



Jawaharlal Nehru Engineering College

MGM Campus, CIDCO, Aurangabad - 431003

Website: <https://mgmu.ac.in/>, <https://www.jnec.org>

Information

for

**Engineering and Architecture CET Examination
MGMU – CET 2021 (M.Tech./M.Arch./MCA)**

for

**Admission to First Year of Two-Year Full-Time Post
Graduate Degree Program (M.Tech., MCA, M.Arch.)
in Engineering & Technology and Architecture
(For Academic Year 2021-22)**

POSTGRADUATE PROGRAMMES

JNEC, MGM University Aurangabad invites applications to its 4 Semester on-campus postgraduate programmes for the year 2021 – 2022. Admissions are open for the following programmes to be offered in MGM University Aurangabad.

Name of The Program	Approved Intake	Duration
M.Tech. Computer Science and Engineering (Digital Transformation)	18	2 Years
M.Tech. Electrical Power Systems	18	2 Years
M.Tech. Mechanical Engineering	18	2 Years
M.Tech. Structural Engineering	18	2 Years
M.Tech. VLSI and Embedded Systems	18	2 Years
Masters in Architecture (Environmental Architecture)	20	2 Years
Masters in Architecture (General)	20	2 Years
Master of Computer Applications	60	2 Years

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Help line number for Technical Assistance for Online application form filling is For MGMU - CET 2021:

M.Tech.: 9404494299

MCA: 8275247705

M.Arch.: 9422711881

website: mgmu.ac.in, jnec.org

1. EXAMINATION SCHEDULE FOR MGMU - CET 2021 (M.Tech./M.Arch./MCA).

Important Information for MGMU PG Entrance Examination (Online Proctored)

Schedule	M.Tech.	MCA	M.Arch.
Online registration of Application Form on website	Already Started	Already Started	Already Started
Payment (Rs. 900/-)	Online	Online	Online
Date and Time	5 th August 2021 11 am / 2 pm	5 th August 2021 11 am / 2 pm	5 th August 2021 11 am / 2 pm
Duration of Examination	1 hour	1hour	1 hour
Declaration of Result	Result will be communicated to the candidate on the registered email id.		

2. INTRODUCTION

- (a) The MGM University Aurangabad has established "ADMISSION REGULATING AUTHORITY AND In-charge Engineering Entrance Exam Cell" as per the Maharashtra Act No XXVI of 2019).
- (b) The In-charge MGMU - CET 2021 Cell, appointed by competent authority is authorized to conduct MGMU - CET 2021 (M.Tech./M.Arch/MCA) and selection of candidates for admission to 2 Year Duration Full Time Post Graduate Degree programs in "Engineering and Technology" and "Architecture", for the academic year 2021-22.
- (c) The Registrar, MGM University Aurangabad has notified the rules to regulate the admissions to the First Year of Full Time Professional Post-graduate programs in "Engineering and Technology" and "Architecture. The admissions shall be carried out as per these Rules and its amendment from time to time.

3. DEFINITIONS

- (a) "Act" means The MGM University, Aurangabad (Regulation of Admissions and Fees) Act, 2019 (Act XXVI of 2019);
- (b) "All India Seats" means seats available to an eligible Indian National Candidate;
- (c) "Application Form" means prescribed form filled up online by the Candidate for admission;
- (d) "Competent Authority" means the Registrar, MGMU Aurangabad.
- (e) "Program" means the postgraduate technical courses in "Engineering and

Technology” and “Architecture.

- (f) “Eligible Candidates” means the candidates who are eligible for different professional courses as notified by the MGMU, Aurangabad.
- (g) “Bachelor of Engineering” and/or “Bachelor of Technology” means A degree from AICTE approved Institute.
- (h) “Bachelor of Architecture” means A degree from council of Architecture approved Institute.
- (i) “GATE” means the Graduate Aptitude Test which is conducted by the IIT.
- (j) “Qualifying Examination” means examinations on the basis of which a candidate becomes eligible for admission or its equivalent examination;
- (k) “COA” means Council of Architecture;
- (l) “EEE” means Engineering Entrance Examination,

4. SCHEME OF EXAMINATION

4.1 MGMU - CET 2021 (M.Tech.)

(a) Pattern and Weightage of Examination:

Sections	Weightage in %	No. of questions	Marks per Questions	Max. Marks	Total Marks
General Aptitude	15%	9	1	9	9
Engineering Mathematics	15%	9	1	9	9
Branch Specific: 1. Computer Science & Engineering (Digital Transformation) 2. Mechanical Engineering 3. Electrical Power Systems 4. Structural Engineering 5. VLSI and Embedded Systems	70%	42	1	42	42
Total	100%	60	1	60	60

Important Instructions to the MGMCET2021 (M.Tech.) candidates.

