320312 (20)

BE (3rd Semester)
Examination, Nov.-Dec., 2021
Branch : Civil

FLUID MECHANICS - I

Time Allowed : Three Hours

Maximum Marks : 80

Minimum Pass Marks : 28

Note : Part (a) in each unit is compulsory. Select any

two from b, c, d of each unit.

UNIT - I

Q. 1. (a) Define the weight density and specific

gravity of fluid. 2

(b) Enunciate Newton's law of viscosity. Explain the importance of viscosity in fluid motion. What is effect of temperature on viscosity of water and that of air ?   7

(c) Define centre of pressure. Derive an expression for depth of centre of pressure of an immersed surface from surface of liquid.   7

(d) A rectangular plane surface is 2m wide and 3 m deep. It lies in vertical plane in water. Determine total pressure and position of centre of pressure on the plane surface when its upper edge in horizontal and

(i) concoides with water surface.

(ii) 2.5 m below the free water surface.　7

UNIT - 2

Q. 2.　(a)　Explain the term 'path line".　　　　　2

(b)　Define the following and give one practical

example of each :　　　　　　　　　7

(i)　Laminar flow.

(ii)　Turbulent flow.

(iii)　Steady flow

(iv)　Uniform flow

(c)　If for a two dimensional potential flow, the

velocity potential is given by

$$\phi = x(2y - 1)$$

determine the velocity at the point p(4, 5).

Determine also the value of stream function

Ψ at the point P.   7

(d) Derive continuity equation of liquid flow

based on conservation of mass principal. 7

UNIT - III

Q. 3. (a) Explain pitot tube.   2

(b) What is venturimeter ? Derive an expression

for discharge through venturimeter.   7

(c) State Bernoulli's theorem for steady flow of

an   incompressible   fluid.   Derive   an

expression for Bernoulli's equation, from

first principal.   7

(d) A water is flowing through a pipe having diameters 20 cm and 10 cm at section 1 and 2 respectively. The rate of flow through pipe is 35 litres/s. The section 1 is 6 m above datum and section 2 is 4 m above datum. If the pressure at section 1 is 30.24 N/cm^2. Find intensity of pressure at section 2.   7

UNIT - IV

Q. 4. (a) What do you understand by "equivalent pipe" ?   2

(b) Derive an expression for the loss of head due to sudden contraction of pipe.   7

320312 (20)   **P.T.O.**

(c) Explain the following :   7

     (i) Minimum Specific Energy

     (ii) Critical Depth.

     (iii) Critical Velocity.

     (iv) Alternate Depth.

(d) A trapezoidal channel has side slopes of 1 horizontal to 2 vertical and the slope of the bed is 1 in 1500. The area of the section is 40 m^2. Find the dimensions of the section if it is most economical. Determine the discharge of the most economical section if C = 50.   7

UNIT - V

Q. 5. (a) Define co-efficient of contraction and coefficient of discharge.　　　2

(b) Explain the classification of orifices and mouth pieces based on their shape, size and sharpness.　　　7

(c) Derive equation for discharge through rectangular notch.　　　7

(d) (i) Define cavitation.　　　2

(ii) A broad crested weir of 50 m length, has 50 cm height of water above its crest. Find the maximum discharge.

(8)

Take Cd = 0.60 Neglect velocity of approach if velocity of approach is to be taken into consideration. Find maximum discharge when the channel has a cross-sectional area of 50 m^2 on the upstream side.   5

320313 (20)

BE (3rd Semester)

Examination, Nov.-Dec., 2021

Branch : Civil

SURVEYING-I

Time Allowed : Three Hours

Maximum Marks : 80

Minimum Pass Marks : 28

Note : (i) (a) bit of every question is compulsory.

(ii) Answer any two from the remaining

completely.

Q. 1. (a) What do you understand by reciprocal

levelling ?   2

(2)

(b) During a construction work, the botttom of a

R.C. chajja A was taken as a temporary B.M.

(R.L. 63.120).

The following notes were recorded :

Reading on inverted staff on B.M. No.

A – 2.232.

Reading on Peg P on ground – 1.034

Change of instrument

Reading on Peg P on ground : 1.328

Reading on inverted staff on Bottom of

cornice B : 4.124.

Enter the reading in a level book page and

calculate the R.L. of cornice B.   7

(c) Discuss the effects of curvature & refraction in levelling. 7

(d) Differentiate between 'permanent' & 'temporary' adjustments of level. 7

Q. 2. (a) What do you understand by Contour Interval (C.I.) ? 2

(b) What is grade contour ? How will you locate it : 7

(i) on the ground

(ii) on the map

(c) Explain the process of interpolation of contours by arithmetic calculations. 7

(d) Give a brief account with sketches on the

uses of contour maps.   7

Q. 3.   (a) What is face left observation in theodolite ? **2**

(b) What are the different errors in theodolite

work ? How are they eliminated ?   7

(c) Explain the principle of surveying (traversing)

with the compass.   7

(d) The table below gives the lengths and

bearings of the lines of a traverse, ABCDE,

the length and bearing of EA having been

omitted. Calculate the length & bearing of

the line EA.   7

Line	Length (m)	Bearing
AB	204	87°30'
BC	226	20°20'
CD	187	280°0'
DE	192	210°80'
EA	?	?

