नेपाल इन्जिनियरिङ्ग परिषद्

प्राविधिक सेवा, इन्जिनियरिङ्ग समूह, अधिकृत सातौं तह, इलेक्ट्रोनिक्स एण्ड कम्युनिकेशन इन्जिनियर पदको प्रतियोगितात्मक परीक्षाको पाठ्यक्रम

पाठ्यक्रम योजनालाई निम्नानुसारका दुई चरणमा विभाजन गरिएको छ :

प्रथम चरण :– लिखित परीक्षा पूर्णाङ्क :– २००

द्वितीय चरण :– अन्तर्वार्ता पूर्णाङ्क :– ३०

परीक्षा योजना (Examination Scheme)

१. प्रथम चरण : – लिखित परीक्षा पूर्णाङ्कः– २००

पत्र	विषय	खण्ड	पूर्णाङ्क	उतीर्णाङ्क	परीक्षा प्रणाली		प्रश्नसंख्या x अङ्क	समय
प्रथम	General Subject	Part I: General Technical Subject	१००	४०	वस्तुगत	बहुवैकल्पिक प्रश्न (MCQ)	७० प्रश्न x १ अङ्क = ७०	१ घण्टा ३० मिनेट
		Part II: General Awareness, Institutional Knowledge and General Reasoning Test					३० प्रश्न x १ अङ्क = ३०	
द्वितीय	Technical Subject		१००	४०	विषयगत	छोटो उत्तर लामो उत्तर	४ प्रश्न x ५ अङ्क = २० ८ प्रश्न x १० अङ्क = ८०	३ घण्टा

२. द्वितीय चरण : – अन्तर्वार्ता पूर्णाङ्क :– ३०

विषय	पूर्णाङ्क	परीक्षा प्रणाली
अन्तर्वार्ता	३०	मौखिक

द्रष्टव्य :

१. लिखित परीक्षाको माध्यम भाषा नेपाली वा अंग्रेजी अथवा नेपाली र अंग्रेजी दुवै हुनेछ ।

२. प्रथम र द्वितीय पत्रको लिखित परीक्षा छुट्टाछुट्टै हुनेछ ।

३. वस्तुगत बहुवैकल्पिक (Multiple Choice) प्रश्नको गलत उत्तर दिएमा प्रत्येक गलत उत्तर बापत २० प्रतिशत अङ्क कट्टा गरिनेछ । तर उत्तर नदिएमा त्यस बापत अङ्क दिइने छैन र अङ्क कट्टा पनि गरिने छैन ।

४. वस्तुगत बहुवैकल्पिक हुने परीक्षामा परीक्षार्थीले उत्तर लेख्दा अंग्रेजी ठूलो अक्षर (Capital letter) A,B,C,D मा लेख्नुपर्नेछ । सानो अक्षर (Small letter) a,b,c,d लेखेको वा अन्य कुनै सङ्केत गरेको भए सबै उत्तरपुस्तिका रद्द हुनेछ ।

५. बहुवैकल्पिक प्रश्नहरू हुने परीक्षामा कुनै प्रकारको क्याल्कुलेटर (Calculator) प्रयोग गर्न पाइने छैन ।

६. परीक्षामा सोधिने प्रश्नसंख्या, अङ्क र अङ्कभार यथासम्भव सम्बन्धित पत्र /विषयमा दिइए अनुसार हुनेछ ।

७. विषयगत प्रश्न हुने पत्रका हकमा प्रत्येक खण्डका लागि छुट्टाछुट्टै उत्तरपुस्तिकाहरू हुनेछन् । परीक्षार्थीले प्रत्येक खण्डका प्रश्नहरूको उत्तर सोही खण्डको उत्तरपुस्तिकामा लेख्नुपर्ने छ ।

८. यस पाठ्यक्रम योजना अन्तर्गतका पत्र/विषयका विषयवस्तुमा जेसुकै लेखिएको भए तापनि पाठ्यक्रममा परेका कानून, ऐन, नियम तथा नीतिहरू परीक्षाको मिति भन्दा ३ महिना अगाडि (संशोधन भएका वा संशोधन भई हटाईएका वा थप गरी संशोधन भई) कायम रहेकालाई यस पाठ्क्रममा परेको सम्झनु पर्दछ ।

