

320612 (20)

BE (6th Semester)
Examination, April-May 2021

Branch : Civil

GEOTECH ENGINEERING - II

Time Allowed : Three Hours

Maximum Marks : 80

Minimum Pass Marks : 28

Note : Part (a) of each unit is compulsory, whereas

attempt any two parts from (b), (c) and (d). Part

(a), is carrying of 2 marks and part (b), (c) and

(d) are carrying of equal 7 marks in each unit.

Use of stability chart is allowed.

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UNIT-I

- Q. 1. (a) Calculate the factor of safety in an infinite slope at a point 5 m below the surface. The slope angle with the horizontal is 20° , and the effective shear parameters for the given soil : $C = 10 \text{ kN/m}^2$ and $\phi = 30^\circ$; unit weight of the moist soil = 19 kN/m^3 . 2
- (b) Explain Swedish Circle method of stability analysis. 7
- (c) A 8m deep cutting has side slopes of $1\frac{1}{2}H : 1V$. The soil was tested and found to have the following properties : $C = 24.5 \text{ kN/m}^2$, $e = 0.80$, $\phi = 14^\circ$. Determine the factor of safety with respect to cohesion, against failure of the slope, when (i) water level in the

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(3)

cut rises upto full height (ii) when water level goes down suddenly. Given : $G = 2.7$; and for

$B = 34^\circ$, Stability Numbers (N) are : 7

ϕ	N
6°	0.122
7°	0.116
14°	0.074

(d) Explain stability analysis of infinite and finite slopes. 7

UNIT-II

Q. 2. (a) Explain backfill with surcharge. 2

(b) (i) Compute the active earth pressure at a depth of 4.5 m in a sand whose

(4)

angle of friction is 37° , and density of
1.56 gm/cc in dry state.

- (ii) Compute the active earth pressure also if the water-table is located at a depth of 1.5 m below the ground surface. Assume submerged density of soil as 0.985 gm/cc. 7
- (c) Explain the theories of earth pressure due to Rankine and Coulomb and indicate the fundamental assumption in each theory. 7
- (d) A 12 m high retaining wall with a smooth vertical back retains a mass of moist cohesionless sand with a horizontal surface. The sand weights 14 kN/m^3 and has an angle of internal friction equal to 32° . 7

(5)

(i) Compute the total lateral earth pressure at rest, and its location.

(ii) If subsequently the water table rises to the ground surface, determine the increase in earth pressure at rest.

Assume a suitable value of $k_R = 0.5$.

UNIT-III

Q. 3. (a) Write down the load-settlement curves for soils with diagram. 2

(b) A foundation in a loose sand is 4 m wide, 6 m long and 1.5 m deep. The soil weighs 16 kN/m^3 and has an angle of internal friction 32° . Compute the Safe Bearing Capacity, adopting a factor of safety of 2. 7

(6)

(c) Explain with neat sketches the general shear failure below a strip footing having (i) smooth base (ii) rough base. 7

(d) Explain in brief the SPT method for determining safe bearing capacity of soils. 7

UNIT-IV

Q. 4. (a) Under what situations a well foundation is preferred over a pile foundation ? 2

(b) In a 16 pile group, the pile diameter is 0.4 m, and center to center spacing of piles in the square group is 1.5 m. If $C_u = 50 \text{ kN/m}^2$, determine whether the failure would occur as a block failure or when the piles act individually. Neglect bearing at the tip of the pile. All piles are 12 m long.

(7)

Take $\alpha = 0.7$ for shear mobilisation around each pile. Also determine the safe load on this group. 7

(c) Describe the methods for determining load carrying capacity of piles in : 7

(i) Clay soils

(ii) Sands soils

(d) Explain shapes and components parts of well foundation with sketches. 7

UNIT-V

Q. 5. (a) What are the characteristics of CNS soils ? 2

(b) Prove that : 7

$$f_n = \frac{w_n}{2\pi} = \frac{1}{2\pi} \sqrt{\frac{k}{m}}$$

(8)

(c) The foundation for a gas engine with a vertical cylinder and vertically oscillating parts has the following data :

Total weight of Engine = 50 kN

Speed of Rotation = 300 rpm

Weight of block = 250 kN

Weight of participating soil = 200 kN

Spring stiffness = 60×10^4 kN/m

Determine the natural frequency and maximum amplitude. Take D , the value of dumping factor $\frac{c}{c_c} = 0.1$. The unbalanced vertical force is 12 kN. 7

(d) What are the problems associated with contaminated and expansive soils. 7

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Roll No. :

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B. E. (Sixth Semester) Examination, April-May 2021

(Civil Engg. Branch)

ENVIRONMENTAL ENGINEERING-I

Time Allowed : Three hours

Maximum Marks : 80

Note : Part (a) compulsory of 2 marks. Select any two parts from (b), (c) and (d) carries 7 marks each.