Q. 4. (a) What do you understand by the term

orientation in plane tabling ? **2**

(b) Explain the process of resection by three

point problem. **7**

(6)

(c) Give a brief account on errors in plane tabling. **7**

(d) Give short notes on advantages & disadvantages of plane tabling. **7**

Q. 5. (a) What is the purpose of providing curve ? **2**

(b) Give classification of curve with neat sketches. **7**

(c) Calculate the ordinates at 10 meters distances for a circular curve having a long chord of 80 meters and a versed sine of 4 meters. **7**

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(d) What are the common difficulties in setting

out simple curves ? Describe briefly the one

method employed in overcoming them.   7

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320351(14)

B. E. (Third Semester) Examination, Nov.-Dec. 2021

(New Scheme)

(Civil Engg. Branch)

MATHEMATICS-III

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

Note : Attempt all questions. Part (a) from each question is compulsory and carry 2 marks. Attempt any two parts (b), (c) & (d) with carries 7 marks each.

Unit-I

1. (a) Write the Dirichlet's conditions for Fourier series.   2

    (b) Expand the Fourier series for $f(x) = |\cos x|$

    $-\pi \le x \le \pi$.   7

(c) Find the Fourier series to represent the function given by

$$f(x) = x \qquad 0 \le x \le \pi$$
$$= 2\pi - x \quad \pi \le x \le 2\pi$$

Hence deduce that

$$\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \ldots\infty = \frac{\pi^2}{8} \qquad 7$$

(d) The following values of y gives the displacement in inches of a certain machine part for the rotation x of flywheel. Expand y' in terms of Fourier series upto 2nd harmonic. 7

x :	0	$\pi/6$	$2\pi/6$	$3\pi/6$	$4\pi/6$	$5\pi/6$
y :	0	9·2	14·4	17·8	17·3	11·7

Unit-II

2. (a) Write the statement of convolution theorem. 2

(b) Evaluate by using Laplace transform 7

$$\int_0^\infty t^3 e^{-t} \sin t \, dt$$

(c) Find $c^{-1}\left(\dfrac{s^2}{\left(s^2 + a^2\right)\left(s^2 + b^2\right)} \right)$ by using convolution theorem. 7

(d) Solve the differential equation

$$\frac{d^2 x}{dt^2} + 2\frac{dx}{dt} + 5x = e^{-t} \sin t$$

given $x(0) = 0$, $x'(0) = 1$, at $t = 0$. 7

Unit-III

3. (a) Form the partial differential equation by eliminating arbitary function. 2

$$z = y^2 + 2f\left(\frac{1}{x} + \log y\right)$$

(b) Solve : 7

$$\left(z^2 - 2yz - y^2\right)p + \left(xy + zx\right)q = xy - zx$$

(c) Solve : 7

$$\left(D^2 - DD' - 2D'^2\right)z = (y-1)e^x$$

(d) Using the method of separation of variables solve

$$\frac{\partial u}{\partial x} = \frac{2\,\partial u}{\partial t} + u, \text{ where } u(x,\, 0) = 6\,e^{-3x}.$$ 7

Unit-IV

4. (a) Find the analytic function whose real part is   2

$$\frac{\sin 2x}{(\cosh 2y - \cos 2x)}$$

(b) Show that the function $f(z) = \sqrt{|xy|}$ is not analytic

at the origin even through $C - R$ equation are satisfied

there it.   7

(c) Evaluate by using Cauchy's Integral formula

$$\int_{c} \frac{\log z}{(z-1)^3}\,dz, \text{ where } C : |z-1| = \frac{1}{2}.$$ 7

(d) Evaluate

$$\int_{c} \frac{\sin \pi z^2 + \cos \pi z^2}{(z-1)^2\,(z-2)}\,dz$$

where C is the circle $|z| = 3$.   7

Unit-V

5. (a) Define briefly the discrete and continuous probability distribution function.   2

(b) The probability density $p\,(x)$ of a continuous random variable is given by

$$p(x) = y_0\,e^{-|x|}, \quad -\infty < x < \infty$$

P.T. $y_0 = 1/2$. Find the mean and variance.   7

(c) Fit the Poisson distribution for the following data :   7

x :	0	1	2	3	4
f :	46	38	22	9	1

(d) In a normal distribution 31% of the items are under 45 and 8% are over 64. Find the mean and S.D. of the distribution

$$P(z = 0 \cdot 5) = 0 \cdot 19, \quad P(z = 1 \cdot 4) = 0 \cdot 42.$$ 7

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320352(20)

B. E. (Third Semester) Examination, Nov.-Dec. 2021

(New Scheme)

(Civil Engg. Branch)

FLUID MECHANICS-I

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

Note : *Attempt all questions. Part (a) from each question is compulsory. Attempt any **two** parts from part (b), (c) & (d) of each questions.*

Unit-I

1. (a) What do you understand by vacuum pressure?   2

   (b) Explain the following :   7

      (i) Pascal's law

      (ii) Differential manometer

(iii) Centre of Pressure

(iv) Buoyancy

(c) A cubical tank has sides of 1.5 m. It contains water for the lower 0.6 m depth. The upper remaining part is filled with oil of specific gravity 0.9. Calculate for one vertical side of tank :   7

(i) Toal Pressure

(ii) Position of centre of pressure

(d) A rectangular pontoon is 5 m long, 3 m wide and 1.20 m high. The depth of immersion of the pontoon is 0.80 m in sea water. If the centre of gravity is 0.6 m above the bottom of the pontoon, determine the meta-centre height. The density for sea water = 1025 Kg/m^3.   7

Unit-II

2. (a) Write convective & local acceleration.   2

(b) Water flows through a pipe AB 1.2 m diameter at 3 m/s and then passes through a pipe BC 1.5 m diameter. At C the pipe branches, Branch CD is 0.8   7

m in diameter and carries one-third of the flow in AB. The flow velocity in branch CE is 2.5 m/s. Find the volume rate of flow in AB, the velocity in BC, the velocity in CD and the diameter of CE.