९. प्रथम चरणको परीक्षाबाट छनौट भएका उम्मेदवारलाई मात्र द्वितीय चरणको परीक्षामा सम्मिलित गराइनेछ ।

१०. **पाठ्यक्रम स्वीकृत मिति :– २०८२/०६/०९**

नेपाल इन्जिनियरिङ्ग परिषद्

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प्रथम पत्र (Paper I, Part I): Technical Subject
Section (A) – 34 Marks

1. **Electronic Device and Circuit Theory [10 x 1 Mark = 10 Marks]**
   - 1.1 Measurement of resistance, capacitance, inductance, current, voltage in different R--L-C circuit, different types of amplifiers and rectifiers' usage and characteristics
   - 1.2 Diodes, operation and characteristics of Diode and its applications. different types ofamplifiers and rectifiers' usage and characteristics
   - 1.3 Bipolar transistors switching characteristics, unijunction transistor, MOS transistorsswitching characteristics
   - 1.4 SCR, UJT, TTL logic circuits, NMOS/CMOS logic circuits
   - 1.5 Memory: RAM, DRAM, PROM, and EPROM.
   - 1.6 Operational amplifiers, A/D & D/A converter circuits.
   - 1.7 Boolean algebra, logical gates and switching algebra, adders circuit , arithmetic operations, digital comparators, parity check generator, multiplexer and demultiplexer
   - 1.8 Flip-flops, shift registers, counters, sequence generators, 7 segment display.
   - 1.9 Input Output Organization : I/O programming , memory mapped I/O, basic interrupt system, DMA Memory Systems, 808X and Intel microprocessors: programming and interfacing

2. **Computer Fundamentals and Programming Language [6 x 1 Mark = 6 Marks]**
   - 2.1 Overview of Programming Language History, Programming Paradigms Computers
   - 2.2 Concept of Procedural Programming, Structural Programming, Object-Oriented Programming
   - 2.3 Components and Architecture of Computers, The role of Language translates in the Programming Process, Virtual Machines, Code Generation, Loop Optimization
   - 2.4 Concept of C programming, C++ Programming, Java Programming for Declaration, Modularity and Storage Management Software Development.
   - 2.5 Storages devices: Overview of Storage Devices, Floppy Disk Drive, Hard Drive, Universal Serial Bus (USB) Devices and Other Storage Devices
   - 2.6 Windows survival guide: Windows Desktop, Program Manager, Organizing the Desktop, File Manager.
   - 2.7 Application software: Using Application Software Windows Explorer, E-mails, Internet, Intranet, Extranet, Ethernet, and HTTP
   - 2.8 Fundamental of Data Structures, Abstract Data types, Lists, Linked Lists, Stacks, Queues, Priority Queue.
   - 2.9 Trees: Traversal, Implementations, Binary Trees, Binary Search Trees, Balanced Search Trees, AVL Trees.
   - 2.10 Indexing Methods. Hashing Trees, Suffix Trees, Worst-Case and Expected time Complexity, Analysis of Simple Recursive and No recursive Algorithms. Searching, Merging and Sorting.

3. **Analog and Digital Communication System. [10 x 1 Mark = 10 Marks]**
   - 3.1 Difference between analog and digital communications, basic communication elements, signal and noise in communication system.
   - 3.2 AM, DSC-SC, PM, FM, Super-heterodyne AM and FM receiver, SSB AM
   - 3.3 Fundamentals of Error Detection and Correction
   - 3.4 Performance evaluation of analogand digital communication systems: SNR and BER

3.5 Sampling theorem, sample and hold circuit, A law, m-law, quantizer, coding (NRZ/HDB3/AMI), error detection and correction, Parity check, PCM/ADPCM, digital modulation

3.6 Frequency spectrum (discrete and continuous) and bands, coulomb's law and electric field intensity, electric flux density and gauss' law, spectral density, Noises (ASK/PSK/QPSK/MSK/QAM/CDMA/FDMA/DSSS), pulse modulation, modulation and demodulation circuits, Frequency hopping, frequency converter and mixers, phase locked loop

3.7 Wave motion in free space, perfect dielectric and losses, wave medium, skin effect, impedance matching, antenna fundamental, polarization, radiation from dipole antenna,wave guides

