

Hemchandracharya

North Gujarat University

Patan

Syllabus

for

Mobile Communication

Under the

Community College Scheme

Semester III & IV

Enforced from June-2015

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY
SYLLABUS FOR MOBILE COMMUNICATION
(Enforced from June - 2014)

OBJECTIVES:

The main objectives of the scheme are:

- (i) To make higher education relevant to the learner and the community;
- (ii) To integrate relevant skills into the higher education system;
- (iii) To provide skill based education to **students currently pursuing higher education** but actually interested in entering the workforce at the earliest opportunity;
- (iv) To provide employable and certifiable skills with necessary general education to Senior Secondary School pass-outs not willing to join existing higher education system;
- (v) To provide for up-gradation and certification of traditional / acquired skills of the learners irrespective of their age;
- (vi) To provide opportunities for community-based life-long learning by offering courses of general interest to the community for personal development and interest;
- (vii) To provide opportunity to move to higher education in future; and
- (viii) To offer bridge courses to certificate holders of general / vocational education, so as to bring them at par with appropriate NVEQF level

CC (MB.) R. 1

Any person who has taken the 10+2 qualification from recognized as equivalent there to may be admitted to the examination for the Course of Mobile Communication, after having fulfilled the requirements as laid down by the University and UGC from time to time.

CC (MB.) R. 2

A candidate, who are the regular student any of the course from any of the university he can take admission in CC and get skill up gradation knowledge.

CC (MB.) R. 3

The CC (MB) Programme is a part time course and consists of One Entry level and many exit level like

Certificate Course	–	06 Months
Diploma certificate Course	–	12 Months
Advanced Diploma certificate	-	02 Years

SYLLABUS FOR Community College (Mobile Communication)
(Enforced from June - 2014)

CC-MC R1: Eligibility Criteria (EC) for Admission

1. The eligibility condition to the program will be 10+2 or equivalent.
2. If the candidate has attained the specific level 4 of NOS of Fashion Industry sector (by decision of equivalence committee of the college) can get admitted in B. Voc. for the programme
3. There is no age bar for admission to Community College
4. The student can take exit from this course at any point of time and get re-entry in this programme.

Such students will get priority in admission than to a fresher student. (multi entry & multi exit scheme)

CC- MC R2: Admission Procedure

1. For admission to the programmes offered, preference should be given to the learners living in the local community. Reservation to SC,ST, OBC and PWD categories will be available as per the extant national / State policy.
2. Admission may be done on a rolling basis depending on the duration of the programmes to facilitate a steady stream of learners joining the college and moving out as trained work force to the job market, round the year and not just once in a year.
3. The applicants seeking re-entry into the college should get preference in admission over the new applicants.
4. Candidates are selected on the basis of Merit.

CC- MC R3 : Fees and Scholarship

1. Student fee should be decided as per the prevalent practice for fee fixation for aided courses.
2. Attempt should be made to recover part of the operating expenditure from the student fees.
3. In order to motivate students to join courses under the scheme, an amount of Rs. 1,000/- per month should be provided to the students under this scheme. This should be paid based on satisfactory attendance and result.

CC- MC R4 : Registration / Enrollment :

1. Every student admitted to the college for the programme must get enrolled to university within a month from the date of admission.

CC- MC R5 : Semester Examinations

1. Candidates desirous of appearing at any semester examination shall have to submit applications in the prescribed form, through the designated authority on or before the prescribed date.
2. No candidate will be admitted to any Semester examination unless the Designated Authority i.e. the Head of the Department or Principal of the College certifies that :
 - (i) The candidate attended the course of study to the satisfaction of the designated authority.
 - (ii) The candidate maintained a good conduct and character during the studies.
 - (iii) The candidate maintained minimum 80% attendance in each semester.

