QP Series Code : **BD**

অসম দক্ষতা বিশ্ববিদ্যালয়

ASSAM SKILL UNIVERSITY
(A Govt of Assam University)

# Assam Skill University Entrance Examinations 2026
# M.TECH. IN CIVIL ENGINEERING
## (Paper No. : 11)

Full Marks : 100 Time : 130 minutes

*Total number of pages in this booklet : 16*

**DO NOT OPEN THE QUESTION BOOKLET UNTIL YOU ARE INSTRUCTED**

*All candidates are required to read the instructions given below, before starting to write the answers. Ensure to write your ROLL NUMBER AT THE BOTTOM OF THIS PAGE.*

## Instructions

1. Candidate should keep his/her admit card on the table with his/her latest photograph pasted on it.
2. There are 100 MCQs meant for applicants **for admission in M.Tech. in Civil Engineering**. All questions are compulsory. MCQS are as per the given syllabus.
3. Each question carries 1 mark. There is no negative marking. **Full marks : 100**.
4. The answers are to be given by making proper marking on the **OMR with ball point Black pen** only in separate OMR sheets.
5. No loose sheet is allowed. Rough work, if required, may be done on the blank pages at the end of this question paper.
6. Talking with any other candidate inside the examination hall may lead to disqualification of the candidate.
7. **OMRs must to be signed by the candidate and the invigilator**. **The candidate has to ensure the same, because lack of these signatures will lead to cancellation of the OMR.**
8. Candidate has to put his/her signature on the attendance sheet. **No candidate is allowed to leave the examination hall before completion of 1 (one) hour from the commencement of examination.**
9. Candidate needs to check the Question booklet after instructed by the invigilator and report if any discrepancies are noticed in the booklet regarding number of pages or damaged pages.
10. **Marking in more than one option against any question on the OMR will cancel that answer**. Instructions are given on the reverse of the OMRs.
11. **Correct Roll Codes is to be written on the concerned OMR**.
12. Handover the Question Paper and the OMR to the invigilator before leaving the exam hall.

Roll Code : | M | C | V |

Roll Number : | | | | | | | |

Sl. No. of the OMR : | | | | | | | |

Signature of the candidate:.....

