8. ADMISSION TO DUAL DEGREE BCA-MCA PROGRAMS (REGULAR)

TU offers dual degree BCA-MCA programs of five years duration (10 Semesters):

8.1 BCA-MCA program (Regular Mode)

Eligibility:

10+2 or equivalent examination with at least 60% marks in aggregate of any three of the subjects namely Physics, Mathematics, Chemistry and Biology.

Mode of Admission:

Admission shall be made on the basis of merit of the entrance test to be conducted online by the University across India. The candidates having minimum 20% (15% for SC/ST) in the entrance test shall only be considered for admission.

Note: The program shall run only if minimum 10 students are admitted.

No. of Seats: 30 (Gen-21, SC/ST-8, PH-1)+ 5 FN/NRI seats. Refer section 13 for eligibility & other conditions.
In addition to above seats, 1% over and above seats are reserved for children of employees of Thapar University. The candidates seeking admission under this category are required to satisfy the eligibility as mentioned above for General candidates.

Admission Schedule:

	Date
Last date for receipt of completed application forms.	June 10, 2013
Date of Entrance test to be conducted by TU	ONLINE Entrance test (**June 26 – 30, 2013**) Browse www.thapar.edu for details
Display of result of Entrance Test	July 08,2013

Counselling including deposit of fee : July 16, 2013
Last round of counselling for vacant seats if any : July 29, 2013

Salient features of the Programme:

i) Unique in India.

ii) To provide a platform for interdisciplinary courses of Computer Science and Engineering.

iii) To bring the young minds in the area of Computer Applications.

iv) To give an Exit option after 3 years with degree of BCA

v) To give an option to medical background students to enter into field of Computer Applications

Entrance Examination

The question paper will have four sections and will include questions on (1) biology (2) mental ability (3) mathematics and (4) physics. Sections of mental ability and physics are compulsory to attempt whereas Candidates may opt one out of mathematics OR biology. All sections carry equal marks. The questions will be of objective type with four answers given for each question. Wrong answers will be awarded negative marks. Duration of the paper will be 1.5 hours consisting of 75 questions.

The syllabus for the entrance examination is given below:

Mathematics (25 questions)

Algebra:

Algebra of complex numbers, addition, multiplication, conjugation, polar representation, properties of modulus and principal argument, triangle inequality, cube roots of unity, geometric interpretations.

Sets and their Representations, Union, intersection and complements of sets, and their algebraic properties, Relations, equivalence relations, mappings, one- one, into and onto mappings, composition of mappings.

Quadratic equations with real coefficients, relations between roots and coefficients, formation of quadratic equations with given roots, symmetric functions of roots.

Arithmetic, geometric and harmonic progressions, arithmetic, geometric and harmonic means, sums of finite arithmetic and geometric progressions, infinite geometric series, sums of squares and cubes of the first n natural numbers. Logarithms and their properties.

Permutations and combinations, Binomial theorem for a positive integral index, properties of binomial coefficients.

Matrices as a rectangular array of real numbers, equality of matrices, addition, multiplication by a scalar and product of matrices, transpose of a matrix, determinant of a square matrix of order up to three, inverse of a square matrix of order up to three, properties of these matrix operations, diagonal, symmetric and skew-symmetric matrices and their properties, solutions of simultaneous linear equations in two or three variables.

Analytical geometry:

Two Dimensions:

Cartesian coordinates, distance between two points, section formulae, shift of origin. Equation of a straight line in various forms, angle between two lines, distance of a point from a line; Lines through the point of intersection of two given lines, equation of the bisector of the angle between two lines, concurrency of lines; Centroid, orthocentre, incentre and circumcentre of a triangle. Equation of a circle in various forms, equations of tangent, normal and chord. Parametric equations of a circle, intersection of a circle with a straig ht line or a circle, equation of a circle through the points of intersection of

two circles and those of a circle and a straight line. Equations of a parabola, ellipse and hyperbola in standard form, their foci, directrices and eccentricity, parametric equations, equations of tangent and normal.

Three Dimensions:

Direction cosines and direction ratios, equation of a straight line in space, equation of a plane, distance of a point from a plane.

Differential Calculus:

Limit and continuity of a function, limit and continuity of the sum, difference, product and quotient of two functions, L'Hospital rule of evaluation of limits of functions. Even and odd functions, inverse of a function, continuity of composite functions, intermediate value property of continuous functions. Derivative of a function, derivative of the sum, difference, product and quotient of two functions, chain rule, derivatives of polynomial, rational, trigonometric, inverse trigonometric, exponential and logarithmic functions. Derivatives of implicit functions, derivatives up to order two, geometrical interpretation of the derivative, tangents and normals, increasing and decreasing functions, maximum and minimum values of a function, Rolle's Theorem and Lagrange's Mean Value Theorem.

Integral Calculus:

Integration as the inverse process of differentiation, indefinite integrals of standard functions, definite integrals and their properties, Fundamental Theorem of Integral Calculus. Integration by parts, integration by the methods of substitution and partial fractions, application of definite integrals to the determination of areas involving simple curves.

Differential equations:

Formation of ordinary differential equations, solution of homogeneous differential equations, separation of variables method, linear first order differential equations.

Statistics and Probability:

Measures of Central Tendency and Dispersion: Calculation of mean, median, mode of grouped and ungrouped data. Calculation of standard deviation, variance and mean deviation for grouped and ungrouped data. Addition and multiplication rules of probability, conditional probability, Bayes Theorem, independence of events, computation of probability of events using permutations and combinations.

MATHEMATICAL REASONING:

Statements, logical operations and, or, implies, implied by, if and only if. Understanding of tautology, contradiction, converse and contrapositive.