- The Online Question Paper will contain Multiple Choice Questions (MCQs) with Four options (answers) for each question.
- Each question will have Four alternatives (answers) out of which only one alternative/answer will be the correct.
- There is no Negative Marking.
- The Questions will be displayed on the computer screen one at a time. Candidates are advised not to spend too much time on any particular question.

- Questions will be available in English language only.

4.1.1 Syllabus for MGMU - CET 2021 (M.Tech. in Computer Science & Engineering (Digital Transformation)):

Section 1: General Aptitude

Verbal Aptitude: Basic English grammar: Tenses, articles, adjectives, prepositions, conjunctions, verb-noun agreement, and other parts of speech Basic vocabulary: words, idioms, and phrases in context Reading and comprehension Narrative sequencing.

Quantitative Aptitude: Data interpretation: data graphs (bar graphs, pie charts, and other graphs representing data), 2- and 3-dimensional plots, maps, and tables Numerical computation and estimation: ratios, percentages, powers, exponents and logarithms, permutations and combinations, and series Mensuration and geometry Elementary statistics and probability.

Analytical Aptitude: Logic: deduction and induction; Analogy Numerical relations and reasoning.

Spatial Aptitude: Transformation of shapes: translation, rotation, scaling, mirroring, assembling, and grouping Paper folding, cutting, and patterns in 2 and 3 dimensions

Section2: Engineering Mathematics

Discrete Mathematics: Propositional and first order logic, Sets, relations, functions, partial orders and lattices. Monoids, Groups. Graphs: connectivity, matching, coloring. Combinatorics: counting, recurrence relations, generating functions.

Linear Algebra: Matrices, determinants, system of linear equations, eigenvalues and eigenvectors, LU decomposition.

Calculus: Limits, continuity and differentiability. Maxima and minima. Mean value theorem. Integration.

Probability and Statistics: Random variables. Uniform, normal, exponential, poisson and binomial distributions. Mean, median, mode and standard deviation. Conditional probability and Bayes theorem.

Section 3: Computer Science & Engineering

Digital Logic: Boolean algebra. Combinational and sequential circuits. Minimization. Number representations and computer arithmetic (fixed and floating point).

Computer Organization and Architecture: Machine instructions and addressing modes. ALU, data-path and control unit. Instruction pipelining, pipeline hazards. Memory hierarchy: cache, main memory and secondary storage; I/O interface (interrupt and DMA mode).

Programming and Data Structures: Programming in C. Recursion. Arrays, stacks, queues, linked lists, trees, binary search trees, binary heaps, graphs.

Algorithms: Searching, sorting, hashing. Asymptotic worst-case time and space complexity. Algorithm design techniques: greedy, dynamic programming and

divide-and-conquer. Graph traversals, minimum spanning trees, shortest paths

Theory of Computation: Regular expressions and finite automata. Context-free grammars and push-down automata. Regular and context free languages, pumping lemma. Turing machines and undecidability.

Compiler Design: Lexical analysis, parsing, syntax-directed translation. Runtime environments. Intermediate code generation. Local optimization, Data flow analyses: constant propagation, liveness analysis, common sub-expression elimination.

Operating System: System calls, processes, threads, inter-process communication, concurrency and synchronization. Deadlock. CPU and I/O scheduling. Memory management and virtual memory. File systems.

Databases: ER-model. Relational model: relational algebra, tuple calculus, SQL. Integrity constraints, normal forms. File organization, indexing (e.g., B and B+ trees). Transactions and concurrency control.

Computer Networks: Concept of layering: OSI and TCP/IP Protocol Stacks; Basics of packet, circuit and virtual circuit-switching; Data link layer: framing, error detection, Medium Access Control, Ethernet bridging; Routing protocols: shortest path, flooding, distance vector and link state routing; Fragmentation and IP addressing, IPv4, CIDR notation, Basics of IP support protocols (ARP, DHCP, ICMP), Network Address Translation (NAT); Transport layer: flow control and congestion control, UDP, TCP, sockets; Application layer protocols: DNS, SMTP, HTTP, FTP, Email.

4.1.2 Syllabus for MGMU - CET 2021 (M.Tech. in Electrical Power Systems):

Section-1 General Aptitude

Verbal Ability: English grammar, sentence completion, verbal analogies, word groups, instructions, critical reasoning and verbal deduction.

Numerical Ability: Numerical computation, numerical estimation, numerical reasoning and data interpretation.

