

Total No. of Questions: 22

Total No. of Pages: 02

Roll No. _____

Paper Code

3E1206

B.Tech. III-Sem (Main & Back) 2025-26

Aeronautical Engineering

3AN2-01 Advanced Engineering Mathematics-I

AN,AG,AE,CE,CR, EC,EL,ME,MH,PI,PT,BM

3E1206

Time : 3 Hours

Maximum Marks : 70

Attempt all ten questions from Part A, five questions out of seven questions from Part B and three questions out of five questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used / calculated must be stated clearly. Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. _____

2. _____

Part A

(Answer should be given up to 25 words only)

All questions are compulsory .

10x2=20

1. With usual notation prove that $\mu = E^{-\frac{1}{2}} + \frac{1}{2}\delta$
2. Write Newton cotes Quadrature formula.
3. Write the corrector formula of Adam's predictor corrector method.
4. Define transcendental equation with examples.
5. Find Laplace transform of $\cos^2 2t$.
6. Write convolution theorem for Inverse Laplace transform.
7. Write Fourier sine transform of $\frac{e^{-ax}}{x}$.
8. Write Fourier cosine transform of $f(t)$.
9. Find z-transform of $\cos h n\theta$.
10. Find inverse z-transform of $\frac{4z}{z-a}, |z| > |a|$

Part-B

T-480

(Analytical/Problem solving questions)

Attempt any five questions.

5x4=20

1. Use stirling formula to find Y_{28} , given $y_{20} = 49225, y_{25} = 48316, y_{30} = 47236, y_{35} = 45926, y_{40} = 44306$.
2. Find the root of $x^4 - x - 10 = 0$ which is nearer to $x=2$ by Newton Raphson method.
3. Solve $\frac{d^2x}{dt^2} + 9x = \cos 2t$, if $x(0) = 1, x\left(\frac{\pi}{2}\right) = -1$
4. Use Euler's method to solve $\frac{dy}{dx} = \frac{y^2 - x}{y^2 + x}$ given $y=1$ at $x=0$ also.
Find y for $x=0.1, 0.2$ and 0.3 .
5. Find Laplace transform of $\sin \sqrt{t}$
6. Find the Fourier transform of $e^{-|x|}$ hence show that
$$\int_0^\infty \frac{x \sin mx}{1+x^2} dx = \frac{\pi e^{-m}}{2}, m > 0$$
7. Find Z-transform of following - (i) $n^2 e^{an}$ (ii) $\sin(3n+5)$

Part-C

(Descriptive / Analytical / Problem Solving/ Design question)

Attempt any three questions.

3x10=30

1. Find value of $\int_1^2 \frac{1}{x} dx$ by (i) Simpson's 1/3 rule (ii) Trapezoidal rule
2. Using fourth order Runge-Kutta method with one step, compute $y(0.1)$ to five places of decimal, if
 $y' = 0.31 + 0.25y + 0.3t^2$ and $y = 0.72$ when $t = 0$
3. Apply convolution theorem to evaluate $L^{-1} \left[\frac{s^2}{(s^2 + a^2)(s^2 + b^2)} \right]$
4. An infinite string is initially at rest and that the initial displacement is $f(x)$ $-\infty < x < \infty$. Determine the displacement $y(x,t)$ of the string.
5. Using Z-transform solve $U_{n+2} - 2U_{n+1} + U_n = 3n + 5$

Total No. of Questions: 22

Total No. of Pages: 02

Roll No. _____

Paper Code
3E1212

B.Tech. III-Sem (Main & Back) January-2026
Civil Engineering
3CE4-08 Engineering Geology
3E1212

Time : 3 Hours

Maximum Marks : 70

Attempt all ten questions from Part A, five questions out of seven questions from Part B and three questions out of five questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used / calculated must be stated clearly. Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. _____

2. _____

Part A

(Answer should be given up to 25 words only)

All questions are compulsory

10x2=20

1. Discuss the scopes of geology in civil engineering.
2. What is silicate mineral?
3. Write physical properties of a feldspar mineral.
4. Which is the most important seismic characteristic of asthenosphere?
5. Write down the most pronounced textural characteristic of saturated volcanic rock.
6. Differentiate discordant and concordant intrusive bodies.
7. Differentiate weathering and erosion.
8. Draw neat sketch of cylindrical plunging anticline fold.
9. Define electromagnetic spectrum which used in remote sensing.
10. Discuss the various factors which affect the stability of bridges.

