

1. Secretary to Vice-Chancellor (for kind information of the Vice-Chancellor), Guru Jambheshwar University of Science & Technology, Hisar.
2. Supdt. O/o Registrar (for kind information of the Registrar), Guru Jambheshwar University of Science & Technology, Hisar.

Sd/-
Asstt. Registrar (Academic)
for Registrar

26. **Considered** and approve / not approve the recommendations made by the BOS&R dated 07.09.2020 Vide (Reso. No. 02) on the recommendations of DRC dated 04.09.2020 (Annexure-XXXV Pages 357-359) for approval of revised synopsis of Ph.D. of Ms. Neha Kumari (Regn. No. 15089004) at the belated stage when her period of Research including usual two years extension granted to her is going to expire on 14.05.2021, as per detail given below:

Name of Scholar / Regn. Branch	**Date of Regn.**	**Existing Title with already minor modification**	**New Title**	**Date of completion of the extension under (4+2)**
Ms. Neha Kumari (Regn. No.15089004)	15.05.2015	To study the efficacy of selected alternative lacquers for replacement of bisphenol-A in food cans	**Development of natural resin based edible coating material for shelf life enhancement of selected horticultural crops**	14.05.2021

Resolved that the above proposal be approved.

27. **Considered** and approve the recommendations made by Board of Study & Research (BOS&R)-Electrical Engineering in its online meeting held on 12.10.2020, to start the Ph.D Programme in the Department of Electrical Engineering. (Annexure-XXXVII Page 362-363 of the agenda)

Resolved that the above proposal be approved.

28. **Noted** the action taken by the Vice-Chancellor U/S 11 (5) of the Guru Jambheshwar University of Science & Technology, Hisar Act, 1995, in anticipation of approval of the Academic Council in approving the developed/updated SLM for the following 10 Distance Education Programmes as per fresh SLM Guidelines in accordance to UGC (ODL) Regulations.

Sr. No.	**Name of Course**	**Semester/Year**
1.	M.Sc. Mathematics	1st and 2nd semester
2.	M.A. (Mass Communication)	1st and 2nd semester
3.	Master of Business Administration (MBA)	1st and 2nd semester
4.	Master of Commerce (M.Com.)	1st year
5.	Master of Computer Applications (3 years)	1st to 4th semester
6.	M.Sc. (Computer Science)	1st to 4th semester
7.	Master of Computer Application -5 year Integrated	1st year
8.	Bachelor of Arts	1st to 3rd year
9.	Bachelor of Commerce (B.Com.)	1st to 4th semester
10.	Bachelor of Arts (Mass Communication)	1st and 2nd year

Resolved that the above proposal be noted and approved.

29. **Noted** the action taken by the Vice-Chancellor U/S 11 (5) of the Guru Jambheshwar University of Science & Technology, Hisar Act, 1995, in anticipation of approval of the Academic Council in approving the Directorate of Distance Education to start the following 07 ODL and Online Programmes from academic session 2020-21 and onwards in phased manner subject to the fulfillment of term and conditions of UGC (Open and Distance Learning Programme and Online Programme) Regulations, 2020.

The following 04 Programmes are approved w.e.f. academic session 2020-21 in first phase:

Online mode

1. Master of Business Administration (MBA)
2. M.Sc. (Mass Communication)
3. Bachelor of Commerce (B.Com).

ODL mode:

4. Bachelor of Computer Applications (BCA)

The following 03 programmes is approved w.e.f. academic session 2021-22 in second phase:

Online mode

1. M.Sc. Mathematics
2. B.A. Mass Communication
3. MCA

Resolved that the above proposal be noted and approved.

30. **Noted** the action taken by the Vice-Chancellor U/S 11 (5) of the Guru Jambheshwar University of Science & Technology, Hisar Act, 1995, in anticipation of approval of the Academic Council in approving the Scheme and Syllabi of following 04 programme through Distance Education w.e.f. 2020-21 at par with Scheme and Syllabi of same programmes in Conventional Mode (Regular Mode) as per the requirement of UGC (Open and Distance Learning Programme and Online Programme) Regulations, 2020 and the following minor changes in Scheme and Syllabi of Conventional Mode (Annexure-XXXIX Pages 389-563 of the agenda:):

1. **Bachelor of Computer Application**
   The Scheme and Syllabi of above said programme is adopted at par with Scheme and Syllabi of BCA programme in Conventional Mode w.e.f. 2020-21. The Scheme and Syllabi of BCA programme in Conventional Mode for the session 2020-21 was approved by the BOSR of CSE department in its meeting held on 13.10.2020.

2. **Bachelor of Commerce**
The Scheme and Syllabi of above said programme is adopted at par with Scheme and Syllabi of B.Com programme in Conventional Mode. The only change was made as per decision of the Executive Council of the University regarding offering the subject Environmental Studies as compulsory subject in 1st semester.

3. **Master of Business Administration**
The Scheme and Syllabi of above said programme is adopted at par with Scheme and Syllabi of MBA programme in Conventional Mode w.e.f. 2020-21. The Scheme and Syllabi of MBA programme in Conventional Mode for session 2020-21 was approved under section 11(5) in anticipation approval of Academic Council.

4. M.Sc. Mass Communication
The Scheme and Syllabi of above said programme is adopted at par with Scheme and Syllabi of M.Sc. Mass Communication programme in Conventional Mode with minor changes. The Scheme and Syllabi of M.Sc. Mass Communication in Conventional Mode having 40% practical content and as per University Grants Commission (Open and Distance Learning Programmes and Online Programmes) Regulations, 2020 practical courses cannot be offered through Online Mode. Therefore, on the recommendations of CIQA meeting held on 13.10.2020 under the Chairmanship of the Vice-Chancellor and requirement of student of Distance Education, it was resolved to adopt the 80% of Scheme and Syllabi of M. Sc. Mass Communication in Conventional Mode at par with Scheme of Syllabi of M.Sc. Mass Communication in Online Mode w.e.f 2020-21. Further, the practical work is converted in field work, case studies and various activities.

Resolved that the above proposal be noted and approved.

Further, the Vice-Chancellor be authorized to approve minor modification, if any, in the scheme and syllabi of above said programmes.

31. **Noted** the action taken by the Vice-Chancellor U/S 11 (5) of the Guru Jambheshwar University of Science & Technology, Hisar Act, 1995, in anticipation of approval of the Academic Council in approving the Programme Project Reports(PPRs) of following 4 Proposed Distance Education Programmes through ODL and Online mode for the session Feb-March 2020-21. (Annexure-XL Pages 565-786 of the agenda):

Online mode

1. Master of Business Administration (MBA)
2. M.Sc. (Mass Communication)
3. Bachelor of Commerce (B.Com).

ODL mode:

1. Bachelor of Computer Applications (BCA)

Resolved that the above proposal be noted and approved.

32. **Noted** the action taken by the Vice-Chancellor U/S 11 (5) of the Guru Jambheshwar University of Science & Technology, Hisar Act, 1995, in anticipation of approval of the Academic Council in approving the developed/updated SLM of Bachelor of Computer Applications (BCA) for 1st to 4th semester as per SLM Guidelines of Distance Education in accordance to UGC (ODL) Regulations.

Resolved that the above proposal be noted and approved.

Sd/-
REGISTRAR

PROGRAMME PROJECT REPORT (PPR)

for

Bachelor of Computer Applications (BCA)

in

Open and Distance Learning Mode (ODL)

Directorate of Distance Education
Guru Jambheshwar University of Science & Technology
Hisar - 125001

AP, DDE, GJUS&T

AP, DDE (on Contract)

AP (on Contract), DDE

Rtn AP (DDE)

Director, DDE

Programme Project Report (PPR)
BCA (BACHELOR OF COMPUTER APPLICATIONS)

Programme's Mission & Objectives:

Mission:
To achieve excellence through blended learning mode and promoting quality of life through striking linkage with IT industries and professional bodies such as IEEE, ACM, CSI.

Objectives:
- To impart knowledge and skills in different functional areas of IT
- To prepare graduates for acquiring competence in software development
- To train human resources for Computer education and research
- To develop specific, add on skills among working IT professionals
- To create and nurture entrepreneurial acumen among young graduates
- To promote innovative and analytical thinking
- To impart computer knowledge in rural areas.

Relevance of the programme with Higher Educational Institution's (HEI's) Mission & Goals:

HEI'S Mission:
The University aspires to be a globally recognized Centre of excellence in the field of technical education and research. It strives to achieve this by introducing innovative job oriented courses, employing competent and motivated faculty, developing state-of-the-art infrastructure, striking purposeful linkages with industry and professional bodies, and promoting quality of work life on campus. The University focuses on the student community to imbue them with passion for knowledge and creativity and to promote sustainable growth in academic resources, student placements, and holistic human development with a strong conviction for professional ethical, social and environmental issues.

HEI'S Goals:
The goals of the University as enshrined in the Act are to facilitate and promote studies and research in emerging areas of higher education with focus on new frontiers of and also to achieve excellence in these and connected fields.

Programmes Offered to Achieve HEI's Mission and goals:
The HEI's mission and goals are holistically inherited in the BCA programme (Bachelor of Computer Applications) of Directorate of Distance Education. Scheme and syllabus of this program is designed by Board of Studies and Research(BOSR) and the same is approved by Academic Council(AC). In 2020-21 same scheme and syllabus for distance programme in line with the Regular mode is adopted as per ODL guidelines of UGC. Latest and updated curriculum is used for this course. BCA is most sought programme after graduation for the students who are looking forward to a carrier in vast clientele base of science, engineering, computers, commerce, economics graduates and other allied jobs. This program delivers

required theoretical and industry inputs to students that develops creative thinking to make them experts and professionals in the field.
The cost of the programs and provision for scholarship have been designed with objective of spreading mass education to meet needs of all class of learners. Personal Contact Programme (PCP) is offered by competent faculty as students' support services which ensures timely response to student's queries and, enhances overall quality standards. In all, the programme offered by Directorate of Distance Education, Guru Jambheswar University of Science and Technology ensure continuous education and meeting the needs of all class of learners.

Nature of prospective target group of learners:

BCA programme (Master of Computer Application 5 year integrated) is a postgraduate Master Degree which specializes in software engineering, algorithms, architecture, database, networks, artificial intelligence, data warehouse This course is especially meant for college students who are presently at the entry level and want to expand their knowledge and career. Students who want to go for further studies or courses like in research or doctorate level can get a bonus with this course.

- Qualified graduates in any field desirous of adding their software development skills and knowledge
- Working Professionals for gaining add on courses
- Persons who cannot pursue higher education due to any reason
- Persons who are not able to pay higher fees in regular mode (Affordable Fee structure)
- Home makers who want to enhance their career in IT and related areas
- Young entrepreneurs who wish to acquire managerial skills through IT
- Post Matric Scholarship (PMS) for SC students of Haryana as per the Government Guidelines

Appropriateness of programme to be conducted in Open and Distance Learning mode of acquire specific skills and competence:

All the courses in the programme are theoretical and problem based. So, no laboratory or experiment is needed to impart the skills and competence required for the programme. The specific skill and competencies required for a BCA post graduate can be imparted to a great extent through SLMs prepared with the approach of self-explanatory self-contained, self-directed, self- motivating and self-evaluating. Distance Education Department is more costs effective and can take place while continuing full-time employment. Distance Education offers outcome based education, having industry centric curriculum. This enables the students to satisfy their needs and aspirations as the system provides enhanced learning opportunities.

Learning outcomes:

In its effort towards contribution of knowledge generation and dissemination the program is expected to

- To enhance employability by upgrading their professional and managerial skills
- To nurture creativity and entrepreneurship by gaining business acumen through case studies
- To educate how to communicate and negotiate effectively to achieve organizational and individual goals.

- To instil sensitivity among the students to become thought provoking leaders to face the challenges of a dynamically unstable environment.
- To sensitize them to understand ethical issues and dilemmas that businesses often face.

Specific skills acquired:

The students in the process of learning acquire the following skills:

- **Negotiation skills:** Negotiation skills are qualities that allow two or more parties to reach a compromise. These are often soft skills and include abilities such as communication, persuasion, planning, strategizing and cooperating. Understanding these skills is the first step to becoming a stronger negotiator.
- **Technical skills:** Technical skills are qualities acquired by using and gaining expertise in performing physical or digital tasks.
- **Entrepreneurial skills**: It refers to the set of cognitive, technical, and interpersonal skills required in the practice of entrepreneurship.
- **Communication skills:** Communication skills are abilities you use when giving and receiving different kinds of information. Communication skills involve listening, speaking, observing and empathizing.