Section 2: Engineering Mathematics

Linear Algebra: Matrix Algebra, Systems of linear equations, Eigenvalues, Eigenvectors.

Calculus: Mean value theorems, Theorems of integral calculus, Evaluation of definite and improper integrals, Partial Derivatives, Maxima and minima, Multiple integrals, Fourier series, Vector identities, Directional derivatives, Line integral, Surface integral, Volume integral, Stokes's theorem, Gauss's theorem, Divergence theorem, Green's theorem.

Differential equations: First order equations (linear and nonlinear), Higher order linear differential equations with constant coefficients, Method of variation of parameters, Cauchy's equation, Euler's equation, Initial and boundary value problems, Partial Differential Equations, Method of separation of variables.

Complex variables: Analytic functions, Cauchy's integral theorem, Cauchy's integral formula, Taylor series, Laurent series, Residue theorem, Solution integrals.

Probability and Statistics: Sampling theorems, Conditional probability, Mean, Median, Mode, Standard Deviation, Random variables, Discrete and Continuous distributions, Poisson distribution, Normal distribution, Binomial distribution, Correlation analysis, Regression analysis.

Section 3: Electrical Power Systems

Electric circuits: Network elements: ideal voltage and current sources, dependent sources, R, L, C, M elements; Network solution methods: KCL, KVL, Node and Mesh analysis; Network Theorems: Thevenin's, Norton's, Superposition and Maximum Power Transfer theorem; Transient response of dc and ac networks, sinusoidal steady-state analysis, resonance, two port networks, balanced three phase circuits, star-delta transformation, complex power and power factor in ac circuits.

Electromagnetic Fields: Coulomb's Law, Electric Field Intensity, Electric Flux Density, Gauss's Law, Divergence, Electric field and potential due to point, line, plane and spherical charge distributions, Effect of dielectric medium, Capacitance of simple configurations, Biot-Savart's law, Ampere's law, Curl, Faraday's law, Lorentz force, Inductance, Magnetomotive force, Reluctance, Magnetic circuits, Self and Mutual inductance of simple configurations.

Signals and Systems: Representation of continuous and discrete time signals, shifting and scaling properties, linear time invariant and causal systems, Fourier series representation of continuous and discrete time periodic signals, sampling theorem, Applications of Fourier Transform for continuous and discrete time signals, Laplace Transform and Z transform.

Electrical Machines

Single phase transformer: equivalent circuit, phasor diagram, open circuit and short circuit tests, regulation and efficiency; Three-phase transformers: connections, vector groups, parallel operation; Auto-transformer, Electromechanical energy conversion principles; DC machines: separately excited, series and shunt, motoring and generating mode of operation and their characteristics, speed control of dc motors; Three-phase induction machines: principle of operation, types, performance, torque-speed characteristics, no-load and blocked-rotor tests, equivalent circuit, starting and speed control; Operating principle of single-phase induction motors; Synchronous machines: cylindrical and salient pole machines, performance and characteristics, regulation and parallel operation of generators, starting of synchronous motors; Types of losses and efficiency calculations of electric machines

Power Systems: Basic concepts of electrical power generation, ac and dc transmission concepts, Models and performance of transmission lines and cables, Series and shunt compensation, Electric field distribution and insulators, Distribution systems, Per-unit quantities, Bus admittance matrix, Gauss-Seidel and Newton-Raphson load flow methods, Voltage and Frequency control, Power factor correction, Symmetrical components, Symmetrical and unsymmetrical fault analysis, Principles of over-current, differential, directional and distance protection; Circuit breakers, System stability concepts, Equal area criterion, Economic Load Dispatch (with and without considering transmission losses).

Control Systems: Mathematical modeling and representation of systems, Feedback principle, transfer function, Block diagrams and Signal flow graphs, Transient and Steady-state analysis of linear time invariant systems, Stability analysis using Routh-Hurwitz and Nyquist criteria, Bode plots, Root loci, Lag, Lead and Lead-Lag compensators; P, PI and PID

controllers; State space model, Solution of state equations of LTI systems, R.M.S. value, average value calculation for any general periodic waveform.

Electrical and Electronic Measurements: Bridges and Potentiometers, Measurement of voltage, current, power, energy and power factor; Instrument transformers, Digital voltmeters and multimeters, Phase, Time and Frequency measurement; Oscilloscopes, Error analysis.

Analog and Digital Electronics: Simple diode circuits: clipping, clamping, rectifiers; Amplifiers: biasing, equivalent circuit and frequency response; oscillators and feedback amplifiers; operational amplifiers: characteristics and applications; single stage active filters, Sallen Key, Butterworth, VCOs and timers, combinatorial and sequential logic circuits, multiplexers, demultiplexers, Schmitt triggers, sample and hold circuits, A/D and D/A converters.