Unit-I

1. (a) Define population forecasting.
(b) Define intake and factors considered for intake site.

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- (c) Write various water demands required, discuss in detail.
- (d) Predict the population for the years 2021, 2031, 2041 from the following census figures of a town.

Year	Population
1961	8, 58, 545
1971	10, 15, 672
1981	12, 01, 553
1991	16, 91, 538
2001	20, 77, 820
2011	25, 85, 862

Unit-II

2. (a) What do you mean by sedimentation?
- (b) Write physical, chemical and biological characteristics of water.
- (c) Explain jar test with neat sketch.
- (d) Explain theory of sedimentation.

Unit-III

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[3]

3. (a) What is break point chlorination?
- (b) Differentiate between rapid and slow sand filters.
- (c) Write the name of several disinfection methods and describe one method with sketch.
- (d) Explain water filtration process in detail.

Unit-IV

4. (a) Define reservoirs.
- (b) Write requirement of Good Water Distribution System.
- (c) Discuss with neat sketch about zeolite method.
- (d) Write storage capacity of distribution reservoir.

Unit-V

5. (a) Define ppm and PM.
- (b) Describe effects of air pollution in detail.
- (c) Explain air pollution control methods in brief.
- (d) Justify with neat sketch about Electrostatic precipitator.

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Roll No. :

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B. E. (Sixth Semester) Examination, April-May 2021

(New Scheme)

(Civil Engg. Branch)

STRUCTURAL ENGINEERING DESIGN-II

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

Note : Attempt all questions. Part (a) of each question is compulsory. Attempt any one part from (b) & (c) of each question. Use IS 800-2007 and Steel Table is permitted.

Unit-I

1. (a) Give two advantages of steel as a structural design material. 2

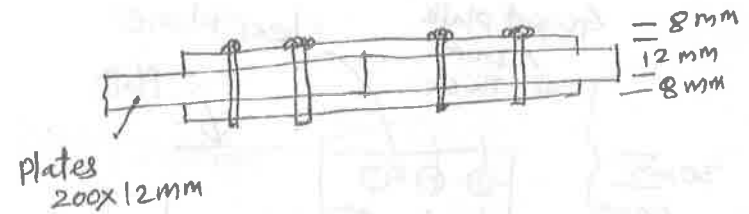
[2]

- (b) (i) State the physical and mechanical properties of steel as a structural material. 7
- (ii) Draw idealized stress-strain curve for mild steel. Discuss the effect of residual stresses. 7
- (c) (i) List out and explain in brief various types of loads to be considered in the design of steel structure. 7
- (ii) Find the shape factor for a diamond section with the unequal diagonals, the shorter being b and longer being h , the shorter diagonal placed parallel to the z -axis. 7

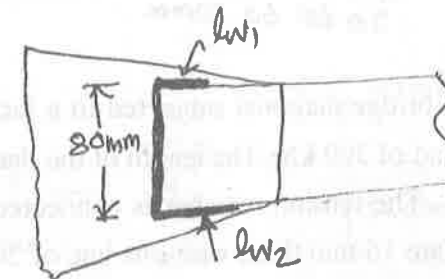
Unit-II

2. (a) Give two disadvantages of welded connection to bolted connection. 2
- (b) Two plates of $200 \text{ m} \times 12 \text{ mm}$ are to be connected by a double cover butt joint with 20 mm diameter bolts as shown in fig. The factored tensile force on the plates is 500 kN. Design the bolted connection. The bolts are arrange to give the maximum efficiency. 14

[3]