Competencies acquired:

The various competencies acquired by students include:

- **Personal Competencies** - How to manage computers.
- **Interpersonal competencies** - How to work with people in teams and make coordination in their activities.
- **Informational competencies**- How to use and process information for the benefits of business or organization.
- **Action competencies**- How to perform in the challenging software environment in a systematic way

Instructional design:

Need based courses have been identified and the courses are developed. They have been fine-tuned taking into consideration industry/social requirements and also to educate rural people professionally. The course, curriculum and syllabi are designed and evaluated by a Departmental Committee. The curriculum and syllabi is then placed in the Board of Studies and research(BOSR) . The finalized curriculum and syllabi are then placed in the Academic Council(AC) for the final approval. The governing body of the distance education ensures that the distance education curriculum has equivalent syllabus as the regular programmes. In addition, electives have been introduced specifically for distance education programmes to suit the requirements of the dynamic changes taking place in the economy and Industry. However electives can be introduced as and when the need arises after obtaining necessary approvals from the appropriate academic bodies of the University. Approval of Board of Studies and Academic Council are obtained whenever modifications/additions are made in the existing curriculum and syllabi.

Curriculum Design:

SCHEME FOR BCA
(BACHELOR OF COMPUTER APPLICATIONS)

Semester - I

Paper No.	Course Name	Credits
BCA-PC(L)-111	Environmental Science	4
BCA-PC(L)-112	Mathematical Foundation	3
BCA-PC(L)-113	Computer and Programming Fundamentals	3
BCA-PC(L)-114	PC Software	3
BCA-PC(L)-115	Problem Solving Through C	3
BCA-PC(P)-116	Problem Solving Through C Lab	2
BCA-PC(P)-117	PC Software Lab	2
Total Credits		**20**

Semester - II

Paper No.	Course Name	Credits
BCA-PC(L)-121	Communication Skills and Personality Development	3
BCA-PC(L)-122	Computer Oriented Numerical Methods	3
BCA-PC(L)-123	Data Structure	3
BCA-PC(L)-124	Operating Systems	3
BCA-PC(L)-125	Management Information System	3
BCA-PC(P)-126	Data Structure Lab	2
BCA-PC(P)-127	OS Linux Lab	2
Total Credits		**19**

Semester - III

Paper No.	Course Name	Credits
BCA-PC(L)-231	Object Oriented Programming using C++	9
BCA-PC(L)-232	Web Designing	3
BCA-PC(L)-233	Digital Electronics	3
BCA-PC(L)-234	Introduction to Database System	3
BCA-PC(L)-235	Advanced Data Structure	3
BCA-PC(P)-236	Object Oriented Programming using C++ Lab	2
BCA-PC(P)-237	Web Designing using HTML Lab	2
Total Credits		**19**

Semester - IV

Paper No.	Course Name	Credits
BCA-PC(L)-241	Core Java	3
BCA-PC(L)-242	RDBMS	3
BCA-PC(L)-243	Computer Architecture	3
BCA-PC(L)-244	Computer Networks	3
BCA-PE(L)-241	Advanced Web Designing	3
BCA-PC(P)-246	Core Java Lab	2
BCA-PC(P)-247	RDBMS Lab	2
Total Credits		**19**

Semester - V

Paper No.	Course Name	Credits
BCA-PC(L)-351	Programming using Python	3
BCA-PC(L)-352	Artificial Intelligence	3
BCA-PC(L)-353	Software Engineering	3
BCA-PC(L)-354	Data Warehousing & Data Mining	3
BCA-PE(L)-351	Data Analytics	3
BCA-PC(P)-356	Python Lab	2
BCA-PC(P)-357	Artificial Intelligence Lab	2
BCA-PC(P)-358	Minor Project*	3
Total Credits		**22**

Semester - VI

Paper No.	Course Name	Credits
BCA-PC(L)-361	Internet Technology	3
BCA-PC(L)-362	E-Commerce	3
BCA-PC(L)-363	Multimedia Technology	3
BCA-PC(L)-364	Information and Cyber Security	3
BCA-PE(L)-363	Software Testing	3
BCA-PC(P)-366	Project Work*	6
Total Credits		**21**

*Project work will be carried out under supervision of official / Engineer / teacher of industry/company/institute/College. Evaluation & viva-voce to be done jointly by internal and external examiners.

Note: 30% of the maximum marks are allocated for internal assessment in each theory paper based on two assignments (handwritten) of 15% marks each.

ENVIRONMENTAL STUDIES

BCA-PC(L)-111

Maximum Marks: 100 **External: 70**
Minimum Passing Marks: 40 **Internal: 30**
Time: 3 Hour

Note: Examiner will be required to set nine questions in all. First question will be compulsory, consisting of objective type/short answer type questions covering the entire syllabus. In addition to that eight more questions will be set, two questions from each unit. A candidate will be required to answer five questions in all, selecting one question from each unit in addition to compulsory question number one. All questions will carry equal marks.

UNIT-I

Multidisciplinary nature of environment Studies: Definition, Scope and Importance, Need for Public Awareness; Concept, Structure and Function of an ecosystem; Producer, Consumers and Decomposition, Energy Flow in the ecosystem, Ecological Succession, Food Chains, Food Webs and Ecological Pyramids; Introduction, characteristics, features, Structure and Functions of different ecosystems such as Forest Ecosystem, Grassland Ecosystem, Dessert Ecosystem, Aquatic Ecosystem (Pond, Stream, Lake, River, Ocean, Estuaries); Biodiversity: Introduction, Definition: Generic, Species and Ecosystem diversity. Bio-geographical classification of India, Ecosystem and Biodiversity services: Ecological, Economic, Social, Consumptive use, Social Ethical, aesthetic and option Values; Biodiversity at global, national and local level, India as a mega-diversity nation, Global Hot-Spot of Biodiversity. Threats to biodiversity: habitat loss, Poaching of Wildlife, Man-Wildlife Conflicts, Biological Invasions, Endangered and endemic species of India, Conservation of Biodiversity: In-Situ and Ex-situ conservation of biodiversity.

UNIT-II

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 forests and tribal people; Water resources: Use and Over Utilization of Surface and ground water, Floods, Droughts conflicts over water, Dams benefits and problems; Minerals, resources: use and exploitation, environmental effects of extracting and mineral resources: World food problems; changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity; Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, case studies; Land resources: land as a resources, Land degradation, man induced landslides, soil erosion and desertification.

UNIT-III

Definition of Environment Pollution: Cause, effects and control measures of Air Pollution, Soil Pollution, Noise Pollution, Nuclear hazards and human health risk; Soil Waste Management: Cause, effects and control measures of urban and industrial waste: Pollution case studies; Disaster Management: Floods, Earthquake, Cyclone and Landslides; Climate Change, Global Warming, Acid Rain, Ozone Layer Depletion; Different Laws related to environment: Environment Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and Control) Act, Wildlife Protection Act, Forest Conservation Act; International Agreements: Montreal & Kyoto Protocol & Nature reserves, Tribal Populations and Human Health.

UNIT-IV

Concept of Sustainability & Sustainable development, Water conservation, Rain Water Harvesting, Watersheds management, Resettlement and rehabilitation of Project affected persons; Case Studies; Environment ethics: role of Indian and other religions and cultures in environment conservation, Environment Communication and Public awareness, case studies (e.g. CNG vehicles in Delhi); Human Population growth: Impact on environment, Human health & welfare, Environmental Movements: Chipko, Silent Valley, Bishnois of Rajasthan.

Field Work: Visit to a Local area of document environmental assets- River/Forest/Grassland/ Mountain; Study of Simple ecosystem-Ponds, River, Hill Slopes etc; Study of common Plants, Insects, birds; Visit to a local Polluted Site- Urban/Rural/Industrial/Agriculture.

TEXT AND REFERENCE BOOKS:

1. Fundamental Concepts in Environmental Studies by Dr. D.D. Mishra S. Chand Publications.
2. Erach Bharucha, "Environmental Studies for Undergraduates Courses", University Granted Commission and Bharati Vidyapeeth Institute of Environmental Education and Research, Pune, University press pvt. Ltd.
3. Essentials of Ecology and Environmental Sciences by Dr, S.V.S. Rana, PHI Learning Pvt. Ltd. Delhi.
4. Environmental Chemistry by Anil Kumar De.Wiley Eastern Ltd.
5. Environment Science by T.G. Miller, Wadsworth Publishing co. 13th Edition.
6. Ecology and Environment by P.D. Sharma, Rastogi Publications

MATHEMATICAL FOUNDATION

BCA-PC(L)-112

Maximum Marks: 100 **External: 70**
Minimum Passing Marks: 40 **Internal: 30**
Time: 3Hour

Note: Examiner will be required to set nine questions in all. First question will be compulsory, consisting of objective type/short answer type questions covering the entire syllabus. In addition to that eight more questions will be set, two questions from each unit. A candidate will be required to answer five questions in all, selecting one question from each unit in addition to compulsory question number one. All questions will carry equal marks.

UNIT-I

Set, Subsets and operations on sets, Venn Diagram of Sets, Power set of a set.
Equivalence relation on a set and partition of a set, Partially ordered sets. Boolean Algebra (definition and examples).

UNIT-II

Basic properties of limits, Continuous functions and classifications of discontinuities, Derivative of a function, Derivatives of Logarithmic, Exponential, Trigonometric, Inverse Trigonometrically and hyperbolic functions. Higher order derivatives.

UNIT-III

Addition and multiplication of matrices, Laws of matrix algebra, Singular and non-singular matrices, Inverse of a matrix, Rank of a matrix, Rank of the Product of two matrices, System of Linear equations i.e. AX=0 and AX=B

UNIT-IV

Characteristic equations of a square matrix, Cayley-Hamilton Theorem, Eigenvalues and eigenvectors, Eigenvalues and eigenvectors of symmetric skew symmetric, Hermitian and skew- Hermitan matrices.

TEXT AND REFERENCE BOOKS:

1. D.A. Murray: Introductory course in Differential Equations, Orient Lengaman
2. S.L. Ross: Ordinary Differential Equations
3. Babu Ram: Discrete Mathematics
4. Shanti Naryana: A Textbook of Matrices

COMPUTER AND PROGRAMMING FUNDAMENTALS

BCA-PC(L)-113

Maximum Marks: 100 **External: 70**
Minimum Passing Marks: 40 **Internal: 30**
Time: 3 Hour

Note: Examiner will be required to set nine questions in all. First question will be compulsory, consisting of objective type/short answer type questions covering the entire syllabus. In addition to that eight more questions will be set, two questions from each unit. A candidate will be required to answer five questions in all, selecting one question from each unit in addition to compulsory question number one. All questions will carry equal marks.

UNIT-I

Computer Fundamentals: Definition, Block Diagram along with its components, characteristics and classification of computers, Applications of computer in various fields.
Memory: Concept of primary and secondary memory, RAM, ROM, types of ROM, flash memory, Secondary storage devices, Sequential and direct access devices, viz. magnetic tape, magnetic disk, CD, DVD.

UNIT-II

Computer hardware & software: I/O Devices, definition of software, relationship b/w hardware and software, types of software.
Overview of operating system: Definition, functions of operating system, concept of multiprogramming, multi-tasking, multi-threading, multi-processing, time-sharing, real time, single user & multi-user operating system.

UNIT-III

Planning the Computer Program: Concept of problem solving, Problem definition, Program design, Debugging, Types of errors in programming, Documentation.
Techniques of problem solving: Flowcharting, algorithm, pseudo code, decision table, Structured programming concepts, Programming methodologies viz. top-down and bottom-up programming.

UNIT-IV

Searching, Sorting & Merging: Linear and binary searching, Bubble, Selection and Insertion sorting.
Computer Languages: Analogy with natural language, machine language, assembly language, high-level language, compiler, interpreter, assembler, characteristics of a good programming language.
Computer Virus: Definition, Types of viruses, Characteristics of viruses, anti-virus software.

TEXT AND REFERENCE BOOKS:
1. Sinha, P.K. & Sinha, Priti, Computer Fundamentals, BPB
2. Dromey, R.G. How to Solve it by Computer, PHI
3. Balagurusamy E, Computing Fundamentals and C Programming, Tata McGraw Hill.
4. Norton, Peter, Introduction to Computer, McGraw Hill
5. Leon, Alexis & Leon, Mathews, Introduction to Computers, Leon Tech World

PC SOFTWARE

BCA-PC(L)-114

Maximum Marks: 100 **External: 70**
Minimum Passing Marks: 40 **Internal: 30**
Time: 3 Hour

Note: Examiner will be required to set nine questions in all. First question will be compulsory, consisting of objective type/short answer type questions covering the entire syllabus. In addition to that eight more questions will be set, two questions from each unit. A candidate will be required to answer five questions in all, selecting one question from each unit in addition to compulsory question number one. All questions will carry equal marks.

UNIT-I

MS Windows: Operating system- Definition and functions, basics of Windows, Basic components of windows, icons, types of icons, taskbar, activating windows, using desktop, title bar, running applications, exploring computer, managing files and folders, copying and moving files and folders. Control panel- display properties, adding and removing software and hardware, setting date and time, screen saver and appearance.