Part-B

(Analytical/Problem solving questions)

Attempt any five questions.

5x4=20

1. Explain various physical properties of silicate minerals.
2. Discuss the geological work of water in respect of erosion, transportation and deposition.
3. Discuss metamorphism. Explain the structures of schist and gneiss metamorphic rocks.
4. Elaborate differences between angular-unconformity, dis-conformity and non-conformity with sketches.
5. Describe following terms of fold with neat and clean diagram.
 - a. Axial Plane
 - b. Plunge of fold.
 - c. Limbs
 - d. Fold axis
6. Define GIS. Write the applications of GIS in civil engineering.
7. Write down the various geological and engineering properties that are important in the selection of rocks for building purposes.

Part-C

(Descriptive / Analytical / Problem Solving / Design questions)

Attempt any three questions.

3x10=30

1. What are the differences between volcanic and plutonic igneous rocks? Also explain the textures and structures of igneous rocks.
2. Explain the process of formation of carbonate sedimentary rock. Also explain the chemically formed structures in detail.
3. Differentiate the normal and reverse fault. Describe classification of fault on the basis of apparent movement of hanging-wall and foot-wall with neat sketches.
4. Define gravity Dam. Discuss the characteristic of concrete gravity Dam. Elaborate on Bhakhda-Nangal Dam of India.
5. Describe the primary spectral regions used in earth remote sensing. Write down the applications of remote sensing in field of civil engineering.

Total No. of Questions: 22

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Roll No. _____

Paper Code

3E1213

B.Tech. III-Sem (Main & Back) January-2026

Civil Engineering

3CE3-04 Engineering Mechanics

3E1213

Time : 3 Hours

Maximum Marks : 70

Attempt all ten questions from Part A, five questions out of seven questions from Part B and three questions out of five questions from Part C.

(Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination.

(Mentioned in form No. 205)

1. _____

2. _____

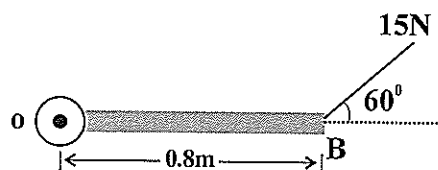
Part-A

(Answer should be given up to 25 words only)

All questions are compulsory.

10x2=20

- Q.1 Define Lami's theorem with diagram.
- Q.2 Two forces of 400N and 600N act at an angle 60° to each other determine the resultant in magnitude and direction.
- Q.3 State parallel axis theorem. T-480
- Q.4 Differentiate centroid and center of gravity.
- Q.5 Write the principle of virtual work.
- Q.6 What is the difference between springs in series and parallel?
- Q.7 Define bulk modulus.
- Q.8 What is angle of repose? T-480
- Q.9 A force of 15N is applied at an angle of 60° to the edge of a door 0.8m wide as shown in Fig. Find the moment of the force about the hinge(O).



- Q.10 A bar of length 2m is subjected to a tensile force, causing an extension of 0.1mm. Find the strain. T-480

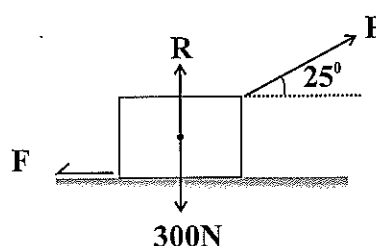
Part-B

(Analytic/Problem solving questions)

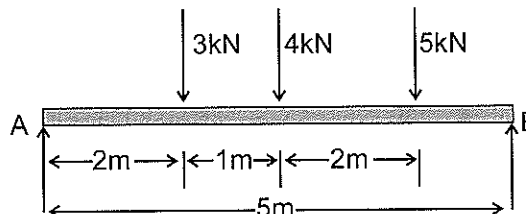
Attempt any Five questions

5x4=20

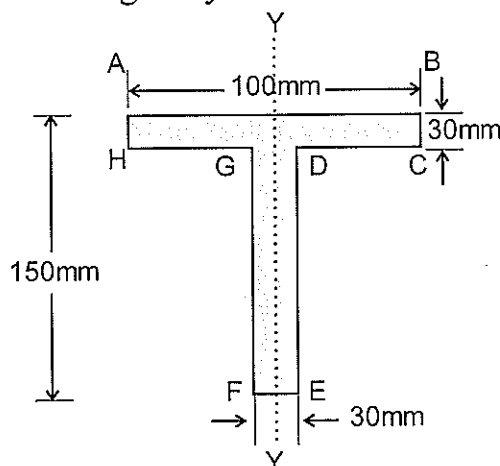
- Q.1 A body of weight 300N is lying on a rough horizontal plane having a coefficient of friction as 0.3. Find the magnitude of the force (P), which can move the body, while acting at an angle of 25° with the horizontal.