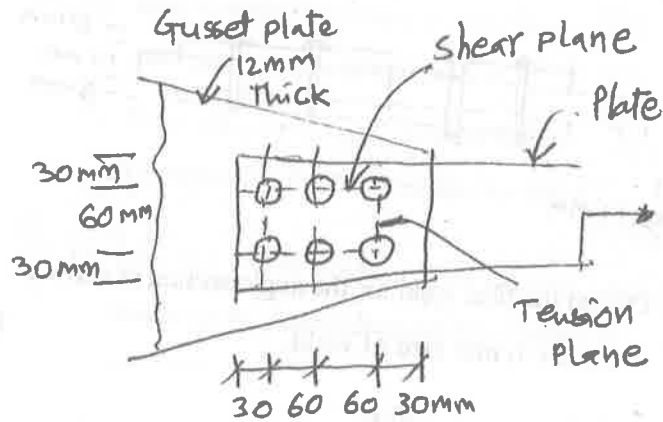
- (c) Design the fillet weld for the angle section as shown in fig use 6 mm size of weld. 14



Unit-III

3. (a) Explain block shear failure. 2
- (b) Determine the design tensile strength of the plate $120 \text{ mm} \times 8 \text{ mm}$ connected to a 12 mm thick Gusset plate with bolt holes as shown in fig. The diameter of bolt is 16 mm and 4.6 grade. Use Fe 410 steel. 14

[4]



- (c) Design a bridge diagonal subjected to a factored tensile load of 300 kN. The length of the diagonal is 3.0 m. The tension member is connected to a gusset plate 16 mm thick with one line of 20 mm diameter bolt of grade 8.8.

14

Unit-IV

4. (a) Why are plastic or compact section preferred for compression member. 2
- (b) For a column section built up of shape as shown in figure determine the axial load capacity in compression for the data indicated against the figure. 14

$f_y = 250 \text{ MPa}$

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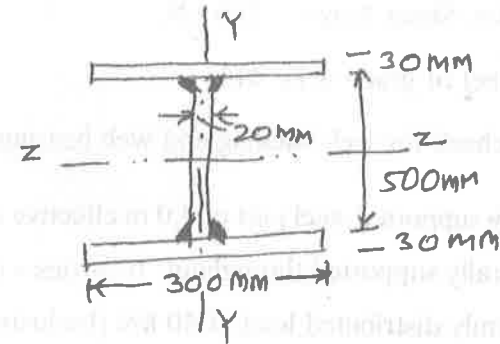
$L = 6.0 \text{ m}$

$t_w = 20 \text{ mm}$

$t_f = 30 \text{ mm}$

$r_{mf} = 1.50$

End condition : Both end restrained in direction and position.



- (c) Design a double angle discontinuous strut to carry a factored load of 135 kN, resulting from combination with wind load. The length of the strut is 3.0 m between intersections. The two angles are placed to back (with long legs connected) and are track bolted. Angles are placed on opposite side of 12 mm gusset plate; Use steel of grade Fe-410. 14

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Unit-V

5. (a) Differentiate between bending and buckling. 2
- (b) Design a laterally unsupported beam for the following
datas : 14
- (i) Effective span = 4 m
 - (ii) Max Bending Moment = 550 kN-m
 - (iii) Max Shear Force = 200 kN,
 - (iv) Steel of grade is Fe 410.
- Also check for web bucking and web bearing.
- (c) Simply supported steel joist of 4.0 m effective span
is laterally supported throughout. If carries a total
uniformly distributed load of 40 kN (Inclusive of
self weight). Design an appropriate section using
steel of grade Fe-410. Check for deflection and
web bearing is also required. 14

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Roll No. :

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B. E. (Sixth Semester) Examination, April-May 2021

(New Scheme)

(Civil Engg. Branch)

GEOTECH ENGINEERING-II

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

Note : Attempt all questions. Part (a) of each question is compulsory. Attempt any one part from (b) and (c).

Unit-I

1. (a) Define infinite and finite slope. 2
- (b) Explain with sketch the concept of Swedish circle method and force triangle of friction circle method. 14

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[2]

- (c) At cut 9 m deep is to be made in a clay with a unit weight of 18 kN/m^3 and a cohesion of 27 kN/m^2 . A hard stratum exists at a depth of 18 m below the ground surface. Determine from Taylors charts if a 30° slope is safe. If a factor of safety of 1.50 is desired, what is a safe angle of slop. 14

Unit-II

2. (a) Define earth pressure at rest. 2
(b) Explain : 14
(i) Coulomb Wedge theory
(ii) Distinguish between active and passive earth pressure
(c) Derive the equation of critical height of an unsupported vertical cut in cohesive soil. 14