UNIT-II

Documentation using MS-Word- Introduction to Office Automation, Creating and Editing Document, Formatting Document, Auto-text, Autocorrect, Spelling and Grammar Tool, Document Dictionary, Page Formatting, Bookmark. Advance Features of MS-Word-Mail Merge, Macros, Tables, Printing, Styles, linking and embedding objects, Template.

UNIT-III

Electronic Spreadsheet using MS-Excel- Introduction to MS-Excel, Creating and Editing Worksheet, Formatting and Essential Operations, Formulas and Functions, Charts, Advance features of MS-Excel-Pivot table & Pivot Chart, Linking and Consolidation, Database Management using Excel- Sorting, Filtering, Table, Validation.

UNIT-IV

Presentation using MS- PowerPoint: Presentations, Creating, Manipulating & Enhancing Slides, Organizational Charts, Excel Charts, Word Art, Layering art objects, Animations and Sounds, Inserting Animated Pictures or Accessing through object, Inserting Recorded Sound Effects or In-Built- Sound Effect.

TEXT AND REFERENCE BOOKS:

1. Microsoft Office- Complete Reference- BPB Publications.
2. Learn Microsoft Office- Russell A. Stultz- BPB Publications
3. Courter, G Marquis(1999), Microsoft Office 2000: Professional Edition. BPB.
4. Koers, D(2001), Microsoft Office XP Fast and Easy. PHI.

PROBLEM SOLVING THROUGH C

BCA-PC(L)-115

Maximum Marks: 100 **External: 70**
Minimum Passing Marks: 40 **Internal: 30**
Time: 3 Hour

Note: Examiner will be required to set nine questions in all. First question will be compulsory, consisting of objective type/short answer type questions covering the entire syllabus. In addition to that eight more questions will be set, two questions from each unit. A candidate will be required to answer five questions in all, selecting one question from each unit in addition to compulsory question number one. All questions will carry equal marks.

UNIT-I

Overview of C: History of C, Importance of C, Structure of a C Program.
Elements of C: C character set, identifiers and keywords, Data types, Constants and Variables, Assignment statement, Symbolic constant.
Operator & Expression: Arithmetic, relational, logical, bitwise, unary, assignment, conditional operators and special operators. Arithmetic expressions, evaluation of arithmetic expression, type casting and conversion, operator hierarchy & associativity.

UNIT-II

Decision making & looping: Decision making with IF Statement, IF-ELSE statement, Nested IF statement, ELSE-IF ladder, switch statement, goto statement, while and do-while loop, jump in loops, break, continue statement.
Functions: Definition, Prototype, Passing parameters, Recursion.

UNIT-III

Arrays in 'C': definition, types, initialization, processing an array, passing arrays to functions.
Strings & Arrays: Declaration and initialization of string, String I/O, Array of strings, String manipulation functions: String length, copy, compare, concatenate, search for a substring.

UNIT-IV

Storage classes in C: auto, extern, register and static storage class, their scope, storage, & lifetime.
Pointers: Introduction, Pointer variables, Pointer operators, Pointer assignment, Pointer conversion, Pointer arithmetic, Pointer comparison, Pointers and arrays, Pointers and functions, Pointers and strings, dynamic allocation using pointers.

TEXT AND REFERENCE BOOKS:

1. Gottfried, Byron S. Programming with C, Tata McGraw Hill
2. Balagurusamy, E., Programming in ANSI C, 4E, Tata McGraw Hill
3. Yashwant Kanetker, Let Us C, BPB
4. Rajaraman, V., Computer Programming in C, PHI
5. Yashwant Kanetker, Working with C, BPB

SEMESTER - II

COMMUNICATION SKILLS AND PERSONALITY DEVELOPMENT

BCA-PC(L)-121

Maximum Marks: 100 **External: 70**
Minimum Passing Marks: 40 **Internal: 30**
Time: 3 Hour

Note: Examiner will be required to set nine questions in all. First question will be compulsory, consisting of objective type/short answer type questions covering the entire syllabus. In addition to that eight more questions will be set, two questions from each unit. A candidate will be required to answer five questions in all, selecting one question from each unit in addition to compulsory question number one. All questions will carry equal marks.

UNIT-I

Personality: Definition, Elements, Determinants.
Personal Grooming: Personal Hygiene, Social Effectiveness, Business Etiquettes (Power Dressing).

UNIT-II

Body Language: Non-Verbal Communication, Types of Body Language, Functions of Body Language, Role of Body Language, Proxemics.
Art of Good Communication: Verbal & Non-Verbal Communication, Difference between Oral and Written Communication, 7' Cs of Effective Communication, Importance of Effective Communication.

UNIT-III

Team: Team Behaviour, Types of Teams, Team Roles and Behaviour.
Group Discussion: Do's and Don't.

UNIT-IV

Interview Preparation: Introduction, Resume Writing, Dress Code, Mock- Interview, How to be successful in an Interview.

TEXT AND REFERENCE BOOKS:

1. C. S. Venkata Ratanam and B. K. Srivastava, "Personal management and Human Resources", Tata McGraw Hill Publishing Ltd. New Delhi.

2. Keith Davis, “Human Behaviour at Work”, Tata McGraw Hill Publishing Ltd. New Delhi.
3. Thomas A. Harris, “I m OK, You re OK”, Pan Books, London and Sydney.
4. Ranjana Salgaocar, “Pleasure of your Company”, Pyramid Publishers, Goa.
5. Arun Agarwal, “How to get the job you want”, Vision Books, New Delhi.
6. Rohit Anand and Sanjeev Bikhachandani, “ Get That Job”, Harper Collins.

COMPUTER ORIENTED NUMERICAL METHODS

BCA-PC(L)-122

Maximum Marks: 100 **External:70**
Minimum Passing Marks: 40 **Internal:30**
Time: 3 Hour

Note: Examiner will be required to set nine questions in all. First question will be compulsory, consisting of objective type/short answer type questions covering the entire syllabus. In addition to that eight more questions will be set, two questions from each unit. A candidate will be required to answer five questions in all, selecting one question from each unit in addition to compulsory question number one. All questions will carry equal marks.

UNIT-I

Computer Arithmetic: Floating point representation of numbers, Arithmetic Operations with normalized floating- point numbers and their consequences, significant figure.
Error in Number Representation: inherent error, truncation, absolute, related, percentage and round off errors.
Iterative Methods: Bisection, False position, Newton-Raphson method. Iteration method, discussion of convergence.

UNIT-II

Solution of Simultaneous Linear Equations & Ordinary Differential Equations: Gauss Elimination method, pivoting, Ill-conditioned equation, refinement of solutions. Gauss-Seidel iterative method, Euler method, Euler modified method, Taylor-series method, Runge-Kutta methods, Predictor-Corrector methods.

UNIT-III

Interpolation and Approximation:
Polynomial Interpolation: Newton, Lagranges, Difference tables, Approximation of functions by Taylor Series.

UNIT-IV

Numerical Differentiation and Integration: Differentiation formula based on polynomial fit, pitfalls in differentiation, Trapezoidal & Simpson Rules, Gaussian Quadrature.

TEXT AND REFERENCE BOOKS:

1. V. Rajaraman, Computer Oriented Numerical Methods, Prentice Hall, India.
2. S.S. Sastry, Introductory Methods of Numerical Analysis.
3. H.C. Saxena, Finite Differences and Numerical Analysis.
4. Modes A, Numerical Analysis for Computer Science.

5. M. K. Jain, S. R. K. Iyengar and R. K. Jain, Numerical Methods for Scientific and Engineering Computation.

DATA STRUCTURE

BCA-PC(L)-123

Maximum Marks: 100 **External:70**
Minimum Passing Marks: 40 **Internal:30**
Time: 3 Hour

Note: Examiner will be required to set nine questions in all. First question will be compulsory, consisting of objective type/short answer type questions covering the entire syllabus. In addition to that eight more questions will be set, two questions from each unit. A candidate will be required to answer five questions in all, selecting one question from each unit in addition to compulsory question number one. All questions will carry equal marks.

UNIT-I

Introduction: Elementary data organization, Data Structure definition, Data type vs. Data structure, Categories of data structure, Data structure operations, Applications of data structure, Algorithms complexity and time-space trade-off, Big-O notation.

UNIT-II

Strings: Introduction, Storing strings, String operations.
Array: Introduction, Linear Arrays, Representation of linear array in memory, Traversal, Insertion, Deletion in an array, Multi-dimensional arrays.

UNIT-III

Linked List: Introduction, Array vs. Linked List, Representation of Linked lists in memory, Traversal, Insertion, Deletion and Searching in a Linked List, Header Linked List, Circular Linked List, Two-Way Linked List, Applications of Linked Lists.
Stack: Introduction, Array and Linked representation of stack, operations on stack,
Applications of stack: Polish Notation, Recursion.

UNIT-IV

Stack: Introduction, Array and linked representation of stacks, Operations on stacks, Applications of Stacks: Polish Notation, Recursion.
Queue: Introduction, Array and linked representation of Queue, Operations on Queues, Dequeues, Priority Queues, Applications of Queues.

TEXT AND REFERENCE BOOKS:

1.Seymour Lipschutz, "Data Structure", Tata McGraw Hill.
2. Horowitz, Sahni & Anderson-Freed, "Fundamentals of Data Structure in C", Orient Longman.
3. Trembley, J.P. And Sorenson P.G., "An Introduction to Data Structures with Applications", McGraw- Hill International Student Edition, New York.
4. Yedidyan Langsam, Moshe J. Augenstein and Aaron M. Tenenbaum, "Data Structures using C", Prentice Hall of India Pvt. Ltd., New Delhi.
5. Mark Allen Weiss, " Data structures and Algorithm Analysis in C", Addison-Wesley (An Imprint of Pearson Education), Mexico City, Prentice-Hall of India Pvt. Ltd., New Delhi.

OPERATING SYSTEMS

BCA-PC(L)-124

Maximum Marks: 100 **External:70**
Minimum Passing Marks: 40 **Internal:30**
Time: 3 Hour

Note: Examiner will be required to set nine questions in all. First question will be compulsory, consisting of objective type/short answer type questions covering the entire syllabus. In addition to that eight more questions will be set, two questions from each unit. A candidate will be required to answer five questions in all, selecting one question from each unit in addition to compulsory question number one. All questions will carry equal marks.

UNIT-I

Introduction: Introduction to Operating System Concepts (Including Multitasking, Multiprogramming, Multi User, Multithreading etc.), Types of Operating Systems: Batch Operating System, Time-Sharing System, Distributed Operating System, Network Operating System, Real Time Operating System, Various Operating System services, architecture, System Programs and Calls.

UNIT-II

Process Management: Process Concept, Process Scheduling, Operations on Processes; CPU Scheduling, Scheduling Criteria, Scheduling Algorithms- First come First Serve(FCFS), Shortest- Job- First (SJF), Priority Scheduling, Round Robin(RR).
Deadlock: Methods for handling deadlock- Deadlock prevention, Avoidance & Detection.

UNIT-III

Memory Management: Logical & Physical Address Space, Swapping, Contiguous Memory allocation, non-contiguous memory allocation paging and segmentation techniques; Virtual Memory Management- Demand Paging & Page Replacement Algorithm; Demand Segmentation.

UNIT-IV

File System: Different types of files and their access methods, directory structures, various allocation methods, disk scheduling and management and its associated algorithms.

TEXT AND REFERENCE BOOKS:

1. Operating System Concepts by Silberschatz et al 5th Edition 1998, Addison-Wesley.
2. Modern Operating System by A. Tanenbaum, 1992, Prentice Hall
3. Operating System By Peterson, 1985, AW.
4. Operating System By Milankovik, 1990, THM
5. Operating System Incorporating with Unix & Windows by Colin Ritche, 1974, THM.

MANAGEMENT INFORMATION SYSTEM

BCA-PC(L)-125

Maximum Marks: 100 **External:70**
Minimum Passing Marks: 40 **Internal:30**
Time: 3 Hour

Note: Examiner will be required to set nine questions in all. First question will be compulsory, consisting of objective type/short answer type questions covering the entire syllabus. In addition to that eight more questions will be set, two questions from each unit. A candidate will be required to answer five questions in all, selecting one question from each unit in addition to compulsory question number one. All questions will carry equal marks.

UNIT-I

Introduction to System and Basic System Concepts, Types of Systems, The Systems Approach, Information System: Definition & Characteristics, Types of information, Role of Information in Decision-Making.

UNIT-II

An overview of Management Information System: Definition & Characteristics, Components of MIS, FrameWork for Understanding MIS: Information requirements & Levels of Management, Simon's Model of decision-Making, Structured Vs Unstructured decisions, Formal vs. Informal Systems.

UNIT-III

Developing Information Systems: Analysis & Design of Information Systems, Implementation & Evaluation, Pitfalls in MIS Development.

