Office of the Dean Academic

Indian Institute of Engineering Science and Technology, Shibpur

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No: 1964/Exam   Date: July 26, 2021

NOTICE TO 7TH SEMESTER STUDENTS OF UG & DD PROGRAMME
(ENGINEERING BRANCH ONLY)

The students of 7th Semester of UG & DD courses are hereby informed that they have to submit the preferences of the open elective subjects through the below mentioned Google Form and the said selection has to be completed on or before July 30, 2021. Selection will be made based on CGPA. The final list will be published in the Institute website. The lists of subjects along with the syllabus to be offered for the 7th Semester students are attached with this Notification.

Maximum and minimum numbers of students that may be allotted to each subject of 7th semester Open Electives are 45 and 15 respectively. If any student fails to submit preference within the above mentioned time then any subject shall be allotted to him/her.

As per the regulation prevailing for these students a subject offered by any department can be taken by the students of other departments as well as the students of the same department also. Each subject is of 3 credits with full marks of 100.

Google Link: https://forms.gle/UJ7TmcthfYVYHynn6

This is issued with the concurrence of the Dean (Academic)

Sd/-
Dr.Nirmalya Kumar Bhattacharyya
Deputy Registrar (Academic)

No. 1964/1(5) Exam   Date: July 26, 2021

Copy forwarded for information and necessary action to:

1. All Heads of the Departments
2. The Chairman-SUGC
3. The Student Senate
4. The Academic Section - File
5. Institute Website

Deputy Registrar (Academic)
IIEST, Shibpur

Indian Institute of Engineering Science & Technology,Shibpur

List of Open Elective offered for 7th Semester B.Tech. Courses (Odd Semester AY 2021-2022)

Sl. No	Name of the Department offering the subject	Name of the Open Elective Subject	Code of the subject	Syllabus
1	Computer Science and Technology	Soft Computing	CS731/2	Fuzzy Logic, Genetic Algorithms and other Optimisation techniques, Artificial Neural Networks
2	Information Technology	Computational Geometry	IT 731/2	1. Computational Geometry: Introduction, degeneracy and robustness, Application domains 2. Orthogonal range searching (in brief): kd-tree, range tree, Lower Bounds on Algebraic tree model and Geometric data structures (DCEL) 3. The Maximal Points Problem (closest pair and farthest pair), Geometric searching, Slab method, Range searching 4. Point Location and Triangulation, triangulating monotone polygon 4 5. Convex Hull, Different Paradigms, Voronoi Diagram and Delaunay Triangulation, and Quickhull 6. Line segment intersection, Linear programming, Intersection of convex polygons, planes 7. Clustering Point Sets using Quadtrees and Applications 8. Introduction using Basic Visibility Problems, visibility graph and edge and applications to robot path planning 9. Shape Analysis and Shape Comparison 10 Intersection and union of rectangles and largest empty space recognition 11. Some applications and case studies
3	Metallurgy and Materials Engineering	Selection of Engineering Materials	MT731/1	Selection of Engineering Materials: 1. Relationship between processing— structure-properties of various engineering materials, Materials selection criteria-shape, micro structural factors, performance criteria in service and other strategic requirements of engineering components to be designed. Economic considerations. 2. Technologically important material properties-physical, mechanical, chemical, thermal optical and electrical properties, Materials used in important engineering sectors. 3.Types of design, materials data and design tools, Methodology for selection of materials for the components, selection of processes to meet the design requirements, Systematic selection process-pertinent case studies, Multiple constraints; its handling strategies.