Power Electronics: Static V-I characteristics and firing/gating circuits for Thyristor, MOSFET, IGBT; DC to DC conversion: Buck, Boost and Buck-Boost Converters; Single and three-phase configuration of uncontrolled rectifiers; Voltage and Current commutated Thyristor based converters; Bidirectional ac to dc voltage source converters; Magnitude and Phase of line current harmonics for uncontrolled and thyristor based converters; Power factor and Distortion Factor of ac to dc converters; Single-phase and three-phase voltage and current source inverters, sinusoidal pulse width modulation.

4.1.3 Syllabus for MGMU - CET 2021 (M.Tech. in Mechanical Engineering):

Section-1 General Aptitude

Logical/ Abstract Reasoning: This shall include the questions to measure how quickly and logically you can think. This section will cover logical situations and questions based on the facts given in the passage. This test shall check the problem-solving capability of the candidate.

English comprehension and verbal ability: Questions in this section will be designed to test the candidate's general understanding of the English language. There will be questions on the topics such as Basic English grammar, Vocabulary, comprehension, synonyms antonyms, sentence correction, word & phrases, jumbled paragraph.

Section 2: Engineering Mathematics:

Algebra: Fundamental operations in Algebra, Expansion, factorization, Quadratic equations, indices, logarithms, arithmetic, geometric and harmonic progressions, binomial theorem, permutations and combinations.

Co-ordinate Geometry: Rectangular Cartesian co-ordinates, equations of a line, mid-point, intersections etc., equations of a circle, distance formulae, pair of straight

lines, parabola, ellipse and hyperbola, simple geometric transformations such as translation, rotation, scaling.

Differential Equations: Differential equations of first order and their solutions, linear differential equations with constant coefficients, homogenous linear differential equations.

Trigonometry: Simple identities, trigonometric equations, properties of triangles, solution of triangles, height and distance, inverse function.

Probability and Statistics: Basic concepts of probability theory, Averages, Dependent and independent events, frequency distributions, and measures of dispersions, skewness and kurtosis, random variable and distribution functions, mathematical expectations, Binomial, Poisson, normal distributions, curve fitting, and principle of least squares, correlation and regression.

Arithmetic: Ratios and proportions, problems on time-work, distance-speed, percentage, etc.

Basic Set Theory and Functions: Set, relations and mappings.

Menstruation: areas, triangles and quadrilaterals, area and circumference of circles, volumes and surface areas of simple solids such as cubes, spheres, cylinders and cones.

Section 3: Mechanical Engineering:

Applied Mechanics and Design: Engineering Mechanics, Mechanics of Materials, Theory of Machines, Vibrations, Machine Design.

Fluid Mechanics and Thermal Sciences: Fluid Mechanics, Heat-Transfer, Thermodynamics, Turbo machinery.

Materials, Manufacturing and Industrial Engineering: Engineering Materials, Casting, Forming and Joining Processes, Machining and Machine Tool Operations, Metrology and Inspection, Computer Integrated Manufacturing, Production Planning and Control, Inventory Control, Operations Research.

4.1.4 Syllabus for MGMU - CET 2021 (M.Tech. in Structural Engineering)):

Section 1: General Aptitude:

Logical/ Abstract Reasoning: This shall include the questions to measure how quickly and logically you can think. This section will cover logical situations and questions based on the facts given in the passage. This test shall check the problem solving capability of the candidate.

English comprehension and verbal ability: Questions in this section will be designed to test the candidate's general understanding of the English language. There will be questions on the topics such as Basic English grammar, Vocabulary, comprehension, synonyms antonyms, sentence correction, word & phrases, jumbled paragraph.

Section 2: Engineering Mathematics:

Linear Algebra: Matrix algebra; Systems of linear equations; Eigen values and Eigen vectors.

Calculus: Functions of single variable; Limit, continuity and differentiability; Mean

value theorems, local maxima and minima; Taylor series; Evaluation of definite and indefinite integrals, application of definite integral to obtain area and volume; Partial derivatives; Total derivative; Gradient, Divergence and Curl, Vector identities; Directional derivatives; Line, Surface and Volume integrals.

Ordinary Differential Equation (ODE): First order (linear and non-linear) equations; higher order linear equations with constant coefficients; Euler-Cauchy equations; initial and boundary value problems.

Partial Differential Equation (PDE): Fourier series; separation of variables; solutions of one- dimensional diffusion equation; first and second order one-dimensional wave equation and two-dimensional Laplace equation.