UNIT-IV

Functional MIS: A Study of Personnel, Financial and Production MIS, Introduction to E-Business Systems, E-Commerce- Technologies, Applications, Decision Support Systems-Support Systems for Planning, Control and Decision- Making.

TEXT AND REFERENCE BOOKS:

1. J. Kanter, "Management/Information Systems", PHI
2. Gordon B. Davis, M. H. Olson, "Management Information Systems- Conceptual Foundations, Structure and Development", McGraw Hill.
3. James A. O'brien, "Management Information Systems", Tata McGraw Hill.
4. Lucas, "Analysis, Design & Implementation", McGraw Hill
5. James A. Senn, " Analysis, Design of Information Systems", Second Edition, McGraw Hill.

SEMESTER - III

OBJECT ORIENTED PROGRAMMING USING C++

BCA- PC(L)-231
Maximum Marks: 100 **External: 70**
Minimum Pass marks: 40 **Internal: 30**

Time: 3 hours

Note: Examiner will be required to set Nine Questions in all. First Question will be compulsory, consisting of objective type/short-answer type questions covering the entire syllabus. In addition to that eight more questions will be set, two questions from each Unit. A candidate will be required to answer five questions in all, selecting one question from each unit in addition to compulsory Question No. 1. All questions will carry equal marks.

UNIT- I

Introduction to C++, C++ Standard Library, Basics of a Typical C++ Environment, Header Files and Namespaces, Library files. Introduction to Objects and Object Oriented Programming, Encapsulation, Access Modifiers; Controlling access to a class, method or variable (public, private, protected, package), Other Modifiers, Polymorphism; overloading, Inheritance, Overriding Methods, Abstract classes, Reusability.

UNIT- II

Classes and Data Abstraction: Introduction, Structure Definitions, Accessing Members of Structure, Class Scope and Accessing Class Members, Initializing Class Objects, Constructor, Using Default Arguments with Constructor, Using Destructor, Classes: Const(Constant) Object and Const Member Function, Object as Member of Classes, Friend Function and Friend class, Function Overloading. Operator Overloading: Introduction, Fundamentals of Operator Overloading, Restrictions on Operator Overloading, Operator Functions as Class Members vs. as Friend Function, Overloading, <<,>> Overloading Unary Operators, Overloading Binary Operators.

UNIT- III

Inheritance: Introduction, Inheritance: Base Classes and Derived Classes, Protected Members, Casting Base-Class Pointers to Derived-Class Pointer, Using Member Functions, Overriding Base-class members in a Derived class, Public, Protected, and Private Inheritance, Using Constructors and Destructors in Derived Classes, Implicit Derived-Class Object to Base-Class Object Conversion.

UNIT- IV

Virtual Functions and Polymorphism: Introduction to Virtual Functions, Abstract Base Classes and Concrete Classes, Polymorphism, New Classes and Dynamic Binding, Virtual Destructor, Polymorphism, Dynamic Binding. File and I/O Streams: Files and Streams, Creating a Sequential Access File, Reading Data From A Sequential Access File, Updating Sequential Access File, Random Access File, Creating A Random Access File, Writing Data Randomly to a Random Access File, Reading Data Sequential from a Random Access File.

TEXT AND REFERENCE BOOKS:

1. C++ How to Program by H.M Deitel and P.J Deitel, 1998, Prentice Hall.
2. Object Oriented Programming in Turbo C++ by Robert Lafore, 1994.

3.Programming with C++ by D. Raichandan, 2003, T.M.H.
4. Object Oriented Programming with C++ by Balagurusamy, 2001, Tata McGraw-Hill.

WEB DESIGNING

BCA-PC(L)-232

Maximum Marks: 100 **External: 70**
Minimum Passing Marks: 40 **Internal: 30**
Time: 3 Hour

Note: Examiner will be required to set nine questions in all. First question will be compulsory, consisting of objective type/short answer type questions covering the entire syllabus. In addition to that eight more questions will be set, two questions from each unit. A candidate will be required to answer five questions in all, selecting one question from each unit in addition to compulsory question number one. All questions will carry equal marks.

UNIT- I

Introduction to Internet and World Wide Web; Evolution and History of Word Wide Web; Basic features; Web Browsers; Web servers; Hypertext Transfer Protocol; URLs; Searching and Web-Casting Techniques; Search Engines and Search Tools;

UNIT- II

Web Publishing: Hosting your Site; Internet Services provider; Planning and designing your Web Site; Steps for developing Your site; Choosing the contents; Home page; Domain Name**s;**

UNIT- III

Web Development: Introduction to HTML; Hypertext and HTML; HTML Document Features; HTML command Tags; Creating Links; Headers; Text styles; Text Structuring; Text colors and Background; Formatting text; Page layouts;

UNIT- IV

Images; Ordered and Unordered lists; Inserting Graphics; Table Creation and Layouts; Frame Creation and layouts; Working with Forms and menus; Working with Radio buttons; Checks Boxes; Text Boxes;

TEXT AND REFERENCE BOOKS:

1. Raj Kamal, “Internet and Web Technologies”, Tata McGraw- Hill.
2. Ramesh Bangia, “Multimedia and Web Technologies”, Firewall Media.
3. Thomas A. Powell, “Web Design: The complete Reference”, 4/e, Tata McGraw- Hill.
4. Wendy Willard, “HTML Beginners Guide”, Tata McGraw- Hill.
5. Deitel and Goldberg, “Internet and World Wide Web, How to Program”, PHI.

DIGITAL ELECTRONICS

BCA- PC(L)-233

Maximum Marks: 100 **External: 70**
Minimum Passing Marks: 40 **Internal: 30**
Time: 3 Hour

Note: Examiner will be required to set nine questions in all. First question will be compulsory, consisting of objective type/short answer type questions covering the entire syllabus. In addition to that eight more questions will be set, two questions from each unit. A candidate will be required to answer five questions in all, selecting one question from each unit in addition to compulsory question number one. All questions will carry equal marks.

UNIT- I

Information Representation: Number Systems, Binary Arithmetic Operations, Fixed-point and Floating point representation of numbers, BCD Codes, Error detecting and correcting codes, Character Representation – ASCII, EBCDIC, Unicode, Binary Logic: Boolean Algebra, Boolean Theorems, Boolean Functions Truth Tables, Canonical and Standard forms of Boolean functions , Simplification of Boolean Functions - Venn Diagram, Karnaugh Maps,

UNIT- II

Digital Logic: Basic Gates -AND, OR, NOT, Universal Gates - NAND, NOR, Other Gates - XOR, XNOR etc. NAND, NOR, AND-OR-INVERT and OR-AND-INVERT implementations of digital circuits, Combinational Logic – Characteristics, Design Procedures, analysis procedures, Multilevel NAND and NOR circuits.

UNIT- III

Combinational Circuits: Half-Adder, Full-Adder, Half-Subtractor, Full-Subtractor, Encoders, Decoders, Multiplexers, Demultiplexers, Comparators, Code Converters BCD to Seven Segment Decoder.

UNIT- IV

Sequential Logic: Characteristics, Flip-Flops, Clocked RS, D type, JK, T type and Master Slave flip-flops. State table, State diagram and State equations. Flip-flop excitation tables.

TEXT AND REFERENCE BOOKS:

1.M. Morris Mano, Digital Logic and Computer Design, Prentice Hall of India Pvt. Ltd.
2. V.Rajaraman, T. Radhakrishnan, An Introduction to Digital Computer Design, Prentice Hall of India Pvt. Ltd.
3. Andrew S. Tanenbaum, Structured Computer Organization, Prentice Hall of India Pvt. Ltd.
4. Nicholas Carter, Schaum's Outlines Computer Architecture, Tata McGraw-Hill.

INTRODUCTION TO DATABASE SYSTEM

BCA- PC(L)-234

Maximum Marks: 100 **External: 70**
Minimum Passing Marks: 40 **Internal: 30**
Time: 3 Hour

Note: Examiner will be required to set nine questions in all. First question will be compulsory, consisting of objective type/short answer type questions covering the entire syllabus. In addition to that eight more questions will be set, two questions from each unit. A candidate will be required to answer five questions in all, selecting one question from each unit in addition to compulsory question number one. All questions will carry equal marks.

UNIT- I

Basic Concepts- Data, Information, Records and Files. Traditional file –based System- File based Approach-Limitations of File based Approach, Database Approach- Characteristics of File based Approach, Database Management System(DBMS), Components of DBMS Environment, DBMS Functions and Components, Advantages and Disadvantages of DBMS.

UNIT- II

Roles In the Database Environment – Data and Database Administrator, Database Designers, Applications Developers and Users. Database System Architecture – Three Levels of Architecture, External, Conceptual and Internal Levels, Schemas, Mappings and Instances. Data Independence – Logical and Physical data Independence.

UNIT- III

Classification of Database Management System, centralized and Client Server Architecture to DBMS. Data Models: Records-based data Models, Object-based Data models, Physical Data Models and Conceptual Modeling.

UNIT- IV

Entity-Relationship model – Entity Types, Entity Sets, Attributes relationship Types, Relationship Instances and ER Diagrams. Basic Concepts of Hierarchical and Network Data Model.

TEXT AND REFERENCE BOOKS:

1. Elmasri & Navathe, " Fundamentals of Database System", 5th edition, Pearson Education.
2. Thomas Connolly Carolyn Begg, " Database System", 3/e, Pearson Education.
3. C.J. Date, " An Introduction to Database System", 8th edition, Addison Wesley N.Delhi.

ADVANCED DATA STRUCTURE

BCA-PC(L)-235

Maximum Marks: 100 **External:70**

Minimum Passing Marks: 40 **Internal:30**

Time: 3 Hour

Note: Examiner will be required to set nine questions in all. First question will be compulsory, consisting of objective type/short answer type questions covering the entire syllabus. In addition to that eight more questions will be set, two questions from each unit. A candidate will be required to answer five questions in all, selecting one question from each unit in addition to compulsory question number one. All questions will carry equal marks.

UNIT-I

Tree: Introduction, Definition, Representing Binary tree in memory, Traversing binary trees, Traversal algorithm using stacks, Header nodes, Threads, Binary search trees- Searching, Insertion and Deletion.

UNIT-II

AVL search trees: Introduction, Insertion and Deletion, m-way search tree: searching, insertion and deletion, B-tree: Insertion and deletion. Hashing: Introduction, Collision resolution.

UNIT-III

Graphs: Introduction, Graph theory terminology, Sequential and linked representation of graphs, Warshall's algorithm for shortest path, Dijkstra algorithm for shortest path, Operations on graphs, Traversal of graph.

UNIT-IV

Sorting: Internal & external sorting, Radix sort, Quick sort, Heap sort, Merge sort, Comparison of various sorting and searching algorithms on the basis of their complexity.

TEXT AND REFERENCE BOOKS:

1.Seymour Lipschutz, "Data Structure", Tata McGraw Hill.

2. Horowitz, Sahni & Anderson-Freed, "Fundamentals of Data Structure in C", Orient Longman.

3. Trembley, J.P. And Sorenson P.G., "An Introduction to Data Structures with Applications", McGraw Hill International Student Edition, New York.

4. Yedidyah Langsam, Moshe J. Augenstein and Aaron M. Tenenbaum, "Data Structures using C", Prentice Hall of India Pvt. Ltd., New Delhi.

SEMESTER - IV

CORE JAVA

BCA-PC(L)-241
Maximum Marks: 100 **External: 70**
Minimum Passing Marks: 40 **Internal: 30**
Time: 3 Hour

Note: Examiner will be required to set nine questions in all. First question will be compulsory, consisting of objective type/short answer type questions covering the entire syllabus. In addition to that eight more questions will be set, two questions from each unit. A candidate will be required to answer five questions in all, selecting one question from each unit in addition to compulsory question number one. All questions will carry equal marks.

UNIT-I

Introduction to JAVA & Principles of Object Oriented Programming: Basic Concepts of OOPs and its Benefits; Applications of OOPs; The Creation of JAVA; Importance of JAVA for the Internet; JAVA's Magic: The Byte-code; Features of Java.

Data Type, Array & Strings: Data types & Operators available in JAVA; Control Structures: if, while, do while, for, switch; Break & Continue Statement;

Array and Strings: Arrays, Arrays of Characters, String handling Using String Class; Operations of String Handling; String Buffer Class.

UNIT-II

Object Oriented: Object Oriented Programming in JAVA, JAVA Program Structure. Defining of a Class, Definition of Methods, Constructors, Creating Objects of a Class, Assigning Object Reference Variables, The keyword "this", Defining and Using a Class, Automatic Garbage Collection. Extending Class and Inheritance: Using Existing Classes, Classes Inheritance, Choosing Base Class, Access Attributes, Polymorphism, Multiple Levels of Inheritance, Abstraction through Abstract Classes, Using Final Modifier, the Universal Super class-Object Class.