K01 GA 011

**PAPER : 11**

**M. TECH in Civil Engineering**

**PART A : Engineering Mathematics**

**1.** If a square matrix has a zero determinant, then the matrix is:

(A) Orthogonal (B) Singular

(C) Identity (D) Symmetric

**2.** For a homogeneous system of linear equations $AX = 0$, a non-trivial solution exists when:

(A) $|A| \neq 0$ (B) $|A| = 0$

(C) $A$ is an identity matrix (D) $A$ is a diagonal matrix

**3.** The eigenvalues of a triangular matrix are:

(A) Always zero (B) Elements of the first row

(C) Diagonal elements (D) Sum of all elements

**4.** A function is differentiable at a point only if it is:

(A) Discontinuous at that point (B) Continuous at that point

(C) Periodic at that point (D) Constant near that point

**5.** Taylor series is used to represent a function as:

(A) A product of constants (B) A polynomial expansion about a point

(C) A definite integral (D) A matrix equation

**6.** The gradient of a scalar function gives the direction of:

(A) Minimum decrease (B) Maximum increase

(C) Constant value (D) Zero slope only

**7.** The divergence of a vector field physically represents:

(A) Circulation (B) Source or sink strength

(C) Directional slope (D) Surface area

**8.** A first-order linear differential equation has the general form:

(A) $\frac{dy}{dx} + Py = Q$ (B) $\frac{d^2y}{dx^2} + y = 0$

(C) $xy = z$ (D) $y^2 + x^2 = 0$

**9.** In solving PDEs by separation of variables, the solution is generally assumed as:

(A) Sum of constants only

(B) Product of functions of individual variables

(C) Only exponential function

(D) Only polynomial function

**10.** Fourier series is mainly used to represent:

(A) Only linear equations (B) Periodic functions

(C) Random variables (D) Matrix determinants

**11.** Conditional probability P(A/B) means the probability of event A:

(A) When B has occurred (B) When B has not occurred

(C) Independent of B only (D) Equal to B

**12.** In a normal distribution, the mean, median and mode are:

(A) All different (B) Mean and median are equal only

(C) Median and mode are equal only (D) All equal

**13.** Poisson distribution is commonly used to model:

(A) Number of rare events in a fixed interval

(B) Continuous height data

(C) Temperature variation only

(D) Linear regression slope

**14.** In numerical methods, the Newton-Raphson method is used to find:

(A) Eigenvectors only (B) Roots of nonlinear equations

(C) Definite integrals only (D) Fourier coefficients

**15.** Simpson's rule is generally more accurate than the trapezoidal rule because it uses:

(A) Straight-line approximation (B) Parabolic approximation

(C) Constant approximation (D) Matrix approximation

## PART B: CIVIL ENGINEERING

**16.** In a free-body diagram, the main purpose is to show:

(A) Only the shape of the body

(B) All external forces and moments acting on the body

(C) Only internal stresses

(D) Only the material properties of the body

**17.** For a body to be in static equilibrium in a plane, the necessary conditions are:

(A) $\sum F_x = 0$, $\sum F_y = 0$, and $\sum M = 0$ (B) $\sum F_x \neq 0$ only

(C) $\sum M = 0$ only (D) Velocity should be constant

**18.** The natural frequency of an undamped single-degree-of-freedom system depends mainly on:

(A) Mass and stiffness (B) Damping and load

(C) Length and width only (D) Temperature only

**19.** The point at which the entire mass of a body may be assumed to be concentrated is called:

(A) Centre of pressure (B) Centre of mass

(C) Shear centre (D) Neutral axis

**20.** In a simply supported beam subjected to a central point load, the maximum bending moment occurs at:

(A) Support (B) Quarter span

(C) Mid-span (D) Anywhere along the beam

**21.** The relation between bending moment and shear force is:

(A) Shear force is the rate of change of bending moment

(B) Bending moment is independent of shear force

(C) Bending moment is the rate of change of load

(D) Shear force is always zero where bending moment is maximum

**22.** In simple bending theory, the bending stress varies:

(A) Uniformly across the section

(B) Linearly across the depth of the section

(C) Parabolically across the section

(D) Randomly across the section

**23.** The neutral axis of a beam section under pure bending is the axis where:

(A) Shear stress is maximum (B) Bending stress is zero

(C) Bending stress is maximum (D) Deflection is zero

**24.** Buckling of columns is mainly associated with:

(A) Tensile failure (B) Instability under compressive load

(C) Shear failure only (D) Torsional cracking only

**25.** A statically indeterminate structure is one in which:

(A) Equilibrium equations alone are sufficient for analysis

(B) Equilibrium equations alone are not sufficient for analysis

(C) No internal force develops

(D) Only axial force is present

**26.** The moment distribution method is mainly used for the analysis of:

(A) Determinate trusses only (B) Indeterminate beams and frames