- Q.2 A simply supported beam AB of span 5m is loaded as shown in Fig. Find the reactions at A and B.

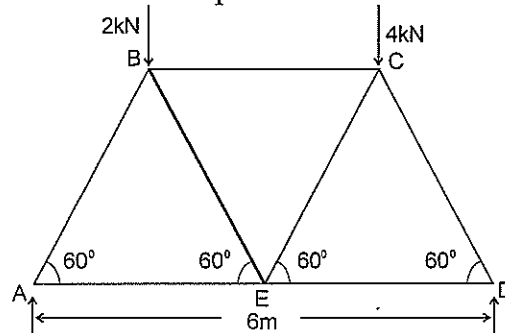


- Q.3 Find the centre of gravity of a 100mm x 150mm x 30mm T-section.



- Q.4 Figure shows a Warren girder consisting of seven members each of 3m length freely supported at its end points. The girder is loaded at B and C

as shown. Find the forces in all the members of the girder, indicating whether the force is compressive or tensile.



- Q.5 A steel ball of weight 60 N is dropped onto a spring of stiffness 500N/m from a height of 100 mm. Find the maximum deflection of the spring (Use the work energy principle) T-480
- Q.6 A steel rod of diameter 20mm and length 1m is subjected to a tensile force of 50kN. Find the volumetric strain in the rod. ($E=200$ GPa, $\nu=0.3$)
- Q.7 A circular wheel of mass 50 Kg and radius 200 mm is rotating at 300 r.p.m. Find its kinetic energy.

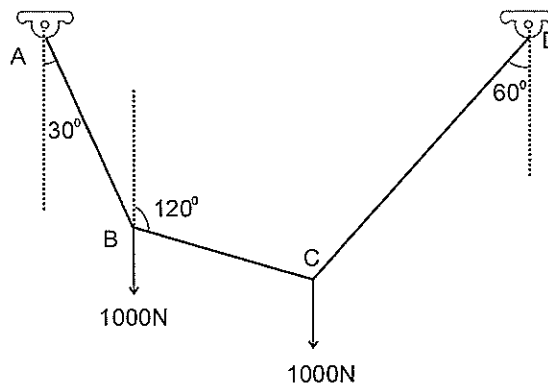
Part-C

(Descriptive/Analytical/Problem Solving/Design question)

Attempt any three questions

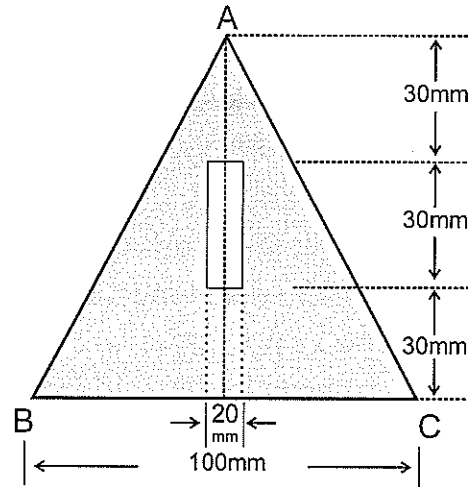
3x10=30

- Q.1 Explain:-
- Concept of virtual work. T-480
 - Bulk Modulus, Young Modulus, Modulus of rigidity.
 - Define and Compare Co-efficient of friction and angle of friction.
- Q.2 A string ABCD, attached to fixed points A and D has two equal weights of 1000N attached to it at B and C. The weights rest with the portions AB and CD inclined at angles as shown in Fig. Find the tensions in the portions AB, BC, and CD of the string, if the inclination of the portion BC with the vertical is 120° .



Q.3

A rectangular hole is made in a triangular section as shown in Figure. Determine the moment of inertia of the section about X-X axis passing through its center of gravity and the base BC.