(c) Derive continuity equation of liquid flow based on conversion of mass principles.   7

(d) The strean function for a two dimensional flow is given by $\psi = 2xy$. Calculate the velocity at the point P (2, 3). Find the velocity potential function ϕ.   7

Unit-III

3. (a) Define Bernoull's equation & what are the assumptions.   2

(b) The water is flowing through a taper pipe of length 100 m having diameters of 600 mm at upper end 300 mm at the lower end at the rate of 50 lit/s. The pipe has a slope of 1 in 30. Find the pressure at the lower end if the pressure at the higher level is 19.62 N/cm^2.   7

(c) A 45° deflection angle reducing bend lies in a horizontal plane and tapper from 60 cm diameter to 30 cm diameter at the outlet. The pressure at the inlet is 15 kPa and the flow through the bend is 0.5 m³/s of water. Computer the magnitude and direction of force exerted by water on the bend. 7

(d) Explain the following : (any **two**) 7

   (i) Euler's equation of motion.

   (ii) Pitot tube

   (iii) Moment of momentum equation

Unit-IV

4. (a) Define open channel flow. 2

(b) Derive the expression for discharge for laminar flow through circular pipe. 7

(c) Derive an expression for the loss of head due to sudden contraction of pipe. 7

(d) A trapezoidal channel with side slopes 3 horizontal to 2 vertical has to be designed to carry 10 m³/sec 7

at a velocity of 1.50 m/sec. So that the amount of concrete lining for the bed and side is minimum field :

   (i) The wetter perimeter

   (ii) Slope of the bed Manning's N = 0.014

Unit-V

5. (a) Compare orifice and mouthpiece. 2

(b) A tank has two identical orifices in of its vertical sides. The upper orifice is 3 m below the water surface and lower one is 5 m below the water surface. If the value of C_v for each orifice is 0.96. Find the point of intersection of the two jets. 7

(c) Explain the different "Hydraulic Co-efficients". 7

(d) A braod crested weir of 50 m length has 50 cm height of water above its crest. Find the maximum discharge take $C_d = 0.60$. Neglect velocity of approach of velocity of approach is to be taken in to consideration. Find maximum discharge when the channel has a cross-sectional area of 50 m² on the upstream side. 7

320353(20)

B. E. (Third Semester) Examination, Nov.-Dec. 2021

(New Scheme)

(Civil Engg. Branch)

SURVEYING-I

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

*Note : Part (a) of each question is compulsory carries 02 marks. Attempt any **two** parts from each question from (b), (c) or (d) carries 07 marks.*

Unit-I

1. (a) If R. L. of a B.M. is 100·00 m, the back-sight is 1·215 m and foresight is 1·870 m, the R.L. of the forward station is :   2

    (i) 99·345 m

(ii) 100·345 m

(iii) 100·655 m

(iv) 101·870 m

(b) Explain the effects of curvature and refraction in leveling.   7

(c) An observer standing on the deck of a ship just sees a light house. The top of the light house is 43 meters above the sea level and the height of the observer's eye is 7 meter above the sea level. Find the distance of the observer from light house.   7

(d) Write short note on (any **two**) :   7

  (i) Reciprocal levelling

  (ii) Fly levelling

  (iii) Profile levelling

Unit-II

2. (a) In the method of contouring, the process of locating or identifying points lying on a contour is called :   2

  (i) Ranging

  (ii) Centering

  (iii) Horizontal control

(iv) Vertical control

(b) What is interpolation of contours? Explain any one method of contour interpolation.   7

(c) What are the various application/uses of contour map? Explain in brief.   7

(d) Explain in brief with neat sketch (any **two**) :   7

  (i) Box Sextant

  (ii) Planimeter

  (iii) Abney Level

Unit-III

3. (a) The angle between the prolongation of the preceding line and the forward line of a traverse is called :   2

  (i) Deflection angle

  (ii) Included angle

  (iii) Direct angle

  (iv) None of these

(b) Explain various sources of errors in Theodolite.   7

(c) Explain how to measure a horizontal angle by repetition method.   7

(d) Write short note on :　　　　　　　　　　7

   (i)　Face right and face left observation

   (ii)　Transiting the telescope

   (iii) Swinging the telescope

Unit-IV

4. (a) Which of the following methods of plane table surveying is used to locate the position of an inaccessible point?　　　　2

   (i)　Radiation

   (ii)　Intersection

   (iii) Traversing

   (iv) Resection

(b) Define the three point problem in Plane Tabling and explain the same by Bessel's method.　　　7

(c) The following traverse has been run off located a point F midway between A and E. If the coordinates of A are (500, 500), compute　　　7