3.8 Propagation characteristics, frequency availability, limitation element at VHF, UHF

3.9 Discrete and continuous spectrums, stay capacitance, internal load inductance, dummyload, Traveling and standing waves, Variable impedance along a mismatched line

3.10 Tune circuit and filters, Phase velocity, phase shift, group velocity, wave guides

4. **Telecommunications and Advanced Communications System [8 x 1 Mark= 8 Marks]**

4.1 Different between Telecommunications and Radio Communication. Signal and noise measurements, echo and signaling

4.2 Space/time/frequency /wave length division multiplexing, Erlang B formulae, queuing theorem

4.3 OSI layers, telephony, functions of switching, electro mechanical switches, stored programmed controlled switch (TS/ST/TST/STS switching, no. 5 and no. 7 control signaling).

4.4 General concept of ISDN, BISDN, ATM, PDH/SDH, DSL, HDSL, ADSL, numbering,routing and channeling plans.

4.5 Principle of optical communication, total internal reflection, Snell's law, Chemical vapour deposition, Laser, Photocell, photo device (LED, CRT, photovoltaic, photo-multipliers, APD's PCN).

4.6 Optical fibers types, capacity and properties, optical transmission, optical transmitters and receivers, interconnected and switched, Joining techniques, splices, connectors and coupling

4.7 Fiber optics networks, optical switching, underground cabling (Route and ambient consideration, tension prediction)

4.8 Radio frequency band, Propagation theory (groundwave, space wave, tropospheric, ionospheric, LOS (line of sight) and non-LOS model, Okumara and Hata model

4.9 Mobile Technologies (DECT, GSM, CDMA2000-1x and etc.), Fundamental of satellitecommunication (tracking, Satellite orbits and Radio spectrum, satellite wave propagation and satellite antennas)

4.10 UMTS, IMT-2000, NGN (Next Generation Network), real time protocol, VoIP, IP/PSTN platform, Overview to IN (Intelligent Network), Basics of GIS (GeographicalInformation System).

Section B- 36 Marks

5 Multimedia System, MIS and Web Engineering [10 x 1 Mark = 10 Marks]

5.1 Introduction: Global structure of Multimedia; Medium; Multimedia System and properties

5.2 Sound / Audio System: Concept of Sound System; Music and Speech; Speech Generation, Speech Analysis, Speech Transmission

5.3 Images and Graphics: Digital Image representation; Image and Graphics Format; Image Synthesis, analysis and transmission
5.4 Video and Animation: Video signal representation, computer video format; computer based animation
5.5 Data Compression: Storage Space; Coding Requirements; Source, Entropy and Hybrid Coding; Lossy Sequential DCT- based Mode; Expanded Lossy DCT-based Mode; JPEG and MPEG
5.6 Information Systems and Decision Making; Knowledge Management.
5.7 The strategic use of Information Technology; Work Process Redesign (Reengineering) with Information Technology; Enterprise Resources Planning Systems
5.8 Information Systems Security, Information Privacy, and Global Information Technology issues
5.9 Introduction to Web Technology: Internet, Intranet, WWW, Static and Dynamic Web Page; Web Clients; Web Servers; Client Server Architecture: Single Tier, Two-Tier, Multi-Tier; HTTP: HTTP Request and Response; URL, Client Side Scripting, Server Side Scripting, Web 2.0
5.10 Hyper Text Markup Language: Introduction to HTML; Elements of HTML Document; HTML Elements and HTML Attributes, Headings, Paragraph, Division, Formatting; Image element; Anchors; Lists; Tables; Frames; Forms
5.11 Client Side Scripting with JavaScript
5.12 Basics of AJAX; Introduction to XML and its Application