Probability and Statistics: Sampling theorems; Conditional probability; Descriptive statistics - Mean, median, mode and standard deviation; Random Variables – Discrete and Continuous, Poisson and Normal Distribution; Linear regression.

Numerical Methods: Error analysis; Numerical solutions of linear and non-linear algebraic equations; Newton's and Lagrange polynomials; numerical differentiation; Integration by trapezoidal and Simpson's rule; Single and multi-step methods for first order differential equations.

Section 3: Structural Engineering

Engineering Mechanics: System of forces, free-body diagrams, equilibrium equations; Internal forces in structures; Frictions and its applications; Centre of mass; Free Vibrations of undamped SDOF system. Solid Mechanics: Bending moment and shear force in statically determinate beams; Simple stress and strain relationships; Simple bending theory, flexural and shear stresses, shear centre; Uniform torsion, Transformation of stress; buckling of column, combined and direct bending stresses.

Structural Analysis: Statically determinate and indeterminate structures by force/energy methods; Method of superposition; Analysis of trusses, arches, beams, cables and frames; Displacement methods: Slope deflection and moment distribution methods; Influence lines; Stiffness and flexibility methods of structural analysis.

Construction Materials and Management: Construction Materials: Structural Steel - Composition, material properties and behaviour; Concrete - Constituents, mix design, short-term and long-term properties. Construction Management: Types of construction projects; Project planning and network analysis - PERT and CPM; Cost estimation.

Concrete Structures: Working stress and Limit state design concepts; Design of beams, slabs, columns; Bond and development length; Prestressed concrete beams.

Steel Structures: Working stress and Limit state design concepts; Design of tension and compression members, beams and beam- columns, column bases; Connections - simple and eccentric, beam-column connections, plate girders and trusses; Concept of plastic analysis - beams and frames.

Geotechnical Engineering: Soil Mechanics: Three-phase system and phase relationships, index properties; Unified and Indian standard soil classification

system; Permeability - one dimensional flow, Seepage through soils – two - dimensional flow, flow nets, uplift pressure, piping, capillarity, seepage force; Principle of effective stress and quicksand condition; Compaction of soils; One-dimensional consolidation, time rate of consolidation; Shear Strength, Mohr's circle, effective and total shear strength parameters, Stress-Strain characteristics of clays and sand; Stress paths.

Foundation Engineering: Sub-surface investigations - Drilling bore holes, sampling, plate load test, standard penetration and cone penetration tests; Earth pressure theories Rankine and Coulomb; Stability of slopes – Finite and infinite slopes, Bishop's method; Stress distribution in soils – Boussinesq's theory; Pressure bulbs, Shallow foundations – Terzaghi's and Meyerhoff's bearing capacity theories, effect of water table; Combined footing and raft foundation; Contact pressure; Settlement analysis in sands and clays; Deep foundations - dynamic and static formulae, Axial load capacity of piles in sands and clays, pile load test, pile under lateral loading, pile group efficiency, negative skin friction.

Water Resources Engineering: Fluid Mechanics: Properties of fluids, fluid statics; Continuity, momentum and energy equations and their applications; Potential flow, Laminar and turbulent flow; Flow in pipes, pipe networks; Concept of boundary layer and its growth; Concept of lift and drag.

Hydraulics: Forces on immersed bodies; Flow measurement in channels and pipes; Dimensional analysis and hydraulic similitude; Channel Hydraulics - Energy-depth relationships, specific energy, critical flow, hydraulic jump, uniform flow, gradually varied flow and water surface profiles.

Hydrology: Hydrologic cycle, precipitation, evaporation, evapo-transpiration, watershed, infiltration, unit hydrographs, hydrograph analysis, reservoir capacity, flood estimation and routing, surface run-off models, ground water hydrology - steady state well hydraulics and aquifers; Application of Darcy's Law. Irrigation: Types of irrigation systems and methods; Crop water requirements - Duty, delta, evapo-transpiration; Gravity Dams and Spillways; Lined and unlined canals, Design of weirs on permeable foundation; cross drainage structures.

Environmental Engineering: Water and Waste Water Quality and Treatment: Basics of water quality standards – Physical, chemical and biological parameters; Water quality index; Unit processes and operations; Water requirement; Water distribution system; Drinking water treatment. Sewerage system design, quantity of domestic wastewater, primary and secondary treatment. Effluent discharge standards; Sludge disposal; Reuse of treated sewage for different applications.

Air Pollution: Types of pollutants, their sources and impacts, air pollution control, air quality standards, Air quality Index and limits.

Municipal Solid Wastes: Characteristics, generation, collection and transportation of solid wastes, engineered systems for solid waste management (reuse/ recycle, energy recovery, treatment and disposal).