CC- MC R6 : Evaluation

1. Appropriate mechanism for assessment of the learners' progress towards acquisition of knowledge and skill should be developed by the College. Partner industries should also be given a clear and well defined role in the assessment of the learners.
2. Practical or hands on skills should be given comparatively more weightage in the overall assessment plan.
3. The CC should adopt and integrate the guidelines and recommendations of the respective Sector Skill Councils (SSCs) for the assessment and evaluation of the vocational component, wherever required. They should also involve the SSCs in the assessment process, wherever required. It applies to colleges, both Autonomous and non-autonomous and university to maintain Occupational Standards and the fitness for the job.

4. Theory of each CORE paper will be evaluated for a maximum of 100 marks out of which, 30 marks shall be for Continuous evaluation (Exams) and 70 marks for the end semester examination shall be of 2 hours duration.
6. Each Elective paper is evaluated for a maximum of 70 marks which will be evaluated internally by continuous evaluation.

CC- MC R7 : Rules for grading & Semester Passing Scheme

As per UGC Guidelines and Hemchandracharya North Gujarat University Rules

CC- MC R 8: Award of degree

1. Award of Certificate, Advanced certificate, Diploma or Advanced Diploma, as the case may be, would depend on acquisition of requisite credits as prescribed by the certification body and not on the calendar time spent in pursuing the course.
2. The certificate shall mention the credits earned course duration (in hours), and the curriculum covered. If the course is aligned with NVEQF / NSQF , the corresponding NVEQF / NSQF Level should also be mentioned on the certificate.
3. Award of degree will be as follows.

NSQF Level	Skill Components Credits	General Education Credits	Normal Duration	Exit Points/Awards
6	72	48	Four Semester	Advance Diploma
5	36	24	Two Semester	Diploma
4	18	12	one Semester	Certificate

SEMESTER-III

Sr. No.	Subject	Credit	Hours	Internal Examination	External Examination		Total
					Theory	Practical	
1	Basic Telecomm and Earthing System	04	60	30	70	---	100
2	Basics of Electronic Components	04	60	30	70	---	100
3	Wireless & Cellular Communications-II	04	60	30	70	---	100
4	Basic Mathematics-1	04	60	30	70	---	100
5	Computer Application-I	04	60	30	35	35	100
6	Telephone Exchange switching Theory- I	03	45	30	70	---	100
7	Detection and Estimation Theory	03	45	30	70	---	100
8	Repairing	04	60	---	---	100	100

SEMESTER-IV

Sr. No.	Subject	Credit	Hours	Internal Examination	External Examination		Total
					Theory	Practical	
1	Advance Data Communications	04	60	30	70	---	100
2	Advanced Digital Signal Processing	04	60	30	70	---	100
3	Satellite Communication	04	60	30	70	---	100
4	Basic Mathematics-II	04	60	30	70	---	100
5	Coding Theory and Communication	03	45	30	70	---	100
6	Telecommunication Switching systems and Networks	04	60	30	70	---	100
7	Network Security and cryptography	03	45	30	70	---	100
8	Comprehensive project	04	60	---	---	100	100

1 DIGITAL COMMUNICATION PRINCIPLES

Fundamental of Telecommunications: Transmission media: Guided and Unguided, Twisted pair cable (STP & UTP), Coaxial cable, fiber optic cable, radio waves, infrared, microwaves links & Satellite Communication. Propagation of signals at HF, VHF, UHF and microwave frequencies, Access- WLL/RLL, DECT, FTTL, WAN-Frame Relay, ATM.

Analog and Digital Communications: Fundamentals of signals, signal transmission and media, modulation & demodulation in analogue and digital systems, Sampling and data reconstructions, Quantization & coding, Time division and frequency division multiplexing, Basic information theory, Equalisation, amplification, crosstalk, attenuation. Digital Signal Processing: Discrete time signals and systems Z- transforms. Structures for digital filters. Frequency Transformations: Linear phase design. Introduction to DFT. Errors in digital filtering.