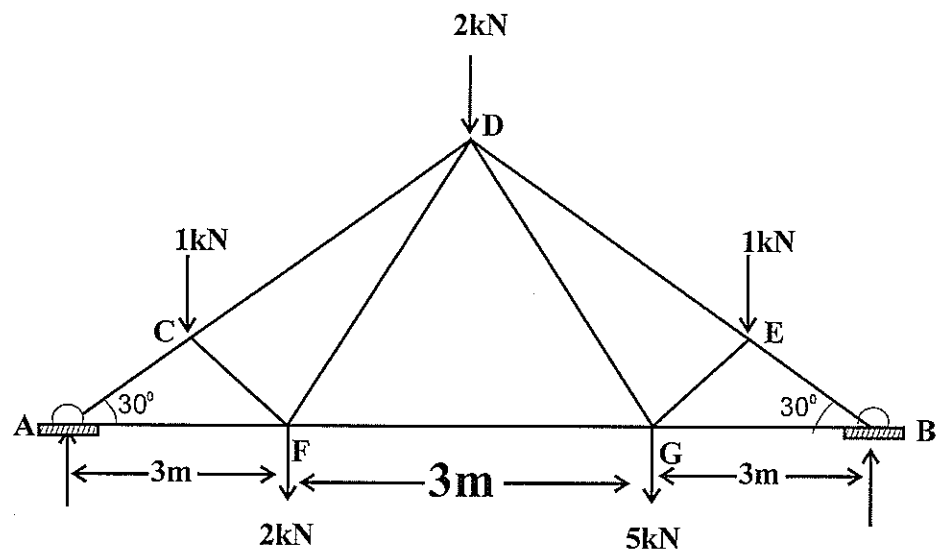


Q.4

A thin cylinder of diameter 500mm and wall thickness 10mm is subjected to an internal pressure of 2MPa, find the hoop stress, longitudinal stress, and change in diameter of the cylinder. ($E=200$ GPa, $\nu=0.3$)

Q.5

A truss of 9m span is loaded as shown in Fig. Find the reactions at the two supports.



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Roll No. _____

Paper Code
3E1214

B.Tech. III-Sem (Main & Back) January-2026
Civil Engineering
3CE4-06 Fluid Mechanics
3E1214

Time : 3 Hours

Maximum Marks : 70

Attempt all ten questions from Part A, five questions out of seven questions from Part B and three questions out of five questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used / calculated must be stated clearly. Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. _____

2. _____

Part A

(Answer should be given up to 25 words only)

All questions are compulsory

10x2=20

- Q.1. Differentiate between ideal fluids and real fluids.
Q.2. Define capillarity. T-480
Q.3. State the Pascal's law.
Q.4. Distinguish between absolute pressure and vacuum pressure.
Q.5. Briefly explain the term centre of Buoyancy and Metacentre.
Q.6. Define stream lines, streak lines and flow net.
Q.7. Define the kinetic energy correction factor.
Q.8. What are the assumptions made in Bernoulli's equation?
Q.9. What is Hagen-Poiseuille formula?
Q.10. Define Vena-contracta.

Part-B

(Analytical/Problem solving questions)

T-480

Attempt any five questions.

5x4=20

- Q.1. State and explain Newton's law of viscosity. Deduce the expression for the dynamic viscosity.
Q.2. Explain the minor losses in pipes.

- Q.3. What is Euler's equation? How will you obtain Bernoulli's equation from it?
- Q.4. A three dimensional flow model is given by
$$V = 2x^2y \hat{i} + 3y^2z \hat{j} - (4xz + 3yz^2) \hat{k}.$$
Show that it is a case of possible steady, incompressible fluid flow.
- Q.5. What is orificemeter? Derive an expression for discharge through orificemeter.
- Q.6. Write a short note on Manometers.
- Q.7. Calculate specific weight, density and specific gravity of two liters of a liquid which weight 7N.

Part-C

(Descriptive / Analytical / Problem Solving / Design questions)

Attempt any three questions.