Transportation Engineering: Transportation Infrastructure: Geometric design of highways - cross-sectional elements, sight distances, horizontal and vertical alignments. Geometric design of railway Track – Speed and Cant. Concept of airport

runway length, calculations and corrections; taxiway and exit taxiway design.

Highway Pavements: Highway materials - desirable properties and tests; Desirable properties of bituminous paving mixes; Design factors for flexible and rigid pavements; Design of flexible and rigid pavement using IRC codes. **Traffic Engineering:** Traffic studies on flow and speed, peak hour factor, accident study, statistical analysis of traffic data; Microscopic and macroscopic parameters of traffic flow, fundamental relationships; Traffic signs; Signal design by Webster's method; Types of intersections; Highway capacity.

Geomatics Engineering: Principles of surveying; Errors and their adjustment; Maps scale, coordinate system; Distance and angle measurement - Levelling and trigonometric levelling; Traversing and triangulation survey; Total station; Horizontal and vertical curves. Photogrammetry and Remote Sensing - Scale, flying height; Basics of remote sensing and GIS.

4.1.5 Syllabus for MGMU - CET 2021 (M.Tech. in VLSI and Embedded Systems):

Section-1 General Aptitude

Verbal Ability: English grammar, sentence completion, verbal analogies, word groups, instructions, critical reasoning and verbal deduction.

Numerical Ability: Numerical computation, numerical estimation, numerical reasoning and data interpretation.

Section-2 Engineering Mathematics

Linear Algebra: Vector space, basis, linear dependence and independence, matrix algebra, eigenvalues and Eigenvectors, rank, solution of linear equations – existence and uniqueness.

Calculus: Mean value theorems, theorems of integral calculus, evaluation of definite and improper integrals, partial derivatives, maxima and minima, multiple integrals, line, surface and volume integrals, Taylor series.

Differential Equations: First order equations (linear and nonlinear), higher-order linear differential equations, Cauchy's and Euler's equations, methods of solution using a variation of parameters, complementary function and particular integral, partial differential equations, variable separable method, initial and boundary value problems.

Vector Analysis: Vectors in plane and space, vector operations, gradient, divergence and curl, Gauss's, Green's and Stoke's theorems.

Complex Analysis: Analytic functions, Cauchy's integral theorem, Cauchy's integral formula; Taylor's and Laurent's series, residue theorem.

Numerical Methods: Solution of nonlinear equations, single and multi-step methods for differential equations, convergence criteria.

Probability and Statistics: Mean, median, mode and standard deviation; combinatorial probability, probability distribution functions - binomial, Poisson, exponential and normal; Joint and conditional probability; Correlation and regression analysis.

Section-3 Electronics and Communication Engineering

Network Methods: Nodal and mesh analysis; Network theorems: superposition, Thevenin and Norton's, maximum power transfer; Wye-Delta transformation; Steady state sinusoidal analysis using phasors; Time-domain analysis of simple linear circuits; Solution of network equations using Laplace transform; Frequency domain analysis of RLC circuits; Linear 2-port network parameters: driving point and transfer functions; State equations for networks.

Electronic Devices: Energy bands in intrinsic and extrinsic silicon; Carrier transport: diffusion current, drift current, mobility and resistivity; Generation and recombination of carriers; Poisson and continuity equations; P-N junction, Zener diode, BJT, MOS capacitor, MOSFET, LED, photodiode and solar cell; Integrated circuit fabrication process: oxidation, diffusion, ion implantation, photolithography and twin-tub CMOS process.

Analog and Digital Circuits: Small signal equivalent circuits of diodes, BJTs and MOSFETs; Simple diode circuits: clipping, clamping and rectifiers; Single-stage BJT and MOSFET amplifiers: biasing, bias stability, BJT and MOSFET amplifiers: multi-stage, differential, feedback, power and operational; Simple op-amp circuits; Active filters; 555 timers; Power supplies.

Number systems; Combinatorial circuits: Boolean algebra, minimization of functions using Boolean identities logic gates, multiplexers, decoders and PLAs; Sequential circuits: latches and flip-flops, counters, shift-registers and finite state machines; Data converters: sample and hold circuits, ADCs and DACs; Semiconductor memories: ROM, SRAM, DRAM; 8-bit microprocessor (8085): architecture, programming, memory and I/O interfacing.

Control Systems: Basic control system components; Feedback principle; Transfer function; Block diagram representation; Signal flow graph; Transient and steady-state analysis of LTI systems; Frequency response; Routh-Hurwitz and Nyquist stability criteria; Bode and root-locus plots; Lag, lead and lag-lead compensation; State variable model and solution of state equation of LTI systems.