2 Basic Electronic Components - I

Unit – I Circuit Concepts

Electrical Quantities, Lumped Circuit Elements, Kirchhoff's Laws, Meters and Measurements, Analogy between Electrical and other Non-Electrical Physical Systems

Unit – II Circuit Analysis Techniques:

Thevenin and Norton Equivalent Circuits, Node-Voltage and Mesh-Current Analysis, Superposition and Linearity, Wye-Delta Transformation, Computer Aided Circuit Analysis

Reference Books:

1. Introduction to Electrical Engineering, M S Sarma, Oxford University Press

3 Wireless & Cellular Communications-I

UNIT I Introduction To Wireless / Cellular Communications And Standards

History and Evolution of mobile radio systems. Types of mobile wireless services/systems - Paging, Cordless, WL, Cellular Systems, WL, Satellite systems. Standards overview: AMPS, GSM, CDMA (IS-95), DECT, 3G – UMTS Network Architecture.

25%

Unit II - Cellular Concept And System Design Fundamentals

Cellular Concept and Frequency Reuse, Multiple Access Schemes, Channel Assignment, Handoff, Interference and System Capacity- Improving Coverage Capacity in Cellular Systems. Trunking and Erlang Capacity - Calculations.

30%

Unit III - Mobile Radio Propagation

Large Scale Path Loss : Introduction to Radio Propagation, Basic Propagation Mechanism, Propagation models (Free Space Propagation Model, Outdoor Models, Indoor Propagation Models), Small Scale Fading : Small Scale Multipath Fading, Types of Small Scale Fading and Parameters of Mobile Multipath Channels.

45%

REFERENCES

1. Kaveh Pahlavan & Allen H. Levesque, "Wireless Information Networks", by John Wiley & Sons, 2005.
2. William Stallings, "Wireless Communication & Networking", Pearson Education Asia, 2010.
3. Gordon L. Stuber, "Principles of Mobile Communication", Springer, 2011.

4 Basic Mathematics-I

I SET THEORY 40%

Sets, types of sets, subset, power set, null set, universal set, equality of two sets, complement of a set, union and intersection of sets, difference of two sets, Venn diagram law of algebra of sets, De Morgan Laws, Cartesian product of two sets and number of elements in a finite set.

II REAL NUMBER SYSTEM 20%

Definition of Natural numbers, Integers, Rational numbers & irrational numbers, Real numbers- absolute value and its properties.

II FUNCTION : 40%

Concepts of a function, domain, co-domain and range of a function, constant functions, real functions, different functions and their graphs - linear function, quadratic function, polynomial function, rational function, exponential function and logarithmic function, function in economic theory (demand, supply, consumption, revenue and cost function) equilibrium price.

Reference Books:

1. Business Mathematics, V. K. Kapoor, Sultan chand and sons, New Delhi.
2. Business Mathematics, Allen R. G. D., Pitamber publication house.
3. Quantitative Techniques in Management, Vohra N. D., Tata MacGraw –Hill Publishing Company, New Delhi.
4. Elements of Business Mathematics by Soni, Sharma and Saxena (Pitamber Publication)
5. Mathematics for Management and Computer Applications, Sharma J. K. , Galgotia Private Limited, New Delhi.

5 Computer Applications-I

I Introduction to Computers, Operating System, Windows & its Utilities

Computer system components, Input devices, Output devices, storage, devices, computer storage elements, types of computer, Applications of computers, advantages of using computer. Operating System: Introduction to operating system, Types of User Interfaces, Functions of Operating Systems Types of Operating Systems, Booting Process, Introduction to Windows, features of Windows, various versions, Components Of Windows Internet and Outlook : Internet and intranet , Most popular internet services, Functions of Internet like email, WWW, FTP, Usenet, IRC, instant, messaging, Internet Telephony Managing emails, Using address book, Working with task list, Scheduling appointments. **50%**