6 **Computer Network and Networks Theory [8 x 1 Mark = 8 Marks]**

6.1 Network Definition, Network Models, Connectivity, Network Addressing
6.2 Network Connectivity: The Data Package, Establishing a Connection, Reliable Delivery, Network Connectivity, Noise Control, Building Codes, Connection Devices
6.3 Advanced Network Theory: The OSI model, Network Resources, Token ring,FDDI, Wireless Networking
6.4 Common Network Protocols: Families of Protocols NetBEUI, Bridge and Switches,TCP/IP Protocol, Building TCP/IP Network, TCP/IP Suite
6.5 TCP/IP Services: Dynamic Host Configuration Protocol, DNS Name Resolution, NetBIOS support, SNMP, TCP/IP Utilities, FTP
6.6 Network LAN Infrastructure: LAN Protocols on a Network, IP Routing, IP Routing Tables, Router Discovery Protocols, Data Movement in a Routed Network, Virtual LANs (VLANS) Network WAN Infrastructure: WAN Environment, Wan Transmission Technologies, Wan Connectivity Devices, Voice over Data Services.
6.7 Remote Networking: Remote Networking, Remote Access protocols, VPN Technologies. Computer Security: Computer Virus, Worm, Trojan horse. Network Security: Introduction, Virus Protection, Local Security, Network Access, Internet Security
6.8 Disaster Recovery: Need for Disaster Recovery, Disaster Recovery plan, Data backup, Fault Tolerance Advanced Data Storage Techniques: Enterprise Data Storage, Clustering, Network Attached Storage, and Storage Area Networks.
6.9 Network Troubleshooting: Using Systematic Approach to Troubleshooting. Network Support Tools: Utilities, Network Baseline. Network Access Points (NAP), Common Network Component, Common Peripheral Ports

7 Information and Communications Technology (ICT) [10 x 1 Mark = 10 Marks]

7.1 Computer architecture, microprocessor fundamental, microcomputer systems, paralleland serial interfaces

7.2 RS-232 standards, flow charts, algorithms, variables, constants, data types, arithmeticexpressions, arrays, concept of Operating System

7.3 Basic concept on internet, e-mail and web-page (such as DNS, IP, URL, http, ftp, IRQ,Routers)

7.4 Server (Web, email, printer), General concept of Cyber security (digital signature, SPAM, VIRUS, WORM, hiking, cracking), Unicode.

7.5 Database Design issues, Data Mining, Data Warehousing. Knowledge Management, The strategic use of Information Technology

7.6 Work Process Redesign (Reengineering) with Information Technology, Enterprise Resources Planning Systems, and Information Systems Security, Information Privacy,and Global Information Technology issues

7.7 Software Supported Demonstrations including advanced Spreadsheet topics, SoftwareComponent Based Systems (CBSE)

7.8 Object-Oriented Programming with COMS & DECOMS, Group Decision Support Systems. Basics of Website Design

8 Artificial Intelligence and Advanced Topics in IT [8 x 1 Mark = 8 Marks]

8.1 Artificial Intelligence, Search: Uninformed search techniques- depth first search, breadth first search, depth limit search, and search strategy comparison; Informed search techniques-hill climbing, best first search, greedy search

8.2 Learning: Supervised Learning; Unsupervised Learning; Semi-supervised Learning; Reinforcement Learning; Neural Networks; Support Vector Machine (SVM); Self Organizing Map (SOM); Genetic Algorithms; Clustering; Decision Trees

8.3 Automated reasoning: FOPL; Knowledge Representation Languages. Basic Conceptsof Natural Language Processing (NLP)

8.4 Parallel and distributed computing

8.5 High speed networks

8.6 Software Architecture

8.7 Cryptography and network security

8.8 E-commerce

8.9 Software Project Management

8.10 Cloud Computing

8.11 Big Data Analytics

8.12 Internet of Things (IoT)

8.13 Machine Learning

नेपाल इन्जिनियरिङ्ग परिषद्

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प्रथम पत्र (Paper I, Part II): General Subject
Section C - 30 Marks

1. General Awareness and Contemporary Issues [7 x 1 Mark = 7 Marks]

1.1 Contribution of major natural resources on the economic development of Nepal: Water resources, minerals, forest and bio-diversity
1.2 Basic knowledge on the geographical diversity, climatic conditions, and livelihood & lifestyle of people
1.3 Major development aspects of current periodic plan of Nepal
1.4 United Nations Sustainable Development Goals (UNSDGs) and Nepal's initiatives
1.5 The constitution of Nepal (from I to 5 and schedules)
1.6 Governance and government of Nepal (federal, provincial and local)
1.7 Major events and current affairs of national and international importance