Communications: Analog communications: amplitude modulation and demodulation, angle modulation and demodulation, spectra of AM and FM, super heterodyne receivers, circuits for analog communications; Information theory: entropy, mutual information and channel capacity theorem.

PCM, DPCM, digital modulation schemes, amplitude, phase and frequency shift keying (ASK, PSK, FSK), QAM, MAP and ML decoding, matched filter receiver, calculation of bandwidth, SNR and BER for digital modulation; Fundamentals of error correction, Hamming codes; Timing and frequency synchronization, inter-symbol interference and its mitigation; Basics of TDMA, FDMA and CDMA.

Electromagnetics: differential and integral forms and their interpretation, boundary conditions, wave equation, Poynting vector; Plane waves and properties: reflection and refraction, polarization, phase and group velocity, propagation through various media, skin depth;

4.2 MGMU - CET 2021 (MCA)

The Online EEE would be comprised of four sections viz Mathematics and Statistics, Logical/ Abstract reasoning, English comprehension and verbal ability and Computer Concepts of total 100 marks with composite time of 60 minutes duration.

Syllabus:

Mathematics and Statistics:

The question paper will cover the following topics of high school mathematics (up to the 12th Standard)

- Algebra: Fundamental operations in Algebra, Expansion, factorization, Quadratic equations, indices, logarithms, arithmetic, geometric and harmonic progressions, binomial theorem, permutations and combinations.
- Co-ordinate Geometry: Rectangular Cartesian co-ordinates, equations of a line, mid-point, intersections etc., equations of a circle, distance formulae, pair of straight lines, parabola, ellipse and hyperbola, simple geometric transformations such as translation, rotation, scaling.
- Differential Equations: Differential equations of first order and their solutions, linear differential equations with constant coefficients, homogenous linear differential equations.
- Trigonometry: Simple identities, trigonometric equations, properties of triangles, solution of triangles, height and distance, inverse function.
- Probability and Statistics: Basic concepts of probability theory, Averages, Dependent and independent events, frequency distributions, and measures of dispersions, skewness and kurtosis, random variable and distribution functions, mathematical expectations, Binomial, Poisson, normal distributions, curve fitting, and principle of least squares, correlation and regression.
- Arithmetic: Ratios and proportions, problems on time-work, distance-speed, percentage, etc.
- Basic Set Theory and Functions: Set, relations and mappings.
- Mensuration: areas, triangles and quadrilaterals, area and circumference of circles, volumes and surface areas of simple solids such as cubes, spheres, cylinders and cones.

Logical/ Abstract Reasoning:

- This shall include the questions to measures how quickly and logically you can think. This section will cover logical situations and questions based on the facts given in the passage. This test shall check the problem-solving capability of the candidate.
- English comprehension and verbal ability:
- Questions in this section will be designed to test the candidate's general understanding of the English language. There will be questions on the topics such as Basic English grammar,

- Vocabulary, comprehension, synonyms antonyms, sentence correction, word & phrases, jumbled paragraph.

Computer Concepts:

- Computer Basics: Organization of a computer, Central Processing Unit (CPU), Structure of instructions in CPU, input / output devices, computer memory, memory organization, back-up devices.
- Data Representation: Representation of characters, integers, and fractions, binary and hexadecimal representations, Binary Arithmetic: Addition, subtraction, division, multiplication, signed arithmetic and two's complement arithmetic, floating point representation of numbers, normalized floating point representation, Boolean algebra, truth tables, Venn diagrams.
- Computer Architecture: Block structure of computers, communication between processor and I / O devices, interrupts.
- Computer Language: Assembly language and high-level language, Computer Programming in C.
- Operating System basics

Marking Scheme and duration

Sr. No.	Section	No. of Questions	Marks per Question	Maximum Marks	Total Marks
1.	Mathematics & Statistics	15	2	30	100
2.	Logical/ Abstract Reasoning	15	2	30	
3.	English comprehension and verbal ability	10	2	20	
4.	Computer Concepts	10	2	20	
The test will comprise of multiple-choice objective type questions (Four Options)					
There is no Negative Marking					

4.3 MGMU - CET 2021 (M.Arch)

The Online test will have 50 Questions based on Topics given below.