UNIT-III

Package & Exception Handling: Understanding Packages, Defining Package, Packaging up your Classes, Adding Classes from a Package to your Program, Understanding CLASSPATH, Standard Packages, Access Protection in Package.

Exception Handling: The Idea behind Exceptions , Types of Exceptions, Dealing with Exceptions, Exception Objects, Defining your own Exception, Checked and Unchecked Exceptions.

UNIT-IV

Creating Applets in JAVA: Applet basics, Applets architecture, Applets life cycle, simple Applet display methods; requesting repainting; using the status window; the html applet tag; passing parameters to applets.**Multithreading Programming**: The JAVA Thread Model, Understanding Threads, The Main Thread, Creating a Thread: extending Thread and implementing Runnable Interface, Creating multiple Threads, Threads Priorities, Synchronization, Deadlocks Inter-thread Communication, Deadlocks.**Input/Output in JAVA :** I/O Basics, Byte and Character Structure, I/O classes, Reading Console Input, Writing to Console, Reading and Writing on Files, Random Access Files, Storing and Retrieving Objects from File, Stream Benefits.

TEXT AND REFERENCE BOOKS:

1. Balagurusamy, E., "Programming with JAVA, Tata McGraw Hill.
2. The Complete Reference JAVA, TMH Publication.
3. Beginning JAVA, Ivor Horton, WROX Public.

4. JAVA 2 UNLEASHED, Tech Media Publications.
5. Patrick Naughton and Herbertz Schildt, "Java-2 The Complete Reference",TMH.

RDBMS

BCA-PC(L)-242

Maximum Marks: 100 **External: 70**
Minimum Passing Marks: 40 **Internal: 30**
Time: 3 Hour

Note: Examiner will be required to set nine questions in all. First question will be compulsory, consisting of objective type/short answer type questions covering the entire syllabus. In addition to that eight more questions will be set, two questions from each unit. A candidate will be required to answer five questions in all, selecting one question from each unit in addition to compulsory question number one. All questions will carry equal marks.

UNIT - I

Relational Model concepts, Codd's Rules for Relational Model, Relational Algebra:- Selection and Projection, Set Operation, Renaming, Join and Division. Relational calculus: Tuple Relational Calculus and Domain Relational Calculus.

UNIT-II

Functional Dependencies and Normalization: Purpose, Data Redundancy and Update Anomalies.
Functional Dependencies:Full Functional Dependencies and Transitive Functional Dependencies, Characteristics of Functional Dependencies.
Decomposition and Normal Forms (1NF, 2NF, 3NF & BCNF)

UNIT – III

SQL: Data Definition and data types, Specifying Constraints in SQL, Schema, change statement, Basic Queries in SQL, Insert, Delete and Update Statement, Views.

UNIT - IV

PL/SQL: Introduction Advantages of PL/SQL, The Generic PL/SQL Block: PL/SQL Exception Environment, PL/SQL Character set and Data Types, Control Structure in PL/SQL.

TEXT AND REFERENCE BOOKS:

1. Elmasri & Navathe: "Fundamentals of Database systems", 5th Edition, Pearson Education.
2. Ivan Bayross : SQL, PL/SQL-The Program Language of ORACLE, BPB Publication.
3. Korth & Silberschatz : Database System Concept, 4th Edition, McGraw Hill International Edition.
4. C.J.Date : An Introduction to Databases Systems 8th Edition, Addison Wesley, New Delhi.

COMPUTER ARCHITECTURE

BCA- PC(L)-243

Maximum Marks: 100 **External: 70**
Minimum Passing Marks: 40 **Internal: 30**
Time: 3 Hour

Note: Examiner will be required to set nine questions in all. First question will be compulsory, consisting of objective type/short answer type questions covering the entire syllabus. In addition to that eight more questions will be set, two questions from each unit. A candidate will be required to answer five questions in all, selecting one question from each unit in addition to compulsory question number one. All questions will carry equal marks.

UNIT – I

Architecture Unit: Main sub-units: Memory data register, accumulator, multiplier quotient register, adder and logic processor, shift counter, status flip-flops. Arithmetic operations – addition and subtraction, shifting, data transfer, multiplication, division, logic operations, storing.

Innovations in Arithmetic Unit: Speed of addition: addition without carries, carry storage adders, carry anticipation, the carry look ahead scheme.

UNIT – II

Memory Systems: Speed imbalance between the arithmetic and memory units, advantages of memory hierarchies, memory interleaving, problems of management of memory hierarchies, operation of virtual memories. Associative memories. Cache memories – operation of the cache, comparison of cache and virtual memory system, schemes for cache organization, word or block replacement, writing into the cache, multi level caches.

UNIT - III

General Organization and Control: Addressing schemes – one, two and three address schemes, no-address scheme, address modification and index registers, general purpose registers, addressing modes, stack organization, use of stack for evaluation of expressions, interrupt processing, subroutine return, storing local variables, storing parameters, implementation of stacks, stack organized processors. Register Transfer Language.

UNIT – IV

I/O Units**:** Early I/O devices, dot-matrix printers, inkjet printers, laser printers. Information exchange between devices – serial and parallel modes of transfer, synchronous and asynchronous modes of transfer–source-initiated, destination-initiated asynchronous data transfer, handshaking. Buffered I/O, Internal buffering. DMA & transfer modes. Data Channel organization, I/O bus, external interface, device controller and internal interface, processor and memory interfaces, ways of connecting devices on a bus, PCI.

TEXT AND REFERENCE BOOKS:

1. P.V.S. Rao, “ComputerSystem Architecture”, PHI, 2009.
2. John D. Carpinelli, “Computer System Organization and Architecture”, Pearson, 2009.
3. Mano, M. Morris,“ Computer Architecture”, 3/e, PHI, 2001.
4. John P. Hayes, “ Computer Architecture and Organization”, McGraw-Hill, 1998.
5. W. Stallings, “Computer Organization & Architecture”, Pearson Education.

COMPUTER NETWORKS

BCA-PC(L)-244

Maximum Marks: 100 **External: 70**
Minimum Passing Marks: 40 **Internal: 30**
Time: 3 Hour

Note: Examiner will be required to set nine questions in all. First question will be compulsory, consisting of objective type/short answer type questions covering the entire syllabus. In addition to that eight more questions will be set, two questions from each unit. A candidate will be required to answer five questions in all, selecting one question from each unit in addition to compulsory question number one. All questions will carry equal marks.

UNIT – I

Introduction to Computer Communications and Networking Technologies, Uses of Computer Networks, Network Devices, Nodes, and Hosts, Types of Computer Networks and their Topologies; Network Software: Network Design issues and Protocols; Connection-Oriented and Connectionless Services; Network Applications and Application Protocols; Computer Communications and Networking Models: Decentralized and Centralized Systems, Distributed Systems, Client/Server Model; Network Architecture and the OSI Reference Model, Example Network: The Internet, X.25, Frame relay;

UNIT – II

Analog and Digital Communications Concepts: Representing Data as Analog Signals, Representing Data as Digital Signals, Data Rate and Bandwidth, Capacity, Baud Rate; Digital Carrier Systems; Guided and Wireless Transmission Media; Communication Satellites; Switching and Multiplexing; Dial Up Networking; Analog Modem Concepts; DSL Service

UNIT - III

Data Link Layer: Framing, Flow Control, Error Control, Error Detection and Correction, Sliding Window Protocols, Media Access Control, Random Access Protocols, Token Passing Protocols, Token Ring, Introduction to LAN technologies: Ethernet, switched Ethernet, VLAN, Fast Ethernet, gigabit Ethernet, token ring, FDDI, Wireless LANs; Bluetooth;

UNIT – IV

Network Hardware Components: Connectors, Transceivers, Repeaters, Hubs, Network Interface Cards and PC Cards, Bridge, Switches, Routers, Gateways;
Routing Concepts: Virtual Circuits and Datagrams, Routing Algorithms, Flooding, Shortest Path Routing, Distance Vector Routing, Link State Routing, Hierarchical Routing, Congestion Control Algorithms, Internetworking;

TEXT AND REFERENCE BOOKS:

1. Michael A. Gallo, William M. Hancock, “Computer Communications and Networking Technologies”, CENGAGE Learning.
2. Andrew S. Tanenbaum, “Computer Networks”, Pearson Education.
3. James F. Kurose, Keith W. Ross, “Computer Networking”, Pearson Education.
4. Behrouz A Forouzan, “Data Communications and Networking”, McGraw Hill.

ADVANCED WEB DESIGNING

BCA- PE(L)-241

Maximum Marks: 100 **External: 70**
Minimum Passing Marks: 40 **Internal: 30**
Time: 3 Hour

Note: Examiner will be required to set nine questions in all. First question will be compulsory, consisting of objective type/short answer type questions covering the entire syllabus. In addition to that eight more questions will be set, two questions from each unit. A candidate will be required to answer five questions in all, selecting one question from each unit in addition to compulsory question number one. All questions will carry equal marks.

UNIT - I

Brief Introduction to Interactivity tools: CGI; Features of Java; Java Script; Features of ASP; VBScript; Macromedia Flash; Macromedia Dreamweaver; PHP

UNIT - II

Introduction and Features of Adobe Photoshop; Microsoft FrontPage Introduction; Features; Title Bar, Menu bar, Front Page Toolbar, Style, Front Face and Formatting Bar; Scroll Bars

UNIT - III

Introduction to DHTML and its features; Events; Cascading Style Sheets, Creating Style Sheets; Common Tasks with CSS: Text, Font, Margins, Links, Tables, Colors; Marquee; Mouseovers; Filters and Transitions; Adding Links; Adding Tables; Adding Forms; Adding Image and Sound

UNIT - IV

Extensible Mark-up Language(XML): Introduction, Features, XML Support and Usage, Structure of XML Documents, Structures in XML, Creating Document Type Declarations, Flow Objects, Working with Text and Font, Color and Background properties.

TEXT AND REFERENCE BOOKS:

1. Internet and Web Technologies, Raj Kamal, Tata McGraw-Hill.
2. Multimedia and Web Technology, Ramesh Bangia, Firewall Media.
3. Internet and Web Design, ITLESL Research and Development Wing, Macmillan India.
4. Web Design: The Complete Reference , 4/e, Thomas A. Powell, Tata McGraw-Hill
5. Internet and World Wide Web, How to Program, Deitel and Goldberg, PHI.

SEMESTER - V

PROGRAMMING USING PYTHON

BCA-PC(L)-351

Maximum Marks: 100 **External: 70**
Minimum Passing Marks: 40 **Internal: 30**
Time: 3 Hour

Note: Examiner will be required to set nine questions in all. First question will be compulsory, consisting of objective type/short answer type questions covering the entire syllabus. In addition to that eight more questions will be set, two questions from each unit. A candidate will be required to answer five questions in all, selecting one question from each unit in addition to compulsory question number one. All questions will carry equal marks.

UNIT - I

Introduction to Python: History and Features of Python Programming, Python Interpreter. Variable, identifiers and literal. Token, keywords. Data Types. Arithmetic operators, Relational operators, Logical operators, Bitwise operators, Assignment operators, Membership operators, Identity operators. Operator precedence. Comment, Indentation, Need for indentation

Built-in Functions: input, eval, composition, print, type, round, min and max, pow. Type Conversion, Random Number Generation. Mathematical Functions. Getting help on a function, Assert Statement.

UNIT - II

Control Statements: if Conditional Statement, for and while Statements. break, continue and pass statements. Functions: Function Definition and Call, Function Arguments-Variable Function Arguments, Default Arguments, Keyword Arguments, Arbitrary Arguments. Command Line Arguments. Global and local Variables. Accessing local variables outside the scope, Using Global and Local variables in same code, Using Global variable and Local variable with same Name.

UNIT - III

Strings: String as a compound data type. String operations- Concatenation, Repetition, Membership operation, Slicing operation. String methods-count, find, rfind, capitalize, title, lower, upper, swapcase, islower, isupper istitle, replace, isalpha, isdigit, isalnum. String Processing examples.

Lists: List operations-multiplication, concatenation, length, indexing, slicing, min, max, sum, membership operator; List functions-append, extend, remove, pop, count, index, insert, sort, reverse.

UNIT - IV

Object Oriented Programming: Introduction to Classes, Method, Class object, Instance object, Method object. Class as abstract data type, Date Class. Access attributes using functions-getattr, hasattr, setattr, delattr. Built-In Class Attributes of Class object (__dict__, __doc__ , __name__, module__).

TEXT AND REFERENCE BOOKS:

1. Sheetal Taneja and Naveen Kumar, “Python Programming A modular Approach”, Pearson
2. P. K. Sinha & Priti Sinha , “Computer Fundamentals”, BPB Publications, 2007.
3. Dr. Anita Goel, “Computer Fundamentals”, Pearson Education, 2010.

4. Allen Downey, Jeffrey Elkner, Chris Meyers.How to think like a computer scientist learning with Python / 1st Edition,2012.