Unit-III

3. (a) Define bearing capacity of soil. 2
(b) Explain Prandtl's method and Meyerh of method for bearing capacity of soil. 14

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[3]

- (c) A circle footing is resting on a stiff saturated clay with $q_0 = 250 \text{ kN/m}^2$. the depth of foundation is 2 m. Determine the diameter of the footing if the column load is 600 kN. Assume a factor of safety as 2.5. The bulk unit weight of soil is 20 kN/m^3 . 14

Unit-IV

4. (a) What is pile driving? 2
(b) Explain : 14
(i) Under-reamed piles
(ii) Negative skin friction
(iii) Zone of overlap
(c) Explain the function of pile foundation and show how the bearing capacity of the foundation can be estimated. 14

Unit-V

5. (a) What is black cotton soil? 2
(b) Discuss the problems in foundation on expansive soil and preventive measures. 14

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(c) Write short notes on :

14

- (i) Swelling potential
- (ii) Swelling pressure
- (iii) Free swell
- (iv) CBR value of black cotton soil

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B. E. (Sixth Semester) Examination, April-May 2021

(New Scheme)

(Civil Engg. Branch)

ENVIRONMENTAL ENGINEERING-I

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

Note : Part (a) of each question is compulsory and carries 02 marks. Attempt any two parts from (b), (c) & (d) and carries 7 marks each.

Unit-I

1. (a) Define population forecasting.
- (b) Define intake and factors considered for intake site.
- (c) Write various water demands required, discuss in detail.

[2]

- (d) Predict the population for the years 2021, 2031, 2041 from the following census figures of a town.

Year	Population
1961	8,58,545
1971	10,15,672
1981	12,01,553
1991	16,91,538
2001	20,77,820
2011	25,85,862

Unit-II

2. (a) What do you mean by sedimentation?
- (b) Write physical, chemical and biological characteristics of water.
- (c) Explain jar test with neat sketch.
- (d) The average daily demand at a town has been estimated as 8 million liters per day. Design a suitable sedimentation tank assuming a detention period of 5 hours and velocity of flow as 22 cm per minute.

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[3]

Unit-III

3. (a) What is break point chlorination?
- (b) Differentiate between rapid and slow sand filters.
- (c) Write the name of several disinfection methods and describe one method with sketch.
- (d) A city is to install rapid sand filters downstream of the clarifiers. The design loading rate is selected to be $160 \text{ m}^3/(\text{m}^2\text{d})$. The design capacity of the water works is $0.35 \text{ m}^3/\text{s}$. The maximum surface per filter is limited to 50 m^2 . Design the number and size of filters and calculate the normal filtration rate.

Unit-IV

4. (a) Define Reservoirs.
- (b) Write requirements of good water distribution system.
- (c) Discuss with neat sketch about Zeolite method.
- (d) An exhausted zeolite softener was regenerated by passing 100 litres of NaCl. Solution containing 150 gm per lit. of NaCl. How many lit. of a sample of

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H₂O of hardness 300 ppm can be softened by this softener?

(Given at wts. for C = 12, O = 16, Na = 23, Cl = 35.5, Ca = 40).

Unit-V

5. (a) Define ppm and PM.
- (b) Describe effects of air pollution in detail.
- (c) Explain air pollution control methods in brief.
- (d) Justify with neat sketch about electrostatic precipitator.

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Roll No. :

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B. E. (Sixth Semester) Examination, April-May 2021

(New Scheme)

(Civil Engg. Branch)

CONCRETE TECHNOLOGY

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

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

Unit-I

1. (a) Define specific surface. 2
- (b) Explain the process of hydration of cement with suitable diagram of hydrated product. 7

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[2]

- (c) What is the need of grading? Explain your answer with suitable example in tabular form for coarse and fine aggregate both. 7
- (d) Write notes on : 7
- (i) Surface index
 - (ii) Alkali aggregate reaction

Unit-II

2. (a) Define Workability. 2
- (b) Describe the function of water reducing admixture used in concrete. 7
- (c) What are the factors affecting workability? Explain each point in detail. 7
- (d) Write notes on : 7
- (i) Slump test
 - (ii) Mineral additives and their effect

Unit-III

3. (a) What are the properties of hardened concrete? 2
- (b) What are the factors affecting compressive strength of concrete? 7

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[3]

- (c) The strength of fully matured concrete was found to be 45 N/mm^2 . Find the strength of an identical concrete at the age of seven days when cured at an average temperature during day time at 20°C and night time at 10°C . 7
- (Take constants $A = 32, B = 54$)
- (d) Write short notes on : 7
- (i) Modulus of elasticity of concrete
 - (ii) Creep behaviour in concrete.