   (i)　The length and bearing of CF

   (ii)　The independent coordinate of C, E and F

Side	Length	Bearing
AB	400	300°00'
BC	350	0°00'
CD	350	31°11'
DE	400	319°31'

(d) A closed traverse ABCDE was made. Due to obstruction it was not possible to observe the length of line DE and EA, find out missing lengths.　　　7

Line	Length (m)	Bearing
AB	500	98°30'
BC	620	30°20'
CD	468	298°30'
DE	?	230°00'
EA	?	150°10'

Unit-V

5. (a) The length of the long cord of a simple circular curve of radius R and angle of deflection Δ is given by :　　　2

(i) $R\cos(\Delta/2)$

(ii) $2R\cos(\Delta/2)$

(iii) $2R\sin(\Delta/2)$

(iv) $R\sin(\Delta/2)$

(b) What are the characteristics of a transition curve?   7

(c) Explain the 'Rankine' method of deflection angle for setting out simple curve.   7

(d) Two tangents AB and BC intersect at B. Another line DE intersects AB and BC at D and E such that angle $ADE = 150°$ and angle $DEC = 140°$. The radius of the first curve is 200 m and that of the second is 300 m. The chainage of B is 950 m. Calculate all data necessary for setting out the compound curve.   7

320354(20)

B. E. (Third Semester) Examination, Nov.-Dec. 2021

(New Scheme)

(Civil Engg. Branch)

MECHANICS of SOLIDS

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

Note : *Attempt all questions. Part (a) from each question is compulsory and carry 2 marks. Attempt any **two** parts (b), (c) & (d) with carries 7 marks each.*

Unit-I

1. (a) What is Hook's law? 2

   (b) Discuss the stress-strain behaviour of an engineering materials with neat sketch showing each point of importance in detail. 7

(c) A steel bar is 800 mm long; its two ends are 50 mm and 60 mm in diameter and the length of each rod is 250 mm. The middle portion of the bar is 20 mm is diameter and 300 mm long. If the bar is subjected to an axial tensile load of 25 kN. Find its total extensions.

Take $E = 2 \times 10^5$ N/mm² or 200 GN/m².   7

(d) Calculate the values of the stress and strain in portions AC and CB of the steel bar as shown in figure. A close fit exists at both the rigid supports at room temperature and the temperature is raised by 75°C. Take $E = 200$ GPa, $\alpha = 12 \times 10^{-10}$/°C for steel. Areas of cross sections of AC and AB are 400 mm² and 800 mm² respectively.   7

0.3m.   0.3m

Fig.
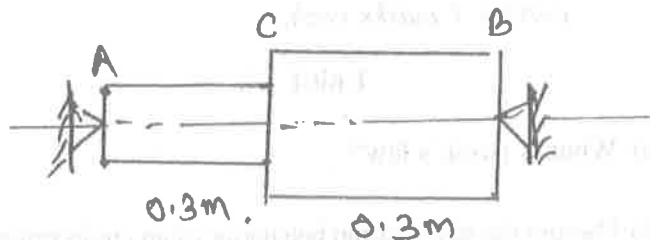
Unit-II

2. (a) What do you mean by Mohr's circle?   2

(b) Write the procedure for Mohr's circle construction for principal stresses.   7

(c) The principal stresses at a point access two perpendicular planes are 75 MN/m² (tensile) and 35 MN/m² (tensile). Find the normal, tangential stress, and resultant stress and its obliquity on a plane at 20° with the major principal planes.   7

(d) Show that in a strained material subjected to two dimensional stress, the sum of normal components of stresses on any two mutually perpendicular planes is constant.   7

Unit-III

3. (a) Write the value of section modulus of a rectangular section of width b and depth d.   2

(b) Write the assumptions made in the theory of simple bending. Support your answer with neat diagram.   7

(c) Three beams having same length same allowable stress and same bending moment. The cross section of the beams are a square, a rectangle and the depth twice the width and a circle. Determine the ratios of weights of the circular and rectangular beams with respect to the square beam. 7
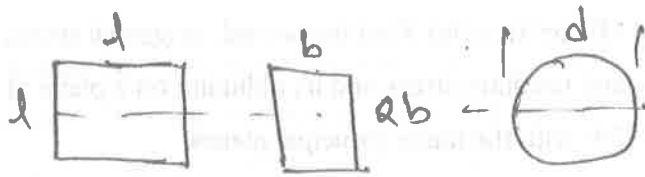
Fig

(d) An I section beam 340 mm × 200 mm has a web thickness of 10 mm and flange thickness of 20 mm. It carries a shearing force of 100 kN. Sketch the shear stress distribution across the section. 7

Unit-IV

4. (a) What will be effective length of a shut or column when : 2

(i) one end is fixed, other is free

(ii) one end is fixed other is pinned.