PHYSICS (25 questions)

PHYSICS AND MEASUREMENT :

Physics, technology and society, S I units, Fundamental and derived units. Least count, accuracy and precision of measuring instruments, Errors in measurement, Significant figures. Dimensions of Physical quantities, dimensional analysis and its applications.

KINEMATICS:

Frame of reference. Motion in a straight line: Position-time graph, speed and velocity. Uniform and non-uniform motion, average speed and instantaneous velocity Uniformly accelerated motion, velocity-time, position- time graphs, relations for uniformly

accelerated motion. Scalars and Vectors, Vector addition and Subtraction, Zero Vector, Scalar and Vector products, Unit Vector, Dot and Cross product of two vectors ,Scalar Triple Products and their geometrical interpretation, Resolution of a Vector. Relative Velocity, Motion in a plane, Projectile Motion, Uniform Circular Motion.

OSCILLATIONS AND WAVES :

Periodic motion – period, frequency, displacement as a function of time. Periodic functions. Simple harmonic motion (S.H.M.) and its equation; phase; oscillations of a spring -restoring force and force constant; energy in S.H.M. – kinetic and potential energies; Simple pendulum – derivation of expression for its time period; Free, forced and damped oscillations, resonance.

Wave motion. Longitudinal and transverse waves, speed of a wave. Displacement relation for a progressive wave. Principle of superposition of waves, reflection of waves, Standing waves in strings and organ pipes, fundamental mode and harmonics, Beats, Doppler effect in sound.

ELECTROSTATICS:

Electric charges: Conservation of charge, Coulomb's law-forces between two point charges, forces between multiple charges; superposition principle and continuous charge distribution.

Conductors and insulators, Dielectrics and electric polarization, capacitor, combination of capacitors in series and in parallel, capacitance of a parallel plate capacitor with and without dielectric medium between the plates, Energy stored in a capacitor.

CURRRENT ELECTRICITY:

Electric current, Drift velocity, Ohm's law, Electrical resistance, Resistances of different materials, V-I characteristics of Ohmic and nonohmic conductors, Electrical energy and power, Electrical resistivity, Colour code for resistors; Series and parallel combinations of resistors; Temperature dependence of resistance.

OPTICS:

Reflection and refraction of light at plane and spherical surfaces, mirror formula, Total internal reflection and its applications, Deviation and Dispersion of light by a prism, Lens Formula, Magnification, Power of a Lens,

ELECTRONIC DEVICES:

Semiconductors; semiconductor diode: I-V characteristics in forward and reverse bias; diode as a rectifier; I-V characteristics of LED, photodiode, solar cell and Zener diode; Zener diode as a voltage regulator. Junction transistor, transistor action, characteristics of a transistor; transistor as an amplifier (common emitter configuration) and oscillator. Logic gates (OR, AND, NOT, NAND and NOR). Transistor as a switch.

COMMUNICATION SYSTEMS:

Propagation of electromagnetic waves in the atmosphere; Sky and space wave propagation, Need for modulation, Amplitude and Frequency Modulation, Bandwidth of signals, Bandwidth of Transmission medium, Basic Elements of a Communication System (Block Diagram only)

Analytical Ability(25 Questions)

The questions in this section will cover, quantitative reasoning, Data interpretation and Logical reasoning

Quantitative Reasoning:

Arithmetic
Ratios and Proportion, Ratios, Percentages, Profit & Loss, Averages, Partnership, Time-Speed-Distance, Work and time, Number system, HCF, LCM, Number Base System, BODMAS,Alligation & Mixtures, Work, Pipes and Cisterns, Simple Interest & Compound Interest, Installment Payments, Clocks, Calendar.

Algebra

Set Theory, Venn Diagram, Quadratic and linear equations

Mensuration and solid Geometry (Lines, angles, Triangles, Spheres, Rectangles, cube, etc.

Data interpretation

Data Interpretation based on text, Data Interpretation based on graphs and tables. Graphs can be Column graphs, Bar Graphs, Line charts, Pie Chart, Graphs representing Area.

Logical Reasoning

Critical reasoning, Visual reasoning, Assumption-Premise-Conclusion, Assertion and reasons, Statements and assumptions, identifying valid inferences, Statements and conclusions, Cause and Effect, Identifying Probably true, Probably false, definitely true, definitely false kind of statement, Symbol Based problems, Coding and decoding , Sequencing , identifying next number in series etc.

Biology (25 questions)

Cell Biology: Cell theory Cell as a unit of life. Tools and techniques of cell studies – Microscopy, Biomembranes -Transport mechanism, cellular respiration, Cell organelles: their structure and functions. Structure of DNA, replication, transcription and translation, principles of the basic techniques in molecular biology.

Zoology: Anatomy and Physiology: Digestive System, Respiratory System, Circulatory System, Excretory System, Nervous System, Sense organs, Reproductive System, Developmental Biology. Diversity of Animal Life: Principles of Classification, animal phyla up to classes (invertebrates) and upto sub-classes/order (vertebrates), Genetics and Evolution,

Mitosis and Meiosis, Mendel's laws of inheritance, Ecology: Physical and biological factors influencing organisms. Food chains, pyramids of numbers and biomass, biological equilibrium. Interspecific associations.

Botany: Meristems -Plant growth and development. Internal and external regulators of growth and development in plants, internal structure of root, stem, secondary growth and

leaves; Xylem and Phloem-their cell elements and functions: Internal structure of dicot and monocot leaves; photosynthesis, history, importance, factors and mechanism, stomatal mechanism, transpiration and respiration. Absorption and cell-water relations, transport of water and minerals, tropic and turgor movements. Significance of life-cycles with special reference to alternation of generations as exemplified in Funaria, Selaginella and Pinus (No structural details). Systematics: Principles of classical and new systematics. Familiarity with taxa, Environmental pollution and preventive measures