II MS Word

MS Word: Creating, navigating and editing Word documents, Formatting text of a document, Formatting , viewing and printing a document, Inserting and removing page breaks, Insert Header and footers, Viewing a document, Page set up of a document, Printing a document, Working with tables and graphics, Working with objects, Mail merge and labels, Spelling and grammar tools, Autocorrect, Auto text, Auto format, Inserting endnotes and footnotes, Working with columns, Inserting comments, Creating index and tables from the content of document, Counting words, Macros, Saving document with passwords. **50%**

University Examination Scheme (70-Marks) :

Theory Examination: 35 Marks

Practical Examination: 35 Marks

Reference Books:

1. PC Software, R. K. Taxali, Tata MacGraw Hill Publishing Company.
2. Working with Personal Computer Software (2nd Ed.) – R.P.Soni, Harshal Arolkar, Sonal Jain, Wiley –India Publications.
3. O-level- Module-I, II & III, Satish Jain, Sashank Jain, Sashi Singh & Dr. Madhulika Jain, BPB Publication.
4. Office 2003 in simple steps- Dreamtech Press.
5. Jain, V.K.; *Computers and Beginners*.

1 Telephone Exchange switching Theory - I

- a) Intelligent Network and Services: Overview of Intelligent Network architecture and functions of SSP, SCP, SMP, IP etc., Various types of IN services, Access codes for various IN services etc.
- b) Signaling Systems including CCS#7: Various signaling systems being used in the department for local and trunk network such as E/M, R2 modified, CCS#7 etc.
- c) ISDN: Overview of OSI layer, ISDN introduction and services, customer premises equipment
- d) Long Distance Switching: Overview of national transmission and signaling / synchronization plans.

2 Wireless and Cellular Telecommunications

Unit I - Modulation And Signal Processing 50%
Overview of Analog and Digital Modulation Techniques, Equalization – Classification, algorithms for Adaptive Equalization, Diversity Techniques, Rake Receiver Concepts. Fundamentals of Channel Coding.

Unit II - Intelligent Network For Wireless Communication 50%
Intelligent Cell Concept, Application for intelligent microcell Systems, In-Building Communication, MIMO, Advanced Intelligent Network(AIN) for Mobile Communication, Mesh Network / Adhoc Network – Introduction to Cooperative Communication Networks – Body Area Networks – Cognitive Radio Networks – Wireless Sensor Networks.

REFERENCES

1. Kaveh Pahlavan & Alen H. Levesque, “Wireless Information Networks”, by John Wiley & Sons, 2005.
2. William Stallings, "Wireless Communication & Networking", Pearson Education Asia, 2010.
3. Gordon L. Stuber, “Principles of Mobile Communication”, Springer, 2011.

3 Repairing

The course is divided into three parts -

1. Theory
2. Practicals
3. Practice

Hardware :**50%**

- * Basics of Mobile Communication.
- * Tools & instruments used in mobile phone repairing.
- * Various components used in mobile phones.
- * Basic parts of mobile phones (mic, speaker, buzzer, LCD, antenna, etc).
- * Use of Multimeter.
- * Use of Battery Booster.
- * Basic Circuit Board/ Motherboard Introduction.
- * Assembling & disassembling of different mobile phones.
- * Soldering & Desoldering Components Using Different Soldering Tools.
- * Names of Different ICs.
- * Work of Different ICs.
- * Working on SMD/ BGA ICs and the PCB.
- * Fault finding & Troubleshooting.
- * Jumpering Techniques.
- * Troubleshooting through circuit diagrams.
- * Repairing procedure for repairing different hardware faults.

Software :**50%**

- * Flashing
- * Formatting
- * Unlocking
- * Use of secret codes
- * Downloading
- * Bluetooth/ infrared

4 Basic Mathematics-II

III DETERMINANT AND MATRIX

50%

Meaning of matrix and types of matrices- Null matrix, square matrix. Identity matrix, symmetric matrix and skew symmetric matrix, transpose of a matrix, orthogonal matrix, addition, subtraction and multiplication of matrices, determinants and their basic properties (without proof), singular and non singular matrices, inverse of a matrix, adjoint of a matrix, solution of simultaneous equations (for two and three variables only) using inverse of matrix.