(b) A solid round bar 60 mm in diameter and 2·5 m long is used a strut. One end the strut is fixed other end is hinged. Find the safe compressive load of this strut using Euler's formula. 7

Take $E = 200$ GN/m^2 and factor of safety $= 3$

(c) Calculate the maximum value of slenderness ratio of a mild steel column for which Euler's formula is valid. 7

(d) A retaining wall of trapezoidal section is 10 m high and retains earth which is level upto the top. The width of the top is 2 m and at bottom 8 m and exposed face is vertical. Find the bending moment developed due to eccentricity. 7

Take density of earh 16 kN/m^2

Take density of masonary 24 kN/m^2

Angle of repose of each $= 30°$

Unit-V

5. (a) What is Shear Centre? 2

(b) Evaluate the shear centre expression for a channel section. 7

(c) A hollow circular shaft 20 mm thick transmits 294 kW at 200 r.p.m. Determine the diameter of the shaft if shear strain due to torsion is not is exceed 8.6×10^{-4}.　　　　　　　　　　　　　7

(d) A weight of 200 N is dropped on a helical spring made of 15 mm wire closely coiled to a mean diameter of 120 mm with 20 coils. Determine the height of drop if the instantaeous compression is 80 mm.　　　　　　　　　　　　　7

Take $C = 84$ GN/m^2

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320355(20)

B. E. (Third Semester) Examination, Nov.-Dec. 2021

(New Scheme)

(Civil Engg. Branch)

BUILDING MATERIALS

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

Note : Part (a) carrying 2 marks is compulsory. Attempt any two from (b), (c) and (d) of each unit and carry 7 marks each.

Unit-I

1. (a) What are the factors affecting rate of hydration of cement?

(b) Explain purpose, significance and uses of the following test of cement :

(i) Tensile test

(ii) Setting test

(iii) Soundness test

(iv) Normal consistency test

(c) Explain hydration process of cement with schematic diagram. Define get water, dormant period and gel.

(d) Discuss about application and classification of pozzolanas.

Unit-II

2. (a) Define modulus of elasticity of concrete.

(b) Discuss the types of admixtures and their purpose in modern concrete.

(c) Define durability of concrete. Enumerate and explain the factors affecting durabilityof concrete.

(d) Explain the various factors affecting stregnth of greem concrete.

Unit-III

3. (a) Define Ceramics.

(b) Write short note on :

(i) Properties of ceramics

(ii) Mthod of shaping and forming of ceramic tiles

(c) Discuss in brief the raw materials and their properties for manufacturing of ceramic tiles.

(d) Differentiate between porecelation tiles and non-porcelain tiles.

Unit-IV

4. (a) Name some timber producing tress and also their relative market values.

(b) Explain requirements of good preservative. Also explain any one method for preservation of timber.

(c) Discuss types, sources and uses of various industrial wastes as of cost effective material in construction.

(d) Explain types and uses of :

(i) Plywood

(ii) Veneers

(iii) Hardboards

[4]

Unit-V

5. (a) Define PVC.

   (b) What do you understand by composite material? Explain its types and uses.

   (c) Explain method of manufacturing and tests for suitability of tiles.

   (d) What are the various ingredients of paints and state the function of eah of them?

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320356(20)

B. E. (Third Semester) Examination, Nov.-Dec. 2021

(New Scheme)

(Civil Engg. Branch)

ENGINEERING GEOLOGY

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

Note : All questions from part (a) carries 2 marks each. Part (b), (c) & (d) carries 7 marks each. Solve each question for 16 marks. Draw neat sketch wherever required.

Unit-I

1. (a) Define Engineering Geology.   2

    (b) Describe the megascopic (physical) properties for identification of the minerals.   7

(c) Describe various engineering properties of rocks.   7

(d) Write short notes on :   7

    (i)   Mohr scale of hardness

    (ii)   Fundamental concept of geology

    (iii)   Cleave and fracture

Unit-II

2. (a) Define magma and lava.   2

   (b) Define sedimentary rocks and explain the structure of sedimentation.   7

   (c) Describe various types of faults in the rocks.   7

   (d) Write short notes on the following :   7

    (i)   Agents of weathering

    (ii)   Types of joint rock

Unit-III

3. (a) Define Seismology.   2

   (b) Explain the classification of different types of seismic waves.   7

(c) Write detailed note on earthquake resisting structures in higher seismic zone.   7

(d) Write short notes on the following :   7

    (i)   Richter scale

    (ii)   Intensity of earthquake

    (iii)   Focus and Epicentre

Unit-IV

4. (a) Define the term strata.   2

   (b) Discuss the role of geological factor in landslide.   7

   (c) Explain land subsidence. Describe its causes and preventive measures.   7

   (d) Describe the role of groundwater in landslides.   7

Unit-V

5. (a) Define Geological map.   2

   (b) Describe the preventive measures between unsafe geological structure and stability of tunnels.   7

[4]

(c) Concepts and usage of geological map for civil engineering projects. 7

(d) Describe various geological considerations for selection of dam and reservoir. 7

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B020312(020)

B. Tech. (Third Semester) Examination, Nov.-Dec. 2021

$\triangle) C J E$ (New Scheme)

$C) V I L$

(Mechanical Engineering Branch)

INTRODUCTION to FLUID MECHANICS

Time Allowed : Three hours

Maximum Marks : 100

Minimum Pass Marks : 35

Note : Part (a) of each question is compulsory. Solve any two from (b), (c) and (d).