4	Electronics and Telecommunication Engineering	Satellite Communication	ET 731/1	1 Overview of Satellite Communication: Historical background of satellite communication, Classification of satellites, General structure of satellite communication, Satellite frequency allocation and bands, Different applications of satellites. 2 Satellites orbits and inclination: Selection of orbits, Look angles, Orbital perturbation, Sun transit outage. 3 Spacecraft and its subsystem: Altitude and orbit control system, Telemetry Tracking and command, Power system, Communication Subsystems, Antenna Subsystems, Reliability & space qualification, Different launch vehicles and launch mechanisms. 4 Satellite Link Design: General link design equation, System noise temperature, C/N and G/T ratio, Uplink design, Down link design, Complete link design, Satellite link design with specified (C/N), Dependence of (C/N) ratio on earth station parameters. 5 Analog Satellite communications: FDM, Generation of FM signal, FM with multiplexed telephone signal. Companded Single Side Band (CSSB) system, Single channel per carrier (SCPC), Analog television transmission. 6 Digital Satellite Communication: Digital base band signal transmission, Digital modulation techniques, Digital transmission of voice and TV signal, Digital demodulation techniques, 7 Multiple Access technique: TDMA, FDMA, CDMA, SDMA, , Mixed access system, DAMA, PAMA and RMA techniques. 8 Encoding & forward error correction: Error detection coding- linear block code, cyclic code, Golay code, convolution code, Automatic repeat request, implementation of error detection and correction methods in satellite link. 9 Inter-satellite link: LEO-LEO, LEO-MEO, LEO-GEO, GEO-GEO. 10 Earth station Technology: Subsystem of an earth station, Small earth station, different types of earth stations, Frequency co-ordination, Earth station of future. 11 Special purpose communication satellites: DBS, INMARSAT, VSAT, MSAT, GPS, RADARSAT, INTELSAT, INSAT, Regional satellites
5	Mechanical Engineering	Power Plant Engineering	ME-731/1	Thermal: Site selection, layout and material estimation. Team power plant performance and auxiliaries, Plant control systems, Coal& ash handling systems. Water chemistry. Binary vapour and Combined cycles. Fluctuating loads in power plants, Economic analysis of power plants and Tariffs. Hydel: Hydro electric power plant. Site selection, Hydrograph, Classification. Dam Type, Storage type, Mini and Micro Hydel plants. Nuclear reactors and nuclear power plants, Environmental aspects of power generation
6	Mechanical Engineering	Metal Forming	ME-731/3	Terminology and classification; Fundamentals of hot and cold working processes; Load estimation for bulk deformation (forging, rolling, extrusion, drawing); Metal forming defects

7	Humanities and Social Sciences	Popular Culture & Literature	HU731/1	In this course, popular culture and literature will be investigated by highlighting the relationship between literary texts and comics/ graphic novels/ cartoon novels. A number of questions on the theories of popular culture and cultural studies shape the syllabus and provide a framework for approaching the course materials. Reading popular literature as an example of mass culture, highly commodified and deeply implicated in consumer capitalism; determining the ways in which popular literature reflects, inscribes, and challenges dominant ideologies; decoding the influence of classic comics on literary narratives; tracing the origins of the familiar aspects of graphic novels to literary texts and broader cultural concerns; and emphasizing the ways in which contemporary graphic novels bring a new kind of seriousness of purpose to comics, thereby, blurring the boundaries between the highbrow and the lowbrow, comprise the kernel of the course. The course envisages an analysis of three novels and one film spread over one semester
8	Humanities and Social Sciences	Indian Writing in English	HU731/2	Brief introduction to social, political and literary history of Indian Writing in English, Introduction to the theories and debates surrounding the genre, Evolution of the genre, Introduction to the major writers , Close reading of the selected texts , Enhancing vocabulary and linguistic competency through the process of reading.
9	Civil Engineering	Environmental Management	CE – 731/4	Industrial activity and the environment Environmental Regulations and International Protocols Life cycle assessment Pollution prevention planning and Improved manufacturing operations Design for the environment Toward a sustainable society

10	Electrical Engineering	Electricity Conservation & Environmental Management	EE731/1	01 Introduction: Concept of energy, energy scenario, conversion of energy to electrical form, energy and society, review of conventional and non-conventional energy sources and their potential, electrical energy generation, distribution and utilization pattern. 02 Pollution and Control: Type of atmospheric pollution (air, water, noise, radiation, etc). Industry wise pollutants, pollution from conventional power generating stations/ sources, & automobile, pollution from nuclear power and uses of PV cells 03 Environmental Analysis: Environmental change, ecosystem, resource depletion, effects, Land use - Government action and Environmental Organization 04 Electrical Energy utilization: Concept of energy efficiency of electrical appliances. Installation, repair and general maintenance of appliances for efficiency improvement. 05 Energy Management: Load dispatch mechanism and energy management at regional and national level, load scheduling, SCADA and EMS. 06 Conservation Methods: Institutional role of energy conservation, related case studies. In transmission and distribution, electric power drives, traction, lighting, heating, refrigeration and air-conditioning, agricultural appliances. 07 Energy Conservation & Environment Protection policy: General awareness energy police and planning economics of energy management, Kyoto protocol, CDM, Carbon Capture and related topics