(C) Cables only (D) Isolated footings only

**27.** Influence lines are mainly used to study the effect of:

(A) Fixed loads only (B) Moving loads

(C) Temperature loads only (D) Wind loads only

**28.** In concrete, creep refers to:

(A) Sudden failure under impact load

(B) Time-dependent increase in strain under sustained load

(C) Increase in strength due to curing only

(D) Loss of water from fresh concrete only

**29.** In reinforced concrete design, development length is required to ensure:

(A) Adequate bond between steel and concrete

(B) Minimum spacing between columns

(C) Reduction in self-weight of concrete

(D) Increase in workability of concrete

**30.** In steel structures, plastic analysis is based on the concept that:

(A) Material remains fully elastic at all loads

(B) Structure fails immediately after first yield

(C) Redistribution of moments occurs after yielding

(D) Buckling is ignored in all cases

**31.** In CPM, the critical path represents the sequence of activities having:

(A) Minimum total duration (B) Maximum total float

(C) Longest project duration (D) Minimum resource requirement

**32.** In a project network, an activity with zero total float is generally considered:

(A) Non-critical activity (B) Critical activity

(C) Dummy activity only (D) Independent activity

**33.** PERT is generally more suitable than CPM when:

(A) Activity durations are known with certainty

(B) Activity durations are uncertain or probabilistic

(C) Only material cost is required

(D) No sequencing of activities is needed

**34.** In PERT, the expected time of an activity is calculated using:

(A) Optimistic, most likely, and pessimistic times

(B) Earliest start and latest finish only

(C) Total float and free float only

(D) Direct cost and indirect cost only

**35.** A dummy activity in a network diagram is used to:

(A) Consume additional time and resources

(B) Represent dependency without consuming time or resources

(C) Reduce the total project duration

(D) Increase the float of critical activities

**36.** The three-phase system of soil consists of:

(A) Solids, water and air (B) Sand, silt and clay

(C) Gravel, sand and silt (D) Water, cement and voids

**37.** The ratio of volume of voids to the volume of solids in a soil mass is called:

(A) Porosity (B) Degree of saturation

(C) Void ratio (D) Water content

**38.** In the Unified Soil Classification System, a well-graded sand is generally represented as:

(A) SP (B) SW

(C) CL (D) CH

**39.** The coefficient of permeability of soil is mainly affected by:

(A) Colour of soil (B) Particle size and void ratio

(C) Shape of container (D) Atmospheric pressure only

**40.** A flow net is commonly used to determine:

(A) Shear strength of soil

(B) Compaction energy

(C) Seepage quantity and pore water pressure

(D) Plastic limit only

**41.** The effective stress in soil is given by:

(A) Total stress + pore water pressure

(B) Total stress – pore water pressure

(C) Pore water pressure – total stress

(D) Total stress × pore water pressure

**42.** Quicksand condition occurs when:

(A) Effective stress becomes zero (B) Total stress becomes zero

(C) Soil becomes completely dry (D) Permeability becomes zero

**43.** In soil compaction, the dry density generally increases with water content up to:

(A) Liquid limit (B) Plastic limit

(C) Optimum moisture content (D) Shrinkage limit

**44.** One-dimensional consolidation is mainly associated with:

(A) Immediate settlement of sand

(B) Expulsion of pore water from saturated clay

(C) Drying shrinkage of concrete

(D) Increase in soil permeability

**45.** Mohr's circle is used in soil mechanics to determine:

(A) Grain size distribution (B) Principal stresses and shear stresses

(C) Soil classification only (D) Specific gravity of solids

**46.** The Standard Penetration Test is mainly used to estimate:

(A) Field resistance of soil (B) Water content only

(C) Chemical composition of soil (D) Plasticity index only

**47.** Rankine's earth pressure theory assumes that the backfill soil is:

(A) Cohesive and saturated only

(B) Homogeneous, isotropic and semi-infinite

(C) Reinforced with steel bars

(D) Completely impermeable

**48.** In slope stability analysis, Bishop's method is commonly used for:

(A) Infinite slopes only (B) Circular slip surfaces

(C) Pile foundation design (D) Flow net construction

**49.** Terzaghi's bearing capacity theory is primarily applicable to:

(A) Deep pile foundations only (B) Shallow strip footings

(C) Raft foundations only (D) Machine foundations only

**50.** Negative skin friction in piles occurs when:

(A) Pile moves downward relative to soil

(B) Surrounding soil settles more than the pile

(C) Pile is subjected only to uplift force

(D) Soil has zero cohesion