Unit-I

1. (a) Define Newtonian and Non-Newtonian Fluid with examples.   4

(b) A rectangular place 0·6 m wide and 1·2 m deep is submerged in an oil bath specific gravity 0·8. The maximum and mininum depths of the plate are 1·6 m and 0·75 m from the free surface. Calculate the hydrostatic force one face of the plate, and the depth of center of pressure.   8

(c) State and explain the principle of floationg. How does it differ from the principle of buoyancy?   8

(d) A piece of wood (specific gravity = 0·6) of 10 cm square in cross-section and 2·5 m long floats in water. How much lead (specific gravity = 12) need to be fastened at the lower end of the stick so that if flows upright with 0·5 m length out of water?   8

Unit-II

2. (a) Differentiate between the Eulerian and Langrangian method of representation.   4

(b) What is Continuity Equation? Derive continuity equation for three dimensional cartesian coordinate.   8

(c) What flows through a pipe AB 1·2 m diameter at 3 m/s and then passs through a pipe BC 1·5 m diameter. At C, the piper branches. Branch CD is

0·8 m in diameter and carries one-third of flow in AB. The flow velocity in branch CE is 2·5 m/s. Find the volume rate of flow in AB, the velocity in BC, the velocity in CD and the diameter of CE.   8

(d) Distinguish between :   8

    (i) Steady flow and un-steady flow,

    (ii) Uniform and nonuniform flow,

    (iii) Compressible and incropressible flow,

    (iv) Rotational and irrigational flow,

    (v) Laminar and turbulent flow.

Unit-III

3. (a) Explain any one application of momentum equation. 4

(b) Derive Euler's equation of motion along a streamline, and hence drive the Bernoulli's theorem.   8

(c) A Venturi-meter is provided to measure the water flowing through a horizontal pipe of 25 cm diameter. The throat of the venture-meter is 12 cm. The pressure of water flowing through the pipe is 1·5 bar and the vacuum measured at the throat is 30 cm of Hg. Find the water flow rate through the pipe. Take $Cd = 0·975$.   8

(d) Describe the procedure of finding the forces on pipe bend. 8

Unit-IV

4. (a) Discuss minor losses in pipes. 4

(b) Derive an expression for calculating loss of head due to sudden contraction and due to sudden enlargement. 8

(c) Find the discharge through a trapezoidal channel of width 8 m and side slope of 1 horizontal to 3 vertical. The depth of flow water is 2.4 m and value of Chezy's constant $C = 50$. The slope of the bed of the channel is given 1 in 4000. 8

(d) Explain with neat sketch the Reynold's experiment and define Laminar and Turbulent flow. 8

Unit-V

5. (a) What is a mouthpiece? State its utility. 4

(b) Deduce a formula for computing discharge through an orifice and mention the factors taken care of by the coefficient employed in it. 8

(c) What are the different types of notches? Explain Rectangular and Stepped nothces. 8

(d) Explain with net diagram the cippoletti and broad crested weir. 8

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B020313(020)

B.Tech. (Third Semester) Examination Nov.-Dec. 2021

A) C T E   (New Scheme)

(Civil Eng. Branch)

INTRODUCTION to SOLID MECHANICS

Time Allowed : Three hours

Maximum Marks : 100

Minimum Pass Marks : 35

Note : All questions are compulsory with internal
choices among (b), (c), (d) parts. ᖯ ∣ 6 𝕞𝕒𝕣𝕜𝕤

Unit-I

1. (a) Mark correct or incorrect among the following
    relations.   4

(i) $G = \dfrac{E}{2(1+\mu)}$

(ii) $K = \dfrac{E}{3(1+2\mu)}$

(iii) $E = \dfrac{9KG}{3K+G}$

(iv) $\mu = \dfrac{3K+2G}{6K+2G}$

(b) Draw stress-strain curve, mark the salient points and explain them. 8

(c) A prismatic bar is fastened between two rigid walls at A and B and subjected to loads as shown in figure below. Determine the reactions at the supports. 8
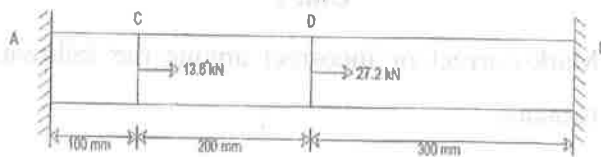
(d) A stepped bar with circular cross section and supported at top, hangs vertically under its own weight. Dimensions of the bar are shown in the figure below. Calculate the elongation of the bar under its own weight. Take $E = 2 \times 10^5$ N/mm² and density $\gamma = 8 \times 10^{-5}$ N/mm³. 8
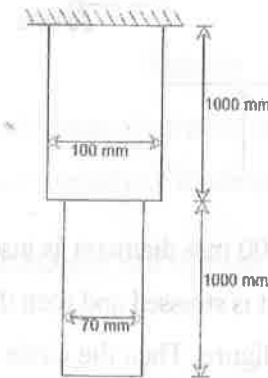
Unit-II