2. Institutional Knowledge and Associated Laws [8 x 1 Mark = 8 Marks]

2.1 Nepal Engineering Council Establishment, goals, objectives, organizational structure, functions, current situation
2.2 Nepal Engineering Council Act, 2055
2.3 Nepal Engineering Council Rules, 2057
2.4 Nepal Engineering Council Personnel Administration Regulations, 2078
2.5 Nepal Engineering Council Financial Administration Regulations, 2073
2.6 The Prevention of Corruption Act, 2059 (Chapter 2 Offenses and Punishment)
2.7 Good Governance (Management and Operation) Act, 2064
2.8 Right to Information Act, 2064 Chapter 2, 4, 5

3. General Reasoning Test (15 ×1 Mark = 15 Marks)

3.1 **Logical Reasoning (5×1 Mark = 5 Marks)**
Verbal Ability, Alphanumeric Series, Reasoning Analogies, Classification, Coding-Decoding, Order & Ranking, Distance & Directions, Analytical and Logical Reasoning, Assertion and Reason, Statement and Conclusion, Input-Output, Venn-diagram

3.2 **Numerical Reasoning (5 ×1 Mark = 5 Marks)**
Arithmetic Series, Analogy, Classification, Arithmetical Reasoning, Fraction. Percentage, Ratio, Average, Profit & Loss, Time & Work, Date & Calendar, Data Sufficiency, Data Interpretation & Data Verification

3.3 **Spatial Reasoning (5×1 Mark = 5 Marks**)
Figure Series, Figure Analogy, Figure Classification, Figure Matrix, Pattern Completion, Embedded Images, Image Formation & Analysis, Mirror and Water Images, Cubes and Dices, Paper Folding & Cutting

नेपाल इन्जिनियरिङ्ग परिषद्

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द्वितीय पत्र **(Paper II): Technical Subject**

Section A - 50 Marks

1. Electronic Device and Circuit Theory. [1 x 10 Marks = 10]

1.1 Measurement of resistance, capacitance, inductance, current, voltage in different R-L-C circuit, different types of amplifiers and rectifiers' usage and characteristics
1.2 Diodes, operation and characteristics of Diode and its applications. different types ofamplifiers and rectifiers' usage and characteristics
1.3 Bipolar transistors switching characteristics, unijunction transistor, MOS transistorsswitching characteristics.
1.4 SCR, UJT, TTL logic circuits, NMOS/CMOS logic circuits
1.5 Memory: RAM, DRAM, PROM, and EPROM.
1.6 Operational amplifiers, A/D & D/A converter circuits
1.7 Boolean algebra, logical gates and switching algebra, adders circuit, arithmetic operations, digital comparators, parity check generator, multiplexer and demultiplexer
1.8 Flip-flops, shift registers, counters, sequence generators, 7 segment display
1.9 Input Output Organization: I/O programming, memory mapped I/O, basic interrupt system, DMA Memory Systems, 808X and Intel microprocessors: programming and interfacing

2. Computer Fundamentals and Programming Language [1 x 10 Marks = 10]

2.1 Overview of Programming Language History, Programming Paradigms Computers
2.2 Concept of Procedural Programming, Structural Programming, Object-Oriented Programming
2.3 Components and Architecture of Computers, The role of Language translates in the Programming Process, Virtual Machines, Code Generation, Loop Optimization
2.4 Concept of C programming, C++ Programming, Java Programming for Declaration, Modularity and Storage Management Software Development.
2.5 Storages devices: Overview of Storage Devices, Floppy Disk Drive, Hard Drive, Universal Serial Bus (USB) Devices and Other Storage Devices
2.6 Windows survival guide: Windows Desktop, Program Manager, Organizing the Desktop, File Manager
2.7 Application software: Using Application Software Windows Explorer, E-mails, Internet, Intranet, Extranet, Ethernet, and HTTP
2.8 Fundamental of Data Structures, Abstract Data types, Lists, Linked Lists, Stacks, Queues, Priority Queue
2.9 Trees: Traversal, Implementations, Binary Trees, Binary Search Trees, Balanced Search Trees, AVL Trees.
2.10 Indexing Methods. Hashing Trees, Suffix Trees, Worst-Case and Expected time Complexity, Analysis of Simple Recursive and No recursive Algorithms. Searching, Merging and Sorting

3. Analog and Digital Communication System [1 x 5 Marks = 5 , 1 x 10 Marks = 10]

3.1 Difference between analog and digital communications, basic communication elements, signal and noise in communication system.
3.2 AM, DSC-SC, PM, FM, Super-heterodyne AM and FM receiver, SSB AM
3.3 Fundamentals of Error Detection and Correction