**51.** The property of a fluid by which it resists shear deformation is called:

(A) Density (B) Viscosity

(C) Surface tension (D) Compressibility

**52.** In fluid statics, the pressure at a point in a fluid at rest acts:

(A) Only in the vertical direction (B) Only in the horizontal direction

(C) Equally in all directions (D) Only along the free surface

**53.** The continuity equation in fluid mechanics is based on the principle of conservation of:

(A) Mass (B) Momentum

(C) Energy (D) Force

**54.** Bernoulli's equation is based on the conservation of:

(A) Mass (B) Energy

(C) Momentum only (D) Viscosity

**55.** In pipe flow, laminar flow is generally associated with:

(A) Very high Reynolds number

(B) Smooth and orderly motion of fluid particles

(C) Complete mixing of fluid particles

(D) Formation of hydraulic jump

**56.** The boundary layer is the region near a solid surface where:

(A) Velocity changes from zero at the wall to free-stream velocity

(B) Pressure is always zero

(C) Flow is always inviscid

(D) Fluid has no viscosity

**57.** Drag force on a body moving through a fluid acts:

(A) Perpendicular to the direction of motion

(B) Opposite to the direction of relative motion

(C) Along the lift direction

(D) Only in stationary fluids

**58.** A Venturimeter is commonly used to measure:

(A) Pressure head only (B) Velocity of wind only

(C) Discharge through a pipe (D) Surface tension of liquid

**59.** Dimensional analysis is mainly useful for:

(A) Finding exact numerical solutions only

(B) Developing relationships between variables and model testing

(C) Measuring soil permeability

(D) Designing reinforcement in beams

**60.** Critical flow in an open channel occurs when the Froude number is:

(A) Less than 1 (B) Equal to 1

(C) Greater than 1 (D) Equal to 0

**61.** A hydraulic jump is a phenomenon in which:

(A) Subcritical flow changes to supercritical flow gradually

(B) Supercritical flow changes to subcritical flow abruptly

(C) Flow velocity becomes zero throughout the channel

(D) Channel bed slope becomes horizontal

**62.** The hydrologic cycle represents the continuous movement of water among:

(A) Rivers and canals only (B) Atmosphere, land surface and oceans

(C) Soil and rocks only (D) Dams and reservoirs only

**63.** Infiltration refers to the process by which water:

(A) Evaporates from water bodies

(B) Enters into the soil from the ground surface

(C) Flows only through rivers

(D) Is stored in reservoirs

**64.** A unit hydrograph represents the direct runoff hydrograph resulting from:

(A) One unit depth of effective rainfall over a watershed

(B) Total annual rainfall

(C) Groundwater flow only

(D) Snowmelt only

**65.** Darcy's law is commonly used to describe:

(A) Turbulent flow in open channels (B) Flow through porous media

(C) Flow over spillways (D) Hydraulic jump formation

**66.** Duty in irrigation means:

(A) Depth of water required by a crop

(B) Area irrigated by a unit discharge of water

(C) Total rainfall in a season

(D) Water lost by evaporation only

**67.** Delta of a crop refers to:

(A) Total depth of water required by the crop during its base period

(B) Discharge through a canal

(C) Area irrigated per cumec

(D) Rate of infiltration only

**68.** A spillway in a dam is provided mainly to:

(A) Increase seepage through the dam

(B) Safely dispose of surplus flood water

(C) Reduce reservoir storage permanently

(D) Prevent evaporation from the reservoir

**69.** Lining of canals is mainly done to:

(A) Increase seepage losses

(B) Reduce seepage losses and improve flow efficiency

(C) Increase bed roughness

(D) Reduce canal capacity

**70.** Cross drainage structures are constructed where:

(A) A canal crosses a natural drain or stream

(B) A road crosses a railway line

(C) A dam crosses a reservoir

(D) A pipe crosses a building foundation

**71.** Turbidity in water is mainly caused by the presence of:

(A) Dissolved oxygen (B) Suspended and colloidal particles

(C) Chloride ions only (D) Dissolved gases only

**72.** The pH value of drinking water generally indicates its:

(A) Colour intensity (B) Acidity or alkalinity

(C) Turbidity level (D) Total hardness only

**73.** Biological Oxygen Demand (BOD) is an important parameter because it indicates:

(A) Amount of dissolved salts in water

(B) Organic pollution load in wastewater

(C) Colour of wastewater

(D) Temperature of wastewater

**74.** The main purpose of coagulation in drinking water treatment is to:

(A) Remove dissolved oxygen

(B) Destabilize fine suspended particles for removal

(C) Increase hardness of water

(D) Add nutrients to water

**75.** Chlorination is commonly used in water treatment for:

(A) Sedimentation (B) Disinfection

(C) Filtration (D) Coagulation

**76.** In a sewerage system, domestic wastewater mainly includes wastewater from:

(A) Rainfall runoff only

(B) Industrial boilers only