2. (a) What is angle of obliquity? 4

(b) For the state of stress shown in figure below, determine : 16

(i) The principal planes

(ii) The principal stresses

(iii) The maximum shearing stress and its plane

(iv) Normal stress corresponding to maximum shearing stress.
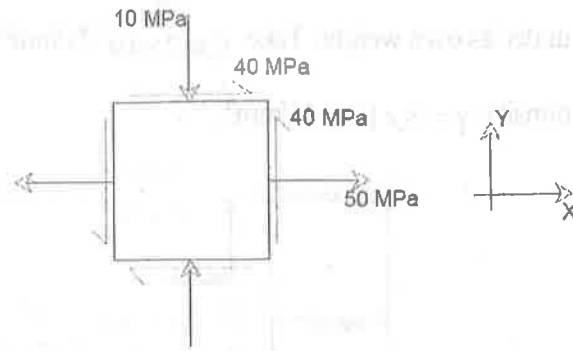
(c) A circle of 100 mm diameter is inscribed on a steel plate before it is stressed and then the plate is loaded as shown in figure. Then the circle is deformed into an ellipse. Determine the major and minor axes of the ellipse and their directions. Take $E = 2.1 \times 10^6$ kg/cm^2 and $\dfrac{1}{m} = \mu = 0.28$.   16
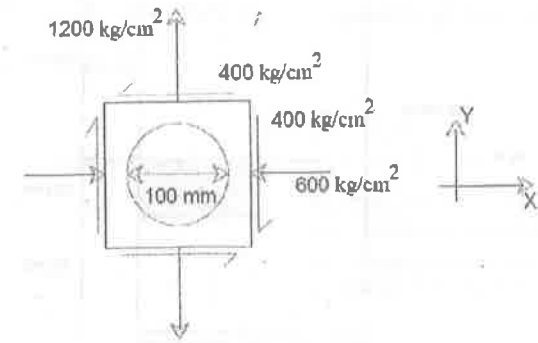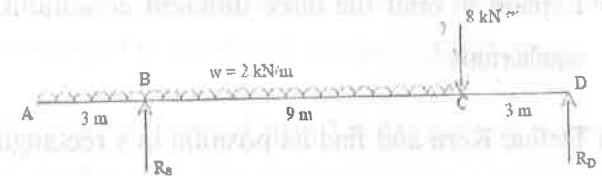

Unit-III

3. (a) What is the relation between bending moment, shear force and intensity of loading?   4

(b) Draw BMD and SFD for the beam shown below.   8

(c) A beam with the cross section given below is subjected to a positive moment (causing compression at the top) of 16 kN-m acting around the horizontal neutral axis. Find the tensile force acting on the hatched area of the cross section.   8
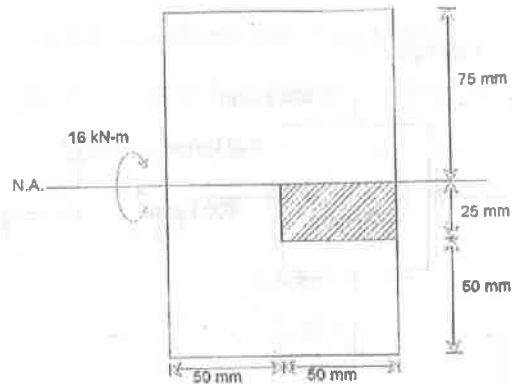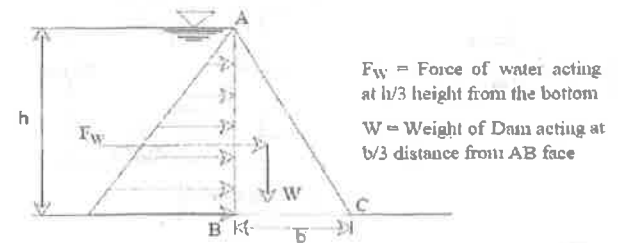
(d) Derive and draw the shear stress distribution in a rectangular section and prove that the maximum shear stress is 1.5 times the average shear stress.　8

Unit-IV

4. (a) Explain in brief the three different conditions of equilibrium.　4

(b) Define Kern and find its position in a rectangular section of size $b \times d$.　8

(c) For an elementary dam profile shown in figure under reservoir full condition, prove that $\dfrac{h}{b} \le \sqrt{G}$ for no

tension at base. Where, G = specific gravity of the dam material.　8

F_W = Force of water acting at h/3 height from the bottom

W = Weight of Dam acting at b/3 distance from AB face

(d) Explain Euler's theory and Rankine's theory for failure of column.　8

Unit-V

5. (a) Write the expression for effective stiffness of spring connected in series and parallel combinations.　4

(b) A cantilever beam of span 2 m has inclined loading at the free end. The section of the beam is shown below. Calculate bending stress at the four corners A, B, C and D of the beam cross section at fixed end.　8
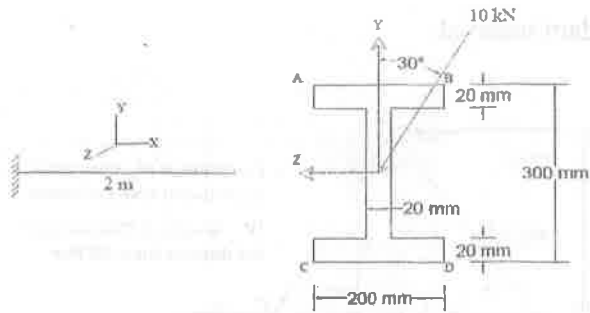
(c) Find torsion reactions at supports A & B for the given loading condition. Assume shear rigidity and uniform cross section.   8
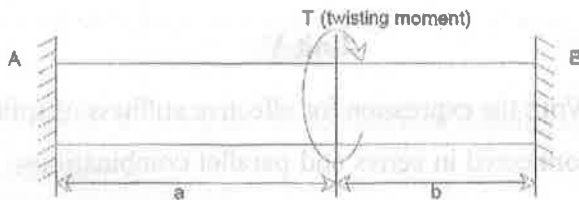
(d) Write short notes on closed coil helical spring.   8

B020314(020)

B. Tech. (Third Semester) Examination, Nov.-Dec. 2021

A)CTE (New Scheme)