3.4 Performance evaluation of analogand digital communication systems: SNR and BER
3.5 Sampling theorem, sample and hold circuit, A law, m-law, quantizer, coding (NRZ/HDB3/AMI), error detection and correction, Parity check, PCM/ADPCM, digital modulation.
3.6 Frequency spectrum (discrete and continuous) and bands, coulomb's law and electric field intensity, electric flux density and gauss' law, Spectral density, Noises (ASK/PSK/QPSK/MSK/QAM/CDMA/FDMA/DSSS), pulse modulation, modulationand demodulation circuits, Frequency hopping, frequency converter and mixers, phaselocked loop.
3.7 Wave motion in free space, perfect dielectric and losses, wave medium, skin effect, impedance matching, antenna fundamental, polarization, radiation from dipole antenna,wave guides.
3.8 propagation characteristics, frequency availability, limitation element at VHF, UHF
3.9 discrete and continuous spectrums, stay capacitance, internal load inductance, dummyload, Traveling and standing waves, Variable impedance along a mismatched line,
3.10 Tune circuit and filters, Phase velocity, phase shift, group velocity, wave guides.

4. Telecommunications and Advanced Communications System

[1 x 5 Marks = 5, 1 x 10 Marks = 10]

4.1 Different between Telecommunications and Radio Communication. Signal and noise measurements, echo and signaling
4.2 Space/time/frequency /wave length division multiplexing, Erlang B formulae, queuing theorem
4.3 OSI layers, telephony, functions of switching, electro mechanical switches, stored programmed controlled switch (TS/ST/TST/STS switching, no. 5 and no. 7 control signaling)
4.4 General concept of ISDN, BISDN, ATM, PDH/SDH, DSL, HDSL, ADSL, numbering,routing and channeling plans
4.5 Principle of optical communication, total internal reflection, Snell's law, Chemical Vapour Deposition, Laser, Photocell, photo device (LED, CRT, photovoltaic, photo-multipliers, APD's PCN)
4.6 Optical fibers types, capacity and properties, optical transmission, optical transmittersand receivers, interconnected and switched, Joining techniques, splices, connectors and coupling
4.7 Fiber optics networks, optical switching, underground cabling (Route and ambient consideration, tension prediction)
4.8 Radio frequency band, Propagation theory (groundwave, space wave, tropospheric, ionospheric, LOS (line of sight) and non-LOS model, Okumara and Hata model
4.9 Mobile Technologies (DECT, GSM, CDMA2000-1x and etc.), Fundamental of satellitecommunication (tracking, Satellite orbits and Radio spectrum, satellite wavepropagation and satellite antennas).
4.10 UMTS, IMT-2000, NGN (Next Generation Network), real time protocol, VoIP, IP/PSTN platform, Overview to IN (Intelligent Network), Basics of GIS (GeographicalInformation System).

Section (B) – 50 Marks

5. Multimedia System, MIS and Web Engineering [1 x 10 Marks = 10]

5.1 Introduction: Global structure of Multimedia; Medium; Multimedia System and properties

5.2 Sound / Audio System: Concept of Sound System; Music and Speech; Speech Generation, Speech Analysis, Speech Transmission

5.3 Images and Graphics: Digital Image representation; Image and Graphics Format; Image Synthesis, analysis and transmission

5.4 Video and Animation: Video signal representation, computer video format; Computer based animation

5.5 Data Compression: Storage Space; Coding Requirements; Source, Entropy and Hybrid Coding; Lossy Sequential DCT- based Mode; Expanded Lossy DCT-based Mode; JPEG and MPEG

5.6 Information Systems and Decision Making; Knowledge Management.

5.7 The strategic use of Information Technology; Work Process Redesign (Reengineering) with Information Technology; Enterprise Resources Planning Systems

5.8 Information Systems Security, Information Privacy, and Global Information Technology issues

5.9 Introduction to Web Technology: Internet, Intranet, WWW, Static and Dynamic Web Page; Web Clients; Web Servers; Client Server Architecture: Single Tier, Two-Tier, Multi-Tier; HTTP: HTTP Request and Response; URL, Client Side Scripting, Server Side Scripting, Web 2.0