3x10=30

- Q.1. Derive an expression for the centre of pressure for a plane immersed in water and inclined by an angle θ to free surface of water.
- Q.2. If for a two dimensional potential flow the velocity function is given by $\phi = x(2y - 1)$, determine the velocity at the point P(2,3). Determine also the value of stream function at the point P.
- Q.3. Derive the Darcy-weisbach equation for head loss due to a flow in a pipe in terms of the friction factor f . Also develop the relations for friction factor and boundary shear stress in terms of flow parameters for laminar flow.
- Q.4. A venturimeter of diameters 200mm and 100mm inlet and throat respectively is installed in a vertical pipe carrying oil of specific gravity 0.8. The inlet is 1.5m above the throat. Pressure gauges installed at the throat and inlet indicate a pressure difference of 9.81kN/m².
- (a) Determine the discharge through the pipe.
- (b) If the throat and inlet connected to a u-tube manometer containing mercury instead of the pressure gauge. Find the difference in mercury levels in the two limbs of u-tube manometer.
- Q.5. A hydraulic lift used for lifting automobiles has 25cm diameter ram which slides in a 25cm diameter cylinder. The annular space being filled with oil having a kinematic viscosity of 3.7cm²/sec and specific gravity 0.85. If the rate of travel of the ram is 15cm/sec, find the frictional resistance, when 3.3m long arm is engaged in cylinder.

Total No. of Questions: 22

Total No. of Pages: 02

Roll No. _____

Paper Code
3E1215

B.Tech. III-Sem (Main & Back) January-2026
Civil Engineering
3CE4-05 Surveying
3E1215

Time : 3 Hours

Maximum Marks : 70

Instructions To Candidates:

Attempt all Ten Questions from Part A. Five questions out of seven questions from Part-B and three questions out of five questions from Part-C

Schematic diagrams must be shown wherever necessary. Any data missing may suitably be assumed and stated clearly. Units of quantities used / calculated must be stated clearly. Use of following supporting material is permitted during examination (As mentioned in form No. 205)

1. NIL _____ 2. NIL _____

Part A

(Answer should be given up to 25 words only)

All questions are compulsory. T-480

10x2=20

- Q.1 What are the objectives of surveying?
Q.2 What do you understand by 'ranging'?
Q.3 Differentiate between WCB and RB.
Q.4 Define the term contour interval.
Q.5 What is meant by contour gradient?
Q.6 State the principle of tacheometric surveying.
Q.7 What do you understand by stadia wire?
Q.8 Enlist the applications of curve surveying.
Q.9 What is the use of aerial photograph?
Q.10 What do you understand by setting out works?

Part B

(Analytical/Problem solving questions)

Attempt any Five questions T-480

5x4=20

- Q.1 The following bearings were observed with a compass survey:

Line	Fore Bearing
AB	60° 30'
BC	122° 0'
CD	46° 0'

- DE 205° 30'
EA 300° 0'
- Determine the interior angles and plot the traverse for the same.
- Q.2 Describe procedure to set out a horizontal angle by method of repetition.
- Q.3 Describe various methods of contouring. Discuss the merits and demerits of each.
- Q.4 Define the term: T-480
(a) True and magnetic bearing (b) Local attraction
(c) Back bearing (d) Magnetic declination
- Q.5 The following readings were taken with a tacheometer with the line of sight horizontal on a staff held vertical: 0.950m, 1.285 m and 1.620m. Determine the horizontal distance from the instrument station to the staff station if $k=100$ and $C=0.15$ m. Also determine the R.L. of the staff station if the R.L. of the instrument station is 101.580m and the height of trunnion axis is 1.460m.
- Q.6 What are the different errors in theodolite work? How are they eliminated?
- Q.7 Write short notes on:
(a) Terrestrial photogrammetry (b) Methods for laying out buildings

Part C

(Descriptive/Analytical/Problem Solving/Design question)

Attempt any three questions. T-480

3x10=30

- Q.1 What are different tape corrections and explain that how are they applied?
- Q.2 Explain how will you determine necessary data to set out a simple circular curve by using the method 'offset from extended chord'?
- Q.3 The areas within the contour line at the site of reservoir and the face of the proposed dam are as follows:

Counter	Area (m ²)	Contour	Area (m ²)
101	1200	106	125000
102	12500	107	1875000
103	92200	108	2150000
104	150200	109	2510000
105	802500		

- Taking 101 as the bottom level of the reservoir and 109 as the top level, determine the capacity of reservoir by trapezoidal and prismoidal rules / formula.
- Q.4 Describe the 'height of instrument' and 'rise and fall' methods of computing the levels. Discuss the merits and demerits of each.
- Q.5 What is total station? Explain the construction and working of total station with neat sketches.