(Civil Engg. Branch)

PLANE SURVEYING

Time Allowed : Three hours

Maximum Marks : 100

Minimum Pass Marks : 35

Note *: Attempt all questions. Part (a) is compulsory and carries 4 marks. Attempt any **two** parts from (b), (c) and (d) of each question which carry 8 marks each.*

Unit-I

1. (a) An observer standing on the deck of a ship just sees a lighthouse. The top of the lighthouse is 45 meters above the sea level and the lights of

observer's eye is 8 metres above the sea level. Find the distance of the observer from the lighthouse. 4

(b) Discuss the effect of curvature and refraction and deduce the expression for each one of them along with the combined correction. 8

(c) A dumpy level was setup midway between A and B, 80 m apart, the reading on A and B being 1·865 and 1·780 m each. The Dumpy level was then set up at C on BA produced 16 m from A. The staff readings at A and B was 1·620 m and 1·550 m. Calculate the staff readings on A and B to give a horizontal line of sight. 8

(d) Write short notes on : (any **two**) 8

   (i) Sensitivity of bubble tube

   (ii) Reciprocal leveling

   (iii) Barometric leveling

Unit-II

2. (a) Define the term "Contour Interval" and "Horizontal Equivalent". 4

(b) What are different methods of contouring? Describe any methods with sketch. 8

(c) What are the methods of Contour Interpolation? 8

(d) Explain with neat sketches : (any **two**) 8

   (i) Box sextant

   (ii) Pantograph

   (iii) Clinometer

Unit-III

3. (a) (i) Define "latitudes" and "departures" in theodolite traversing with respect to co-ordinate systems.

   (ii) Explain about the Trunnion axis in Theodolite Surveying. 4

(b) Write a detail note on permanent adjustments of Theodolite. 8

(c) Explain how you would measure horizontal angle by repetition method with theodolite. 8

(d) Give in short notes on : 8

   (i) Face right and face left observation

(ii) Swinging the telescope

(iii) Transmitting the telescope

Unit-IV

4. (a) (i) How is the plane table survey method different from other methods survey?

(ii) Mention the different methods of orientation. 4

(b) Explain with neat figure, the Bassel's Graphical method, in plane table surveying. 8

(c) Adjust the following traverse table. 8

Line	Included Angles	Length (m)	W.C.B.
AB	73° 31′	66·6	30° 30′
BC	107° 42′	135·7	102° 47′35″
CD	187° 8′	66·3	95° 39′12″
DE	77° 30′	76·6	198° 8′48″
EA	94° 7′	214·3	284° 1′24″

(d) Explain with neat sketches the methods of radiation & intersection in plane Tabling. 8

Unit-V

5. (a) What are the uses/applications of a curve? 4

(b) Write the characteristics of a transition curve. 8

(c) What are the elements of a simple curve? Brief them with neat sketch. 8

(d) Two tangents AB and BC intersect at B. Another line DE interest AB and BC at D and E such that $\angle ADE = 150°$ and $\angle DEC = 140°$. The radius of the first curve is 200 m and that of the second is 300 m. The chainage of B is 950 m; calculate all data necessary for setting out the compound curve. 8

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B020315(020)

B. Tech. (Third Semester) Examination, Nov.-Dec. 2021

(AICTE Scheme)

(Civil Engg Branch)

BUILDING MATERIALS

Time Allowed : Three hours

Maximum Marks : 100

Minimum Pass Marks : ~~33~~ 35

Note : Attempt all questions. Part (a) of each question is compulsory. Attempt any two parts from (b), (c) and (d).

Unit-I

1. (a) What is IS Code for Ennore sand?   4

(b) What are Bogue compounds and their functions? What is their role in hydration mechanism in cement? 8

(c) What is fineness modulus of aggregate ands what is its unit? Explain abrasion test and impact test of aggregates. 8

(d) What are Natural Puzzolonas? What are the types of pozzolans and their characteristics? 8

Unit-II

2. (a) What is True Slump? 4

(b) How can you test the quality of fresh and hardened concrete? 8

(c) Write short notes on : 8

(i) EC of concrete

(ii) Yield strength of concrete

(iii) Flexural strength of concrete

(iv) Creep of concrete

(d) What are the variables in proportioning of concrete mix? What are the criteria that must be used when designing a concrete mix? 8

Unit-III

3. (a) What is low cost construction materials? 4

(b) What are the characteristics of : 8

(i) Particle Board

(ii) Plywood

(c) Which materials waste can be used in construction industry and how? 8

(d) What is form work and what are requirements of good form work? 8

Unit-IV

4. (a) Which type of varnish is used on hardwood substances to hide grain defects? 4

(i) Wax Polish

(ii) Asphalt Varnish

(iii) Flat Varnish

(iv) French Polish

(b) What material is Bitumen? What products are made from bitumen? 8

[4]

(c) How Distempering is different from painting? Which one is better distemper or emulsion and how?   8

(d) What is the full form of PVC with respect to paint? What are the different ingredients of paint?   8

Unit-V

5. (a) What is Structural Steel?   4

(b) What is Aluminium and its alloys? Write down its properties, uses and advantages.   8

(c) What is glass their types and their uses in civil engineering?   8

(d) Write short notes on :   8

    (i) Ceramics

    (ii) Types of tiles

    (iii) Refractories

    (iv) Uses of PVC