11	Electrical Engineering	Illumination Engineering	EE731/2	1. Sources of light: Day light, artificial light source; energy radiation, visible spectrum of radiation, black body radiation and full radiator. 2. Production of light: Incandescence, dependence of light o/p on temperature. Theory of gas discharge. 3. Perception of light and colour: optical system of human eye, eye as visual processor. Reflection, refraction and other behaviors of light. Mesopic Photometry 4. Measurement of light — radiometric and photometric quantities and their units of measurement. Standardization, measurement of light distribution, direct & diffused reflection, fundamental concept of colorimeters and measurement of color. 5. Types of lamps: GLS Tungsten —halogen, Discharge, low pressure sodium vapour, high pressure sodium mercury vapour, fluorescent, Metal- halide IR and UV lamps, their construction , filament material , theory of operation , life , characteristics and application Xenon Lamps, LED lamps, Fibre Optic and Laser Lighting 6. Design of Lighting: Objectives and specification of lighting & system design of luminaire; their electrical circuits and auxiliaries. Basic Lighting Design Considerations and Lighting parameters for interior lighting, exterior lighting and day lighting 7. Other aspects of Lighting: Design and Installation of Lighting Systems, Smart Control and Energy efficient lighting; the physiological effects of lighting , 8. A Case Study with Lighting design Software to learn an optimized design approach
12	Aerospace Engineering and Applied Mechanics	Finite Element Method	AE731/1	1 Overview of Finite Element Method (FEM): Basic concept; Historical background; Engineering applications; Introduction to Displacement, Force and Mixed Formulations 2 Basic procedure : Discretization – Basic element shapes, Node numbering scheme; Interpolation model - Order of polynomial, Generalized and Natural co-ordinates, Convergence requirement, Patch test; Illustrations 3 Derivation of Characteristic Matrices : Introduction to Direct approach, Variational approach (Raleigh-Ritz) and Weighted Residual Approach (Collocation, Least Square, Galerkin); Derivation of Finite Element equations using Variational and Weighted Residual Approach; Introduction to Strong and Weak Form formulation; Illustrations 4 Assembly and Derivation of System Equations : Co-ordinate Transformation; Assemblage; Substitution of Boundary Conditions. 5 Numerical Solution of FEM Equations : Introduction to Band solver and Skyline technique; Applications to Equilibrium and Eigen value problems 6 Concluding Remarks: Comparison with other established numerical methods; Introduction to popular FEM packages

13.	Mathematics	Operations Research	MA-731/1	1. Duality: Concept of duality- Formulation of primal-dual problems, Rules for forming dual problem from a primal problem in L.P.P., Fundamental properties of duality, Duality and simplex method. 2. Transportation Problem: Introduction, Mathematical model of transportation problem, Finding initial basic feasible solution, Optimality test unbalanced transportation problem. 3. Assignment Problem: Introduction, Mathematical formulation of assignment problem, Solution of an assignment problem, Unbalanced assignment problem, The travelling salesman problem. 4. Integer Programming: Introduction, Gomory's cutting plane method for solution of integer programming problem, Branch and bound method for solution integer programming problem. 5. Sensitivity Analysis: Introduction, Changes in the cost parameters, Changes in the requirement parameters, Addition and deletion of a new variable, Addition and deletion of a new constraints. 6. Non-linear Programming: Introduction, Lagranges method for solution of a non-linear programming problem, Non-linear programming with equality and inequality constraints, KhunTucker conditions, Solutions using KTP conditions.
14.	Mathematics	Classical and quantum information theory	MA-731/2	1. Classical Information Theory: Probability spaces, Characterization of information by Shannon's entropy. Basic properties of entropy, entropy rate, conditional entropy and information, Relative entropy. 2. Types of Channels: Information channels, stationery properties of channels. Data processing inequality. 3. Mathematical Background of Quantum Information: The description of Ket vectors. Operator theory in Ket space. Quantum evolution operator, Quantum measurement. 4. Classical-bit or Qubit: Definition of qubits as units of quantum information. Comparison of qubits with classical bits. 5. Entanglement: Quantum entanglement- definition and elementary properties. Bell's states and GHZ –states as entangled states. 6. Measurement: Measures of quantum entanglement through quantum entropy. Uses of entangled states as quantum information resources. Maximally entangled states. The quantum no-cloning theorem. The quantum no-deletion principle. 7. Teleportation: Transmission of quantum information. The teleportation protocols for single qubits and multi-qubits.

For details about the courses, please refer website of the respective departments who are offering the subjects