ARTIFICIAL INTELLIGENCE

BCA-PC(L)-352

Maximum Marks: 100 **External: 70**
Minimum Passing Marks: 40 **Internal: 30**
Time: 3 Hour

Note: Examiner will be required to set nine questions in all. First question will be compulsory, consisting of objective type/short answer type questions covering the entire syllabus. In addition to that eight more questions will be set, two questions from each unit. A candidate will be required to answer five questions in all, selecting one question from each unit in addition to compulsory question number one. All questions will carry equal marks.

UNIT-I

Overview of Artificial Intelligence: Introduction to AI, Importance of AI, AI and its related field, AI techniques, Problems, Problem Space and search: Defining the problem as a state space search, Production system and its characteristics, Issue in the design of search problem.

UNIT-II

Knowledge representation: Definition and importance of knowledge, Knowledge representation, various approaches used in knowledge representation, Issues in knowledge representation, Using Predicate Logic: Representing simple facts in logic.

UNIT-III

Heuristic Search Technique: Generate and test, hill climbing, Best first search technique, Problem Reduction, Constraint Satisfaction.
Natural language processing: Introduction syntactic processing, Semantic processing, Discourse and pragmatic processing.

UNIT-IV

Learning: Introduction learning, Rote learning, learning by taking advice, Learning in problem solving, learning from example-induction, Explanation based learning.
Expert system: Introduction, Representing using domain specific knowledge, Expert system shells, LISP and other AI programming languages.

TEXT AND REFERENCE BOOKS:

1. E. Rich and K. Knight, “Artificial intelligence”, TMH, 2nd edition,1999.
2. D. W. Patterson, “Introduction to AI and Expert Systems”, PHI, 1999.
3. Nils J Nilsson, “Artificial intelligence –A new Synthesis”, 2nd Edition (2000), Harcourt Asia Ltd.

SOFTWARE ENGINEERING

BCA-PC(L)-353

Maximum Marks: 100 **External: 70**
Minimum Passing Marks: 40 **Internal: 30**
Time: 3 Hour

Note: Examiner will be required to set nine questions in all. First question will be compulsory, consisting of objective type/short answer type questions covering the entire syllabus. In addition to that eight more questions will be set, two questions from each unit. A candidate will be required to answer five questions in all, selecting one question from each unit in addition to compulsory question number one. All questions will carry equal marks.

UNIT- I

Software Crisis – problem and causes, Software life cycle models: Waterfall, Prototype, Evolutionary and Spiral models. Software Project Planning: Cost estimation: COCOMO model, Project scheduling, project monitoring.

UNIT- II

Software Requirement Analysis and Specifications: Structured Analysis, Data Flow Diagram, Data Dictionaries, Software Requirement and Specifications, Behavioral and non-behavioral requirements. Software Design: Design fundamentals, problem partitioning and abstraction, design methodology, Cohesion & Coupling, Classification of Cohesiveness & Coupling.

UNIT- III

Software Configuration Management, Quality Assurance, Risk Management, Software Maintenance: Type of maintenance, Management of maintenance..

UNIT- IV

Coding: Programming style, structured programming. Software testing: Testing fundamentals, Functional testing: Boundary Value Analysis, Equivalence class testing, Decision table testing, Cause effect graphing, Software testing strategies: Unit testing, integration testing, validation testing, System testing, Alpha and Beta testing.

TEXT AND REFERENCE BOOKS:

1. Pressman R.S., “Software Engineering- A Practitioner’s Approach”, Tata McGraw- Hill.
2. K.K. Aggarwal, Yogesh Singh, “Software Engineering”, New Age Pub.
3. Jalote P., “An Integrated approach to Software Engineering”, Narosa.
4. Sommerville, “Software Engineering”, Addison Wesley.
5. Fairley R., “Software Engineering Concepts”, Tata McGraw- Hill.
6. James Peter, W Pedrycz, “Software Engineering”, John Wiley & Sons.

DATA WAREHOUSING AND DATA MINING

BCA-PC(L)-354

Maximum Marks: 100 **External: 70**
Minimum Passing Marks: 40 **Internal: 30**
Time: 3 Hour

Note: Examiner will be required to set nine questions in all. First question will be compulsory, consisting of objective type/short answer type questions covering the entire syllabus. In addition to that eight more questions will be set, two questions from each unit. A candidate will be required to answer five questions in all, selecting one question from each unit in addition to compulsory question number one. All questions will carry equal marks.

Unit I

Data Mining: Introduction, Kind of data to be mined, Data Mining Functionalities, Technologies used in Data Mining, Applications of data Mining, Major Issues in Data Mining.

Unit II

Data Pre-Processing: Introduction, Need of preprocessing, Data Objects and Attribute type, Statistical description of data, Data Visualization, Measuring similarity and dissimilarity of data, Data Cleaning, Data Integration, Data Reduction, Data Transformation and Data Discretization

Unit III

Data Warehouse: Introduction, Data Warehouse and Database Systems, Data Warehouse Architecture, Data Warehouse Models, Data Cube and OLAP, Multidimensional data Model, Concept Hierarchies, OLAP operations, Data Warehouse Implementation

Unit IV

Mining Frequent Patterns, Associations and Correlations: Introduction, Frequent Itemset Mining using Apriori Algorithm ,Generating Association Rule from Frequent Itemsets. Improving efficiency of Apriori, Pattern Growth Approach for Mining Frequent Itemsets, Pattern evaluation Methods.

TEXT AND REFERENCE BOOKS:

1. Data Mining Concepts and Techniques, Jiawei Han, Micheline Kamber and Jian Pei, Third Edition, Morgan Kaufmann Publishers, July 2011
2. Data Warehousing, Data Mining & Olap, AlexBerson And Stephen J. Smith, Tata Mcgraw – Hill Edition, 2004.
3. Introduction To Data Mining, Pang-Ning Tan, Michael Steinbach and Vipin Kumar, Pearson Education, 2014.
4. Insight Into Data Mining Theory And Practice, K.P. Soman, Shyam Diwakar and V. Ajay, Easter Economy Edition, Prentice Hall Of India, 2009.
5. Introduction To Data Mining With Case Studies, G. K. Gupta, Easter Economy Edition, Prentice Hall Of India, 2006.
6. Data Mining Methods And Models, Daniel T. Larose, Wiley, 2006.
7. Building The Data Warehouse, W.H. Inmon , 4th , Wiley India,2005.

DATA ANALYTICS

BCA-PE(L)-351

Maximum Marks: 100 **External: 70**
Minimum Passing Marks: 40 **Internal: 30**
Time: 3 Hour

Note: Examiner will be required to set nine questions in all. First question will be compulsory, consisting of objective type/short answer type questions covering the entire syllabus. In addition to that eight more questions will be set, two questions from each unit. A candidate will be required to answer five questions in all, selecting one question from each unit in addition to compulsory question number one. All questions will carry equal marks.

UNIT-I

Data Analytics: Introduction to Data Analytics, Business Intelligence (BI) for better decisions, Decision types, BI tools, BI skills, BI applications.

Data warehousing: Introduction to Data warehousing (DW), Design considerations for DW, DW development approaches, DW architecture.

Data Mining: Introduction to Data mining, Data cleaning and preparation, outputs of Data mining, evaluation of data mining results, Data Mining Techniques.

UNIT-II

Decision Trees: Introduction to Decision tree, Decision tree problem, Decision tree construction, Lessons from constructing trees, Decision tree algorithms.

Regression: Introduction, Correlations and Relationships, Visual Look at Relationships, Logistic regression, Advantages and disadvantages of regression models.

UNIT-III

Artificial Neural Networks: Introduction, business applications of ANN, Design principles of an ANN, Representation of a neural network, architecting a neural network, developing an ANN, Advantages and disadvantages of using ANN.

Cluster analysis: Introduction, Applications of cluster analysis, Definition of a cluster, representing clusters, Clustering techniques, K-means algorithm for clustering, Selecting the number of clusters.

UNIT-IV

Association rule Mining: Introduction, Business applications of association rules, Representing association rules, Algorithms for association rule, Apriori algorithm, Creating association rules.

Naive-bayes analysis: Introduction, Probability, Naïve base model, Text classification example.

Support vector machines: Introduction, SVM model, The kernel method,

TEXT AND REFERENCE BOOKS:

1. Data Analytics by Anil Maheshwari, McGraw Hill Education, 2017.
2. Data Analytics for Beginners, Robert J. Woz, Createspace Independent Pub (October 2017)

SEMESTER - VI

INTERNET TECHNOLOGY

BCA-PC(L)-361

Maximum Marks: 100 **External: 70**
Minimum Pass marks: 40 **Internal: 30**
Time:3 hours

Note: Examiner will be required to set Nine Questions in all. First Question will be compulsory, consisting of objective type/short-answer type questions covering the entire syllabus. In addition to that eight more questions will be set, two questions from each Unit. A candidate will be required to answer five questions in all, selecting one question from each unit in addition to compulsory Question No. 1. All questions will carry equal marks.

UNIT- I

Internet and TCP/IP: Introduction to the Internet, Internet History, Internet Administration; Internet and Intranet; Internet Service; TCP/IP Model and its protocols; IP addresses: IPv4; Subnetting, IPv4 addresses; Supernetting; Next generation Internet Protocol(IPv6); The need forIPv6; Packet Format; IPv6 Addresses; Extension Headers.

UNIT- II

TCP/IPs Transport and Network Layer Protocols: Role of TCP, UDP, IP and Port Numbers; Format of TCP, UDP and IP; TCP services; TCP connection management; Remote Procedure Call; SCTP; IP address resolution- Domain Name Space; DNS mapping; Recursive and Iterative resolution; Resource records; Mapping Internet Address to Physical Addresses; ARP, RARP, BOOTP, DHCP; ICMO; IGMP.

UNIT- III

TCP/IP Application Level Protocols; Electronic Mail: Architecture; SMTP, MIME, POP, IMAP; Web Based Mail; File Access and transfer: FTP, Anonymous FTP, TFTP, NFS; Remote login using TELNET; Voice and Video over IP: RTP, RTCP, IP Telephony and Signaling, Resource Reservation and Quality of service, RSVP.

UNIT- IV

Routing in Internet: RIP, OSPF, BGP; Internet Multicasting; Mobile IP; Private Network Interconnection: Network Address Translation(NAT), Virtual Private network(VPN); Internet Management: SNMP; Internet Security; IPSec, EMail Security; Web Security, Firewalls; Digital Signatures; Certificates.

TEXT AND REFERENCE BOOKS:

1.Douglas E.Corner, "Internetworking with TCP/IP Volume-I, Principles, Protocols, and Architecture", Fourth Edition, Pearson Education.
2. Andrew S. Tanenbaum,"Computer networks", Pearson Education.
3. Behrouz A Forouzan," Data Communications and Networking", McGraw Hill.
4.Michael A.Gallo, William M.Hancock, "Computer Communications and Networking Technologies", CENGAGE Learning.
5.James F. Kurose, Keith W.Ross, Computer Networking, A Top-Down Approach Featuring the Internet, Pearson Education.
6.Wayne Tomasi, "Introduction to Data Communications and Networking", Pearson Education.

E-COMMERCE

BCA-PC(L)-362

Maximum Marks: 100 **External: 70**
Minimum Pass marks: 40 **Internal: 30**
Time:3 hours

Note: Examiner will be required to set Nine Questions in all. First Question will be compulsory, consisting of objective type/short-answer type questions covering the entire syllabus. In addition to that eight more questions will be set, two questions from each Unit. A candidate will be required to answer five questions in all, selecting one question from each unit in addition to compulsory Question No. 1. All questions will carry equal marks.

UNIT-I

Introduction to E-Commerce-Business operations, E-commerce practices vs. traditional business practices; concepts of b2b,b2c,c2c,b2g,g2c; Features of E-Commerce, Types of Ecommerce Systems, Elements of E-Commerce, Benefits and Limitations of E-Commerce.

UNIT-II

Concepts of EDI (Electronic Data Interchange), EDI vs. Traditional methods, Benefits of EDI, Drawbacks of EDI, Components of EDI, EDI Implementation, Applications of EDI, Financial EDI, Concept of E-Governance.

UNIT-III

Products in b2c model, e-brokers; Broker-based services on-line; Benefits and impact of e-commerce on travel industry; Online banking and its benefits; On-line financial services, E-auctions-implementations and benefits.

UNIT-IV

Electronic Payment System and its types, define E-money and E-wallets, Electronic fund transfer, Security Issues in E-commerce, Essential Security Requirements for safe Electronic Payments, Security Schemes.