S.No	Topics	No of questions	marks per Question	Max. Marks	Total Marks
1	Building Construction Technology and Materials: Building systems, Building Science and services, Concept of green building, Construction materials.	10	2 Marks	20 Marks	100 Marks
2	Environment: Concept, Ecology and landscape design, Environment laws and regulations, Environment design strategies w.r.t site.	10	2 Marks	20 Marks	
3	Architecture History and Humanities: Awareness of Art and culture and architectural theory, major architecture movements in the world and in India.	10	2 Marks	20 Marks	
4	Human Settlement planning: Urbanization, Urbanism, Urban and rural system, History of Settlement, planning theory and legislation.	10	2 Marks	20 Marks	
5	Current Architecture Practice: Awareness of National building code. Town planning laws and development control regulation, knowledge of Regulatory and professional bodies on architecture.	10	2 Marks	20 Marks	
Test Duration 60 minutes , Mode of Examination – Online					

5. ELIGIBILITY FOR ADMISSION TO FIRST YEAR POST GRADUATE DEGREE IN ENGINEERING/ TECHNOLOGY

5.1 Eligibility Criteria: Program: Master of Technology (M.Tech.)

The candidate should fulfill the following eligibility criteria:

- The candidate should be an Indian National;
- Passed Bachelor Degree in the relevant field of Engineering and Technology from All India Council for Technical Education or Central or State Government approved institutions (or equivalent) with at least 50% marks (at least 45% marks in case of candidates of Backward class categories and persons with disability belonging to Maharashtra State only).
- Candidates appearing for final year of qualifying examination are also eligible to appear for MGMU - CET 2021 (M.Tech).

5.2 Eligibility Criteria: Program: Master of Computer Applications (MCA)

The candidate should fulfill the following eligibility criteria:

- The candidate should be an Indian National;
- Passed minimum three-year duration Bachelor's Degree awarded by University recognized by University Grants Commission or Association of Indian Universities in any discipline with at least 50% marks in aggregate or equivalent (at least 45% in case of candidates of backward class categories and Persons with Disability belonging to Maharashtra State only);
- Studied Mathematics as one of the subjects at (10+2) level or at Graduate level examination; for B.Sc./B.Com./B.A. (Candidates appearing for final year of qualifying examination are also eligible to appear for MGMU - CET 2021).

5.3 Eligibility Criteria: Program: Masters in Architecture (M.Arch)

The candidate should fulfill the following eligibility criteria:

- The candidate should be an Indian National
- The candidate with a minimum of 50 % marks in aggregate (at least 45% marks in case of Candidates of Backward class categories and persons with disability belonging to Maharashtra State only) in a Bachelor of Architecture degree course or equivalent courses recognized by the Council of Architecture.
- Candidates appearing for final year of qualifying examination are also eligible to appear for MGMU - CET 2021 (M.Arch).

6. ONLINE APPLICATION FORM

Application Form for MGMU - CET 2021 (M.Tech./M.Arch./MCA) will be filled through Online Mode only. For submission of online application form the candidates should visit www.mgmu.ac.in or www.jnec.org website.

The online entrance examination application submission is three steps process:

1. Applicant needs to fill entrance examination application Form on www.mgmu.ac.in/admissions/jnec, <https://jnec.org/>
2. Applicant needs to pay entrance exam fees of Rs. 900/-.
3. Applicant will get entrance exam link to his/her login.

Fees once paid will not be refundable under any circumstances. For all Category Candidates from Maharashtra State, Outside Maharashtra State (OMS), J & K Migrant candidates the application fees for MGMU - CET 2021 is RS. 900/-.

7. Download Hall ticket:

The candidate can download his/her hall ticket, for MGMU - CET 2021 from his/her Log-In ID . Issue of Hall ticket is merely an enabling document for appearing the MGMU - CET 2021 and does not imply that the candidate satisfies all the requirements of eligibility conditions of admission.

Important Note:

- a) Incomplete application forms will be rejected. Application form sent by post/courier will not be entertained and hence be rejected. The candidate shall submit one and only one application form.
- b) In any case, the candidate has cancelled his/her application, the fees paid for the same will not be refunded under any circumstances.
- c) The email id and mobile number entered in the application form for validation will be treated as primary contact details and all communications will be sent to the same.
- d) In case of mail is not received in INBOX, candidate should check the Spam / Junk Folder of his/her E-mail.
- e) Candidates are advised to check their emails on regular basis.

8. CONDUCT AND DISCIPLINE

- Failure of the candidate in entering full and correct information in the online application form and/or suppression of any information would lead to disqualification of the candidate for MGMU - CET 2021 or even at later date. Such a candidate will be debarred from the examination / entire selection process.
- Adopting an unfair means or engaging in malpractice in the examination shall render a candidate liable for punishment under and disqualify the candidate for MGMU - CET 2021 examination.
- Any issue not dealt here-in above will be dealt with, when arising, fully and

finally by the competent authority. Any amendments made by Registrar, MGM University Aurangabad from time to time will be implemented.