III CO-ORDINATE GEOMETRY

50%

Co-ordinate of points, slope and intercepts of a straight line, equation of a straight line, different forms of equations of a straight line - (1) $\frac{y-y_1}{y_1-y_2} = \frac{x-x_1}{x_1-x_2}$. (2) $y-y_1 = m(x-x_1)$. (3) $y = mx + c$ (4) $\frac{x}{a} + \frac{y}{b} = 1$. General equation of a straight line, concurrent lines, angle between two straight lines, distance between two points area of a triangle and quadrilateral, collinearity of three points.

Reference Books:

1. Business Mathematics, V. K. Kapoor, Sultan chand and sons, New Delhi.
2. Business Mathematics, Allen R. G. D., Pitamber publication house.
3. Quantitative Techniques in Management, Vohra N. D., Tata MacGraw –Hill Publishing Company, New Delhi.
4. Elements of Business Mathematics by Soni, Sharma and Saxena (Pitamber Publication)
5. Mathematics for Management and Computer Applications, Sharma J. K. , Galgotia Private Limited, New Delhi.

5 Computer Application - II

I MS Excel

50%

Introduction To Excel, Concept of workbook, worksheet, workspace, Types of data, Formatting workbook, Sorting Data Advanced Excel , Data validation, Data filter (Auto & Advance), Charts, What if analysis, Protecting Worksheet. **25%**

Functions and formulas:

1. Mathematical: Round, ceil floor, fact, subtotal, sum , sum if
2. Logical : AND, OR, NOT, if
3. Statistical: Min, max, avg, count if
4. Text: Concatenate, Exact, find, left, right, lower, upper, trim
6. Date and Time: Date, day, days360, hours, minute, now, second, time, today, year, date
7. Financial Functions: FV, IPMT, NPER, NPV, PMT, PV, Rate Data analysis : Standard deviation, Variance correlation, z-test, Chi-square).

II MS PowerPoint

50%

Creating , browsing & saving Presentation, Editing & formatting slides, Linking multiple slides using hyperlinks and advance buttons, Using slide layouts, Adding notes to the slides, Editing and formatting slides, Working with slide masters, Inserting objects on the slide, Animating objects, Slide transitions, Choosing preset animations, Triggering animations, Applying sound effects to animation effects, Playing videos, Slide show, Custom Show **25%**

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2. Working with Personal Computer Software (2nd Ed.) – R.P.Soni, Harshal Arolkar, Sonal Jain, Wiley –India Publications.
3. O-level- Module-I, II & III, Satish Jain, Sashank Jain, Sashi Singh & Dr. Madhulika Jain, BPB Publication.
4. Office 2003 in simple steps- Dreamtech Press.
5. Jain, V.K.; *Computers and Beginners*.

Advance Data Communications

- UNIT -I: Digital Modulation Schemes:** BPSK, QPSK, 8PSK, 16PSK, 8QAM, 16QAM, DPSK – Methods, Band Width Efficiency, Carrier Recovery, Clock Recovery.
- UNIT -II: Basic Concepts of Data Communications, Interfaces and Modems:** Data Communication Networks, Protocols and Standards, UART, USB, I2C, I2S, Line Configuration, Topology, Transmission Modes, Digital Data Transmission, DTE-DCE interface, Categories of Networks – TCP/IP Protocol suite and Comparison with OSI model.
- UNIT -III: Error Correction:** Types of Errors, Vertical Redundancy Check (VRC), LRC, CRC, Checksum, Error Correction using Hamming code **Data Link Control:** Line Discipline, Flow Control, Error Control **Data Link Protocols:** Asynchronous Protocols, Synchronous Protocols, Character Oriented Protocols, Bit-Oriented Protocol, Link Access Procedures.
- UNIT -IV: Multiplexing:** Frequency Division Multiplexing (FDM), Time Division Multiplexing (TDM), Multiplexing Application, DSL. **Local Area Networks:** Ethernet, Other Ether Networks, Token Bus, Token Ring, FDDI. **Metropolitan Area Networks:** IEEE 802.6, SMDS **Switching:** Circuit Switching, Packet Switching, Message Switching. **Networking and Interfacing Devices:** Repeaters, Bridges, Routers, Gateway, Other Devices.