(C) Toilets, bathrooms, kitchens and washing activities

(D) Agricultural fields only

**77.** Primary treatment of wastewater mainly removes:

(A) Settleable suspended solids (B) Dissolved gases only

(C) Heavy metals completely (D) Pathogenic bacteria completely

**78.** Secondary treatment of wastewater is mainly aimed at removing:

(A) Grit only (B) Biodegradable organic matter

(C) Floating plastics only (D) Dissolved minerals only

**79.** The Air Quality Index is used to indicate:

(A) Soil fertility

(B) Overall air pollution level and its health significance

(C) Water hardness

(D) Noise intensity only

**80.** In municipal solid waste management, recycling is preferred because it:

(A) Increases landfill requirement

(B) Converts all waste directly into drinking water

(C) Reduces waste volume and conserves resources

(D) Eliminates the need for waste collection

**81.** In highway geometric design, camber is provided mainly to:

(A) Increase vehicle speed

(B) Drain off rainwater from the pavement surface

(C) Reduce road width

(D) Increase pavement thickness

**82.** Sight distance in highway design is the length of road visible to the driver for:

(A) Safe stopping or overtaking

(B) Increasing road roughness

(C) Reducing traffic signs

(D) Designing pavement materials only

**83.** The minimum sight distance required at all points on a road is :

(A) Overtaking sight distance (B) Intermediate sight distance

(C) Stopping sight distance (D) Headlight sight distance

**84.** Superelevation is provided on horizontal curves to counteract :

(A) Braking force (B) Centrifugal force

(C) Rolling resistance (D) Wind pressure only

**85.** The ruling gradient in highway alignment refers to :

(A) Maximum gradient used only in emergencies

(B) Gradient normally adopted for design

(C) Zero gradient in flat terrain

(D) Gradient used only at hairpin bends

**86.** In railway track design, cant is provided mainly to:

(A) Reduce sleeper spacing

(B) Counterbalance centrifugal force on curves

(C) Increase rail joint spacing

(D) Reduce track gauge

**87.** Equilibrium cant in railway track is the cant at which :

(A) Train remains stationary on the curve

(B) Centrifugal force is fully balanced by the provided cant

(C) Track becomes completely level

(D) Speed becomes zero

**88.** Airport runway length is corrected mainly for:

(A) Temperature, elevation and gradient

(B) Soil classification only

(C) Pavement colour only

(D) Terminal building height

**89.** Exit taxiways are provided at airports to:

(A) Increase runway thickness

(B) Allow aircraft to leave the runway quickly after landing

(C) Store aircraft permanently

(D) Replace the main runway

**90.** A desirable property of highway aggregates is:

(A) High crushing value (B) High impact value

(C) High strength and durability (D) High water absorption only

**91.** Bituminous paving mixes should preferably have:

(A) Adequate stability, durability and flexibility

(B) Very high air voids only

(C) No binder content

(D) Very low resistance to deformation

**92.** Flexible pavements distribute wheel loads mainly through:

(A) Slab action (B) Layer-by-layer load distribution

(C) Arch action only (D) Suspension cables

**93.** Rigid pavements primarily resist traffic loads through:

(A) Flexural strength of concrete slab

(B) Bitumen viscosity only

(C) Subgrade compaction only

(D) Granular interlock only

**94.** Peak Hour Factor is used in traffic engineering to indicate:

(A) Uniformity of traffic flow within the peak hour

(B) Total road length

(C) Pavement thickness requirement only

(D) Number of traffic signs

**95.** Webster's method is commonly used for:

(A) Design of traffic signal timings (B) Design of runway length

(C) Calculation of railway cant (D) Design of concrete mix

**96.** The main principle of surveying is to work from:

(A) Part to whole (B) Whole to part

(C) Centre to boundary only (D) Boundary to centre only

**97.** In surveying, random errors are generally minimized by:

(A) Taking repeated observations and averaging

(B) Ignoring small measurements

(C) Using only one observation

(D) Avoiding instrument calibration

**98.** The representative fraction of a map indicates the ratio of:

(A) Map distance to corresponding ground distance

(B) Ground distance to map distance

(C) Contour interval to map scale

(D) Latitude to longitude

**99.** A total station is an instrument that combines:

(A) Compass and chain only

(B) Theodolite and electronic distance measurement system

(C) Dumpy level and plane table only

(D) Barometer and GPS only

**100.** Remote sensing involves collection of information about an object or area:

(A) Only by physical contact

(B) Without direct physical contact

(C) Only by underground drilling

(D) Only through manual chain surveying

**SPACE FOR ROUGH WORK (IF REQUIRED)**