TEXT AND REFERENCE BOOKS:

1. Turban E,. Lee J., King D. and Chung H.M: "Electronic commerce-a Managerial Perspective", Prentice-Hall International, Inc.
2. Bhatia V., "E-commerce", Khanna Book Pub. Co.(P) Ltd., Delhi.
3. Bharat Bhasker, "Electronic Commerce -Framework, technologies and Applications",TMH Publications.
4. Whitely David , " Electronic Commerce", TMH, N Delhi.
5. Shurety, "E-business with Net Commerce", Addison Wesley.
6. Kosiur, "Understanding E—Commerce", Prentice Hall of India, N. Delhi

MULTIMEDIA TECHNOLOGY

BCA-PC(L)-363

Maximum Marks: 100 **External: 70**

Minimum Pass marks: 40 **Internal: 30**

Time: 3 hours

Note: Examiner will be required to set Nine Questions in all. First Question will be compulsory, consisting of objective type/short-answer type questions covering the entire syllabus. In addition to that eight more questions will be set, two questions from each Unit. A candidate will be required to answer five questions in all, selecting one question from each unit in addition to compulsory Question No. 1. All questions will carry equal marks.

UNIT-I

Introduction to Multimedia: Components of Multimedia; Hypermedia and Multimedia; Overview of Multimedia Software Tools; Multimedia Hardware and Software; Basic Software Tools; Making Instant Multimedia; Presentation Tools; Multimedia Authoring; Types of Authoring Tools; Page-Based Authoring Tools; Icon-Based Authoring tools; Time-Based Authoring Tools.

UNIT-II

Graphics and Image Data Representation: Graphics/Image Data Types, Popular File Formats; Color Models in Images and Video; Types of Video Signals Analog and Digital Video: Broadcast Video Standards: NTSC, HDTV; Chroma Subsampling.

UNIT-III

Digital Audio: Digitization of Sound; MIDI Versus Digital Audio; Quantization and Transmission of audio: Coding of Audio; Pulse Code Mo Differential Coding of Audio; Lossless Predictive Coding; DPCM.

UNIT-IV

Multimedia Data Compression: Run-Length Coding; Variable-Length Coding; Dictionary-Based Coding; Transform Coding; Image Compression Standards-JPEG standard; Video Compression Technique: MPEG.

TEXT AND REFERENCE BOOKS:

1. Ze-Nian Li, Mark S. Drew, “Fundamentals of Multimedia”, Pearson Education.
2. Tay Vaughan, “Multimedia Making it Work”, Tata McGraw-Hill
3. Ramesh Bangia, “Multimedia and Web Technology”, Firewall Media
4. John F. Koegel Buford, “Multimedia systems”, Addison Wesley, Pearson Education.
5. Ana Weston Solomon, “Introduction to Multimedia”, Tata McGraw-Hill. Dulation; Differential

INFORMATION AND CYBER SECURITY

BCA-PC(L)-364

Maximum Marks: 100 **External: 70**
Minimum Passing Marks: 40 **Internal: 30**
Time: 3 Hour

Note: Examiner will be required to set nine questions in all. First question will be compulsory, consisting of objective type/short answer type questions covering the entire syllabus. In addition to that eight more questions will be set, two questions from each unit. A candidate will be required to answer five questions in all, selecting one question from each unit in addition to compulsory question number one. All questions will carry equal marks.

Unit I

Cryptography: Overview of Information Security, Basic Concepts, Cryptosystems, Cryptanalysis, Ciphers & Cipher modes, Symmetric Key Cryptography DES, AES. Asymmetric Key Cryptography, RSA algorithm, Diffie Hellman Algorithm. Digital Signature-Digital Signatures.

Unit II

System Security: Program Security, Malicious Logic, Protection. Database Security- Access Controls, Security & Integrity Threats, Defence Mechanisms. OS Security-Protection of System Resources.

Unit III

Ethics in Cyber Security: Privacy, Intellectual Property in cyberspace, Professional Ethics, Freedom of Speech, Fair User and Ethical Hacking, Trademarks, Internet Fraud, Electronic Evidence, forensic Technologies, Digital Evidence collections. Tools and Methods Used in Cybercrime: Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking.

Unit IV

Cybercrimes and Cybersecurity: Cybercrime and Legal Landscape around the world, Cyberlaws, The Indian IT Act, Challenges, Digital Signatures and Indian IT Act, Amendments to the Indian IT Act, Cybercrime and punishment, Cost of Cybercrimes and IPR Issues, Web threats for Organizations, Social Computing and associated Challenges for Organizations.

TEXT AND REFERENCE BOOKS:

1.Cryptography and Network security-Principles and Practices, Pearson Education, Ninth Indian Reprint 2005
2.Charlie Kaufman , Network Security : Private communication in Public World, Prentice-Hall International, Inc. April 2008
3. Cyber Security by Nina Godhole, Sunit Belapure, Wiley India, 2011.
4.Cyber Security Essentials by James Graham, Ryan Olson, Rick Howard CRC Press, Taylor & Francis, 2011.

SOFTWARE TESTING

BCA-PE(L)-363

Maximum Marks: 100 **External: 70**
Minimum Passing Marks: 40 **Internal: 30**
Time: 3 Hour

Note: Examiner will be required to set nine questions in all. First question will be compulsory, consisting of objective type/short answer type questions covering the entire syllabus. In addition to that eight more questions will be set, two questions from each unit. A candidate will be required to answer five questions in all, selecting one question from each unit in addition to compulsory question number one. All questions will carry equal marks.

Unit I

Introduction: Some Terminologies, Failures, Testing Process, Limitations of Testing and V-Shaped Software Life-Cycle Model.

Functional Testing: Boundary Value Analysis, Equivalence Class Testing, Decision Table Based Testing, and Cause Effect Graphing Technique.

Unit II

Structural Testing: Control Flow Testing, Data Flow Testing, Slice Based Testing and Mutation Testing.

Software Verification: Verification Methods, Software Requirement Specification Document Verification, Software Design Description Document Verification.

Unit III

Selection, Minimization and Prioritization of Test Cases for Regression Testing: Regression Testing, regression Test Case Selection, Reducing the Number of Test Cases, Risk Analysis and Code Coverage Prioritization Techniques.

Software Testing Activities: Levels of Testing, Debugging, Software Testing Tools, Software Test Plan.

Unit IV

Object Oriented Testing: Object Orientation, Object Oriented Testing, Path Testing, State Based Testing and class testing.

Metrics in Software Testing: Software Metrics, Categories of Metrics, Object Oriented Metrics in Testing.

TEXT AND REFERENCE BOOKS:

1. Software Testing, . Yogesh Singh, Cambridge University Press, 2012.
2. Effective Methods for Software Testing, William E. Perry, John Wiley and Sons, 2002.
3. Software Testing: Principle, Techniques and Tools, M. G. Limaye, Tata McGraw Hill, 2009.
4. Software Engineering, K. K. Aggarwal and Yogesh Singh, New Age International Publishers, Third Edition, 2008.
5. The Art of Software Testing, Glenford J.Myers,Tom Badgett and Corey Sandler, Wiley & Sons, Third Edition, 2012.

Duration of Programme:

Minimum duration of the MCA Programme is 3 years and maximum duration is 5 years.

1. A student who for whatever reasons is not able to complete the programme within the normal period or the minimum duration prescribed for the programming shall be allowed two years period beyond the normal period to clear the backlog to be qualified for the degree. The general formula, therefore, will be as follows:
   a) Time span = N+2 years for the completion of programme. Where N stands for the normal or minimum duration prescribed for completion of the programme.
   b) In exceptional circumstances a further extension of one more year may be granted. The exceptional circumstances be spelt out clearly by the relevant statutory body of the University.
   c) During the extended period, the student shall be considered as a private candidate and also not be eligible for ranking.
2. Ordinarily, no student will be given time beyond the extended period of two years. However, in exceptional circumstances and on the basis of the merits of each case, University may allow a student one more year for completion of the programme.
3. Further, the mercy chance, if any will be given within maximum allowed period of the programme as per UGC guidelines. In normal circumstances, only two chance will be given to pass re -appear examination.

Faculty and Support Staff:

The Directorate of Distance Education (DDE) of the university is headed by the full time Director who is a full time faculty member (Professor) of the university appointed by Vice-Chancellor to facilitate the development, implementation and monitoring the programmes offered at DDE and to attend all administrative matters concerned with the activities of directorate. In addition, there is one full time faculty member of Directorate of Distance Education who is holding the position of Deputy Director/Deputy Registrar. The supporting staff such as one Assistant Director, one Superintendent, two Deputy Superintendent, one Hindi Officer, Six Assistants and other clerical staff are coordinating the activities of Directorate of Distance Education (DDE) and looks after the administrative activities and problems of the distance students. The Supporting staff looks after the problems of the students through on line admission help line, examination related work, study material delivery, grievance redressal and so on. The DDE is assisted by the IT CELL for the online uploading and evaluation of assignments and other student support activities. The DDE also assisted by Pt. Deendayal Upadhyaya Computer and Informatics Centre (PDUCIC) for development/ regular updating of Distance education dedicated website of Guru Jambheshwar University of Science and Technology, Hisar. Computer Centre of the university having very qualified team of IT professionals. There are 4 faculties of computer science in Directorate of Distance Education who are looking after the programme as course coordinator.

Faculty:

The Directorate of Distance Education (DDE) have qualified teaching faculty to look after the programme as a Programme coordinator. They look for the following activities related to the Distance education:

- Conducting Personal Contact Programme (PCP) classes for the Distance students.

- Assisting in the change of Regulations and Curriculum, admission work, counselling new students and other issues such as break of study, exemptions etc..
- Coordinating with all Study Centers to maintain academic activities.
- Coordinating for the preparation of study materials for all semesters/year.

Instructional Delivery Mechanism:

The Instructional system of the University comprises four components, viz, Self-Learning Material (SLM), Personal Contact Programme, Internal Assessments and End Term Examination.

- **Self-Learning Material (SLM) –** The success and effectiveness of distance education systems largely depends on the study materials so it is necessary that the study material (SLM) must be ideal for easy and better understanding in self-learning mode. Learning Material through Print media named self-learning Material (SLM) is developed with the approach of self-explanatory, self-contained, self-motivating and self-evacuating followed by the UGC guidelines. The study material is also available in in form of E-content. Further, university having excess of various E-learning platforms like SWAYAM, NPTEL, E-books etc
- **Personal Contact Programme –** PCP sessions guide the learners as the programme proceeds. The date and venue for the PCP will be communicated to the learners through our website or SMS Service. During PCP, the learner gets guidance for better understanding of the programme and subject. The Personal Contact Programme (PCP) of will be arranged for each of the course by the respective Programme Coordinator in consultation with course co-ordinators at the University campus. The learners can get their doubts cleared with the help of subject experts so as to improve their self- learning capability. Learners are required to attend PCP sessions for all their respective subjects.
- **Internal Assessments-** Distance education learners have to depend much on self-study. In order to ascertain the writing skill and level of comprehension of the learner, assignment work is compulsory for all learners. The Directorate of Distance Education (DDE) of this university has an online portal for the uploading of the assignments and same has been evaluated online by the subject expert. Two assignments of 30 marks. The assignment question papers will be uploaded to the website within a scheduled time and the learners shall be required to respond them within a specified period of time. The response of the learner is examined by a faculty member.
- **End Term Examination-** At the end of every session learners will give theory exam for 70 marks for each subject. For examination, there will be of nine questions. The first question will be compulsory consisting of seven short questions of two marks each covering the entire syllabus (all four Units). In addition, eight more questions of 14marks each will be set comprising from the entire syllabus and the students are required to attempt any four questions from these.

Student Support Services:

The distance department of the university is provides the Student Support Services through online mode. Following are the main student support services provided by university through online mode:

- On line Admission Portal
- On line fee portal for students

- SMS alert facility for the students for information related to start of PCPs and term-end examinations, last date of submission of assignments, Project Deadlines and Viva-voce etc.
- Student Support Service is provided through online mode and grievance handling mechanism is adopted with the help of supporting technical staff
- On line availability of Synopsis/Research Project Guidelines
- Research Project Based Assessment
- Online availability of Old Question Papers
- Comprehensive viva-voce is conducted after Term End examination in the University
- Student Help Desk

Procedure for admission, curriculum transaction and evaluation:

Admission Procedure:

All the admissions are made online by filling Online Admission Form. The procedure of filling the online application form is a four multi step procedure, which is mentioned below:

- **Candidate Registration:** Click the registration form and fill the necessary details like: Name of Candidate, Father's Name, Date of Birth, Category, Name of Programme etc.
- **Payment Option:** Registered candidate may deposit fee by any of the following modes of payment:
  a. Net Banking
  b. Debit Card
  c. Credit Card
- **Filling of Application Form:** After Registration and depositing of fee, registered candidate may fill the complete application form with all the fields given in the form.
- **Uploading Documents:** In final step, the following scanned documents (all documents /image/signature should be in "jpg", "gif", "bmp", "jpeg" (format only) are to be uploaded:
  a. 10th Mark Sheet (for the purpose of proof of Name of candidate, Date of Birth, Father's and Mother's Name etc.) not greater than 500kb.
  b. 12th Mark Sheet not greater than 500kb.
  c. Mark sheet of qualifying exam along with degree of lower examination, if any, not greater than 500kb.
  d. Photograph of candidate (should not be greater than 75kb) and Maximum size (Width 132px Height 170px) Minimum Size (Width 102px Height 140px).
  e. Signature of candidate (should not be greater than 50kb) and Maximum size (Width 210px Height 80px) Minimum Size (Width 150px Height 50px).
  f. Proof of fee concession, if applicable not greater than 500kb.
  g. Caste Certificate, if applicable, not greater than 500kb.
- **Generating Preview:** After uploading the document, a preview of the complete application will be generated. If necessary, academic information can be edited before locking.
- **Lock form to generate enrolment no. And admission letter:** Finally, the application form is locked to generate enrolment No. and admission letter.