5.10 Hyper Text Markup Language: Introduction to HTML; Elements of HTML Document; HTML Elements and HTML Attributes, Headings, Paragraph, Division, Formatting; Image element; Anchors; Lists; Tables; Frames; Forms

5.11 Client Side Scripting with JavaScript

5.12 Basics of AJAX; Introduction to XML and its Application

6. Computer Network and Networks Theory [1 x 5 Marks = 5 , 1 x 10 Marks = 10]

6.1 Network Definition, Network Models, Connectivity, Network Addressing.

6.2 Network Connectivity: The Data Package, Establishing a Connection, Reliable Delivery, Network Connectivity, Noise Control, Building Codes, Connection Devices.

6.3 Advanced Network Theory: The OSI model, Ethernet, Network Resources, Token ring,FDDI, Wireless Networking.

6.4 Common Network Protocols: Families of Protocols NetBEUI, Bridge and Switches,TCP/IP Protocol, Building TCP/IP Network, TCP/IP Suite.

6.5 TCP/IP Services: Dynamic Host Configuration Protocol, DNS Name Resolution, NetBIOS support, SNMP, TCP/IP Utilities, FTP.

6.6 Network LAN Infrastructure: LAN Protocols on a Network, IP Routing, IP Routing Tables, Router Discovery Protocols, Data Movement in a Routed Network, Virtual LANs (VLANS) Network WAN Infrastructure: WAN Environment, Wan Transmission Technologies, Wan Connectivity Devices, Voice over Data Services.

6.7 Remote Networking: Remote Networking, Remote Access protocols, VPN Technologies. Computer Security: Computer Virus, Worm, Trojan horse. Network Security: Introduction, Virus Protection, Local Security, Network Access, Internet Security.

6.8 Disaster Recovery: Need for Disaster Recovery, Disaster Recovery plan, Data backup, Fault Tolerance Advanced Data Storage Techniques: Enterprise Data Storage, Clustering, Network Attached Storage, and Storage Area Networks.

6.9 Network Troubleshooting: Using Systematic Approach to Troubleshooting. Network Support Tools: Utilities, Network Baseline. Network Access Points (NAP), Common Network Component, Common Peripheral Ports

7. Information and Communications Technology (ICT)

[1 x 5 Marks = 5 , 1 x 10 Marks=10]

7.1 Computer architecture, microprocessor fundamental, microcomputer systems, paralleland serial interfaces.

7.2 RS-232 standards, flow charts, algorithms, variables, constants, data types, arithmeticexpressions, arrays, concept of Operating System.

7.3 Basic concept on internet, e-mail and web-page (such as DNS, IP, URL, http, ftp, IRQ,Routers).

7.4 Server (Web, email, printer), General concept of Cyber security (digital signature, SPAM, VIRUS, WORM, hiking, cracking), Unicode

7.5 Database Design issues, Data Mining, Data Warehousing. Knowledge Management, The strategic use of Information Technology

7.6 Work Process Redesign (Reengineering) with Information Technology, Enterprise Resources Planning Systems, and Information Systems Security, Information Privacy,and Global Information Technology issues

7.7 Software Supported Demonstrations including advanced Spreadsheet topics, SoftwareComponent Based Systems (CBSE)

7.8 Multimedia, Object-Oriented Programming with COMS & DECOMS, Group Decision Support Systems. Basics of Website Design

8. Artificial Intelligence and Advanced Topics in IT [1 x 10 Marks = 10]

8.1 Artificial Intelligence, Search: Uninformed search techniques- depth first search, breadth first search, depth limit search, and search strategy comparison; Informed search techniques-hill climbing, best first search, greedy search

8.2 Learning: Supervised Learning; Unsupervised Learning; Semi-supervised Learning; Reinforcement Learning; Neural Networks; Support Vector Machine (SVM); Self Organizing Map (SOM); Genetic Algorithms; Clustering; Decision Trees

8.3 Automated reasoning: FOPL; Knowledge Representation Languages. Basic Conceptsof Natural Language Processing (NLP)

8.4 Parallel and distributed computing

8.5 High speed networks

8.6 Software Architecture

8.7 Cryptography and network security

8.8 E-commerce

8.9 Software Project Management

8.10 Cloud Computing

8.11 Big Data Analytics

8.12 Internet of Things (IoT)

8.13 Machine Learning