SATELLITE COMMUNICATIONS

- UNIT -I: Communication Satellite: Orbit and Description:** A Brief history of satellite Communication, Satellite Frequency Bands, Satellite Systems, Applications, Orbital Period and Velocity, effects of Orbital Inclination, Azimuth and Elevation, Coverage angle and slant Range, Eclipse, Orbital Perturbations, Placement of a Satellite in a Geo-Stationary orbit.
- UNIT -II: Satellite Sub-Systems:** Attitude and Orbit Control system, TT&C subsystem, Attitude Control subsystem, Power systems, Communication subsystems, Satellite Antenna Equipment. **Satellite Link:** Basic Transmission Theory, System Noise Temperature and G/T ratio, Basic Link Analysis, Interference Analysis, Design of satellite Links for a specified C/N, (With and without frequency Re-use), Link Budget.
- UNIT -III: Propagation Effects:** Introduction, Atmospheric Absorption, Cloud Attenuation, Tropospheric and Ionospheric Scintillation and Low angle fading, Rain induced attenuation, rain induced cross polarization interference. **Multiple Access:** Frequency Division Multiple Access (FDMA) - Intermodulation, Calculation of C/N

UNIT -IV: **Earth Station Technology:** Transmitters, Receivers, Antennas, Tracking Systems, Terrestrial Interface, Power Test Methods, Lower Orbit Considerations. **Satellite Navigation and Global Positioning Systems:** Radio and Satellite Navigation, GPS Position Location Principles, GPS Receivers, GPS C/A Code Accuracy, Differential GPS.

TELECOMMUNICATION SWITCHING SYSTEMS AND NETWORKS

UNIT -I: **Introduction:** Evolution of Telecommunications, Simple Telephone Communication, Basics of Switching System, Manual Switching System, Major Telecommunication Networks. **Crossbar Switching:** Principles of Common Control, Touch Tone Dial Telephone, Principles of Crossbar Switching, Crossbar Switch Configurations, Cross point Technology, Crossbar Exchange Organization.

UNIT -II: **Electronic Space Division Switching:** Stored Program Control, Centralized SPC, Distributed SPC, Software Architecture, Application Software, Enhanced Services, Two-Stage Networks, Three-Stage Networks, n- Stage Networks. **Time Division Switching:** Basic Time Division Space Switching, Basic Time Division Time Switching, Time Multiplexed Space Switching, Time Multiplexed Time Switching, Combination Switching, Three- Stage Combination Switching, n- Stage Combination Switching.

UNIT -III: **Telephone Networks:** Subscriber Loop System, Switching Hierarchy and Routing, Transmission Plan, Transmission Systems, Numbering Plan, Charging Plan, Signaling Techniques, In-channel Signaling, Common Channel Signaling, Cellular Mobile Telephony **Signaling:** Customer Line Signaling, Audio- Frequency Junctions and Trunk Circuits, FDM Carrier Systems, PCM Signaling, Inter- Register Signaling, Common- Channel Signaling Principles, CCITT Signaling System no.6, CCITT Signaling System no.7, Digital Customer Line Signaling.

UNIT -IV: **Packet Switching:** Statistical Multiplexing, Local- Area and Wide- Area Networks, Large-scale Networks, Broadband Networks. **Switching Networks:** Single- Stage Networks, Gradings, Link Systems, Grades of service of link