It is mandatory for every candidate to lock the form. If a candidate fails to lock the form, it will be assumed that he/she is not interested in taking the admission and his/her candidature will be automatically stands cancelled and 50% of the fees paid will be refunded to him/her.

Note: For entrance test, a separate registration portal with registration form with choice of examination center available on the website. For appearing in the entrance test, the candidate will have to pay registration fee of Rs. 1000/- only. After qualifying the respective entrance test, the candidate can proceed to make the payment of fee, filling of application form, uploading of required documents and locking of form.

Eligibility and Fee Structure:

Sr. No.	Title of Programme	Eligibility	Annual Fee Per Year (In Rs.)
1.	Bachelor of Computer Applications (BCA)	Mathematics as a course at 10+2 level.	Rs. 15000/- Per Annum (fees is taken in two instalments in a year)

Curriculum Transaction:

The Directorate will supply study material in the form of Self-Learning Mode (SLM) printed book/lessons as well as available on the website of Distance Education. The students will get the same directly from the Directorate either by-hand or will be sent by post/courier service.

The Personal Contact Programme (PCP) will be arranged for each of the course by the respective Programme Coordinator at the University campus. Theory/Practical teaching as per requirements will be provided to the students by the subject specialists. The PCPs will be held as per the schedule given in the prospectus. In addition to the students are informed through Distance Education website and SMS as well. However, the students are advised to report to the concerned Course Coordinator for PCP at the contact given therein.

Evaluation:

Internal assessment is based on practical assignments and the evaluation is done by experts in relevant field. External term end evaluation is done by experts in relevant field.

The students have to upload two internal handwritten assignments of each theory paper of 30% weightage in the stipulated time period mentioned above. Assignments to be prepared by the students will be available on the website dde.gjust.ac.in. It is the sole responsibility of the student to download the question paper of the assignment and upload the solved assignments.No request for re-evaluation of internal assignment will be considered.

Requirement of the laboratory support and Library Resources :

Laboratory Support:

A well-equipped Computer lab with latest computers and very fast internet facility available in the department of Directorate of Distance Education (DDE) of this university. This Computer Lab is established with an aim to meet the computing requirements of all the Distance learners of the University. This lab is equipped with 21 desktop computers of latest configuration. Further, there university computer centre with facility of more than 200 computers with all the facilities.

Library Resources:

The infrastructure related to library resources is available in the present set-up of the university whereby, we have a well stacked library with latest books, journals, magazines and newspapers.It is named after the great Indian Jurist, Economist, Politician and Social Reformer Dr. Bhim Rao Ambedkar. The seating capacity of the University Library is 400 seats. By the end of December 2018, the Library has a collection of 106566 books. The Library in its electronic repository has the access to 7000+ e-journals from 14 publishers and 5 Databases. Moreover, 2149 e-books of national and international repute publishers have also been added in e-repository to enrich the students. University library provides different services to distance learners such as Air Conditioned Reading Halls, Reading Facility for 400 students, Laptop Lab for SC/ST students consisting of 20 Laptops with internet facility and Potable Water facility on every floor. The online e-library resources namely INFLIBNET is also available for the accessibility of books and journals.

Cost estimate of the programme and the provisions :

Cost estimated of programme is based on following components:

- Study Material development and delivery such as cost of writing, vetting, editing, SLM conversion, printing and despatch etc. remuneration rates are attached
- PCP and related activities remuneration rates are attached
- Examination and evaluation related activities remuneration rates attached
- Internal assessment including assignment preparation and evaluation
- Miscellaneous cost like advertising on FM radio broadcast, newspapers and SMS alert
- Salary to Teaching and Non–Teaching Staff

Special Provisions:

- The Scheduled Caste students of Haryana whose family income from all sources is up to Rs. 2.5 Lacs per annum as prescribed by the State Govt. for Post Matric Scholarship and who produces, at the time of admission, the "Caste" and "Income" certificates issued by the competent authority, are not required to pay any kind of fees and they may pay a sum of Rs.1000/-(Refundable) as security/caution money at the time of admission. The eligible SC students will submit the Post Matric Scholarship forms at the time of admission/fee deposition. The hard copy of the filled post matric scholarship form is to be submitted within the stipulated time in the office of the Directorate of Distance Education failing which the candidate will not be allowed to appear in the examination. In case the student does not apply for scholarship or is found ineligible for award of scholarship or being eligible he/she is not awarded scholarship due to one or other reason, he/she will be liable to pay full fee along with late fine @ Rs. 10/- per day.
- The fee concession on the pattern of Guru Jambheshwar University of Science & Technology employees will also be extended to the employees of the office of the Directorate of Technical Education Haryana posted in the Head Office at Panchkula and the Audit staff posted in Guru Jambheshwar University of Science & Technology, Hisar for pursuing studies in all the courses being run by the University. However, the Audit Staff will be entitled to avail such facility up to the period till they remain posted in Guru Jambheshwar University of Science & Technology, Hisar.

- The students must remit the fee of subsequent semesters/installments as per the schedule without waiting for the result so as to enable the Directorate to supply the study material in time.
- In case of sudden demise of any student during study the fees paid by him/her for the session of demise will be refunded, if claimed by parents
- 25% concession of the total fees to serving/ retired military personal upto the rank of N.C.O. or of military personal killed or incapacitated wholly or partially during the war and their wards, will be allowed.

Quality assurance mechanism and expected programme outcomes Quality assurance mechanism :

Quality Policy of University:

The Guru Jambheshwar University of Science & Technology (GJUST) is committed to achieve excellence in teaching, research, and extension by follow and implement following points of quality policy:

- Imparting globally competitive education
- Selecting and retaining competent and motivating faculty
- Providing state or the art infrastructural resources
- Promoting quality research culture
- Ensuring transparent and accountable governance
- Focusing on holistic development of learners
- Symbiotic relationship with industry, other academic institutions, and society
- Striving for financial self-reliance

Advisory Committee:

The following Advisory Committee has been constituted for smooth functioning and monitoring of academic activities of Directorate of Distance Education:

1.	Vice-Chancellor, GJUS&T, Hisar	Chairman
2.	Registrar, GJUS&T, Hisar	Member
3.	Dean. of Colleges, GJUS&T, Hisar	Member
4.	Dean, Academic Affair, GJUS&T, Hisar	Member
5.	Director, Distance Education, Kurukshetra University	Member
6.	Director, Distance Education, GJUS&T, Hisar	Member
7.	Director, HSB, GJUS&T, Hisar	Member
8.	Chairman, Deptt. of CSE, GJUS&T, Hisar	Member
9.	Chairman, Deptt. of CM&T, GJUS&T, Hisar	Member
10.	Chairman, Deptt. of Mathematics, GJUS&T, Hisar	Member
11.	Prof. H. Bansal, HSB, GJUS&T, Hisar	Member
12.	Prof. Saroj, Deptt. of CSE, GJUS&T, Hisar	Member
13.	Prof. Manoj Dayal, Deptt. of CM&T, GJUS&T, Hisar	Member

14.	Director, UCIC, GJUS&T, Hisar	Member
15.	All Programme Co-ordinators, DE, GJUS&T, Hisar	Members

Centre for Internal Quality Insurance (CIQA):

The CIQA also oversees the development and preparation of SLMs, then it is submitted to the Board of Studies concerned for the approval. The objective of establishment of Centre for Internal Quality Assurance (CIQA) is to develop and put in place a comprehensive and dynamic internal quality assurance system to provide high quality programmes of higher education in the Open and Distance Learning mode.

Composition of CIQA for the year 2020-21:

1. Director (DE), Director of CIQA
2. Dean of Colleges, Member
3. Controller of Examination, Member
4. Director, UCIC, Member
5. Prof. Umesh Arya, Deptt. of CMT, Member
6. Prof. Vikram Kaushik, Deptt. of CMT, Member
7. Prof. S.C. Kundu, HSB, Member
8. Prof. Karam Pal Narwal , HSB, Member
9. Prof. M.C. Garg, HSB, Member
10. Prof. N.K. Bishnoi, Deptt. of Economics, Member
11. Prof. Yogesh Chaba, Deptt. of CSE, Member
12. Prof. Kuldeep Bansal, Deptt. of Mathematics, Member
13 Sh. Vinod Kumar, Assistant Professor (Computer Science), DDE, Member
14. Dr. Sunaina, Assistant Professor (Mass Communication), DDE, Member
15. Dr. Vizender Singh, Assistant Professor (Mathematics), DDE, Member
16. Dr. Kashmiri Lal, Assistant Professor, Deptt. of Chemistry, Member
17. DR (Academics), Member
18. Dy. Registrar (DE), Member Secretary

Function of Internal Quality Assurance (CIQA):

Following are the main functions of CIQA:

- To maintain quality in the services provided to the learners.
- To ensure continuous improvement in the entire operations of the Higher Education Institution.
- To identify the key areas in which the Higher Education Institution should maintain quality.
- To disseminate information on quality assurance.

- To device mechanisms for interaction and obtaining feedback from various Departments or Centres or Schools in the Higher Education Institution.
- To suggest to the authorities of the Higher Education Institution, measures for qualitative improvement.
- To ensure the implementation of its recommendations through regular monitoring.
- To ensure participation of all stake holders namely, learners, teachers, staff, parents, society, employers and Government in Quality Improvement Process.
- To prepare Programme Project Report and ensure another launch of programme(s).
- Collection, collation and dissemination of accurate, complete and reliable statistics about the quality of the programme(s).

Activities of Centre for Internal Quality Assurance (CIQA):

Following are the main activities of CIQA:

- Prepare a Programme Project Report (PPR) for each programme according to the norms and guidelines prescribed by the Commission and wherever necessary by the appropriate regulatory authority having control over the programme;
- Get the Programme Project Report (PPR) approved by the appropriate authority of the Higher Educational Institution and the Commission before launch of the programme;
- Oversee the development of Study Learning Material (SLM), integration of Information and Communication Technology (ICT), setting up of Learning Centres and coordination with the parent institution and relevant Regulatory authorities;
- Put in place monitoring mechanism to ensure the proper implementation of Programme Project Reports (PPRs);
- Design annual plans for quality level enhancement at the level of the Higher Educational Institution and ensure their implementation;
- Arrange for feedback responses from students, employers and other stakeholders for quality related institutional processes;
- Develop quality benchmarks or parameters for the various academic and administrative activities of the Higher Educational Institution;
- Obtain information from other Higher Educational Institutions on various quality benchmarks or parameters and best practices;
- Organise workshops or seminars on quality related themes and Higher Educational Institution wise dissemination of the proceedings of such activities;
- Suggest restructuring of programmes in order to make them relevant to the job market;
- Develop and implement innovative practices in major areas leading to quality enhancement in services to the learners;
- Create learner centric environment rather than institution centric environment;
- Adopt measures to ensure internalisation and institutionalisation of quality enhancement practices through periodic accreditation and audit;
- Conduct or encourage system based research to bring about qualitative change in the entire system;
- Coordinate between the Higher Educational Institution and the Commission for various quality related issues or guidelines;
- Record activities undertaken on quality assurance in the form of an annual report; and
- To coordinate recognition and accreditation of the Higher Educational Institution.

Expected Programme Outcomes:

MCA programme has been designed to prepare graduates for attaining the following program outcomes:

- An ability to apply knowledge of mathematics, computing and domain knowledge to solve problems.
- An ability to analyze real world/scientific problems and convert them to computable algorithms/solutions.
- An ability to evaluate, analyze and use available technological solutions to design and implement the same.
- An ability to devise and conduct experiments, interpret data and provide well informed conclusions.
- An ability to identify modern computing and/or development tools and techniques and use them to develop solutions.
- An ability to function professionally with ethical responsibility as an individual as well as in teams in projects.
- An ability to communicate effectively, both written and oral.
- An ability to engage in lifelong learning in the field of computer science.
- An ability to design a system to meet desired needs within realistic constraints such as safety, security and applicability.
- An ability to understand the impact of system solutions in a contemporary, global, legal, economical, environmental, and societal context for sustainable development