Unit-IV

4. (a) State the principle of concrete mix design. 2
- (b) Write notes on : 7
- (i) Sampling and acceptance criteria of concrete
 - (ii) Difference between destructive and non-destructive testing of concrete
- (c) Differentiate between the ACI, DOE and IS 10262 : 1982 methods for mix design of concrete. 7
- (d) Design a concrete mix to be used in structural elements by IS method for following requirements.

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[4]

- (i) Characteristics compressive strength = 30 N/mm²
- (ii) Maximum size of aggregate = 20 mm
- (iii) Shape of coarse aggregate = angular
- (iv) Degree of workability desired, compacting factor = 0.85
- (v) Degree of quality control = good
- (vi) Type of exposure = moderate

Test data for concrete making material :

Specific gravity of cement = 3.15

Specific gravity of coarse aggregate = 2.72

Specific gravity of fine aggregate = 2.66

Water absorption (air dry to saturated surface dry) in coarse aggregate, percent = 0.5

Surface moisture coarse aggregate = nil

Fine aggregate = 2%

- (vii) Compressive strength of cement at 28 days = 51 N/mm²

7

[5]

Sieve analysis :

IS designation	Cumulative % passing		Sand
	Fraction I	Fraction II	
	10 mm	20 mm	
40 mm	100	100	
25 mm	100	100	
20 mm	100	88	
12.5 mm	100	24	
10 mm	90	12	100
4.75 mm	4	1	92
2.36 mm	3	—	86
1.18 mm	—	—	78
600 micron	—	—	64
300 micron	—	—	16
150 micron	—	—	2
Passing 150 micron	—	—	—

Note : Sand conforming to zone III of IS : 383-1970

Unit-V

- | | |
|--|---|
| 5. (a) What do you mean by no-fines concrete? | 2 |
| (b) Explain the need and procedure of vacuum dewatered concreting. | 7 |
| (c) Explain the manufacturing process of light weight concrete. | 7 |
| (d) Write notes on : | 7 |
| (i) Shotcreting | |
| (ii) Fiber reinforced concrete | |

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**B. E. (Sixth Semester) Examination, April-May 2021
(New Scheme)**

(Civil Engg. Branch)

CONSTRUCTION PLANNING

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

Note : (i) Answer all questions. Part (a) of each question is compulsory. Attempt any two part from (b), (c) and (d) of each question. In Unit-III attempt any one part from (b) and (c) each carries 14 marks.

(ii) The figures in the right hand margin indicate marks.

Unit-I

1. (a) What do you understand by Job layout? 2
- (b) Write note on : 7.
- (i) Bar chart
- (ii) Milestone chart

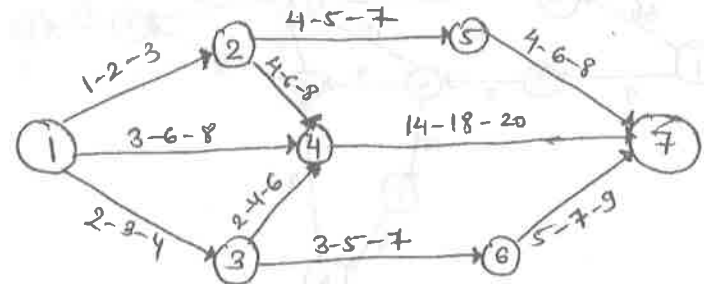
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- (c) What are the objective and function of construction management? 7
- (d) What is feasibility report? Explain in brief. 7

Unit-II

2. (a) Define slack? 2
- (b) What are the three time estimates followed by PERT with its significance? 7
- (c) In a small construction project, there are 6 activities identified from G to L. The following are the relationship between the different activities? Also define dummy? 7
- (i) G is the first activity to be performed
 - (ii) H and I can be done concurrently and must follow G
 - (iii) H must precedes J
 - (iv) K must succeed I, but, it cannot start until H is completed.
 - (v) The last operation L is dependent upon the completion of both J and K
- (d) From the network given below, find the expected time for each path. Also find the critical path as well as the expected time for the project completion. 7

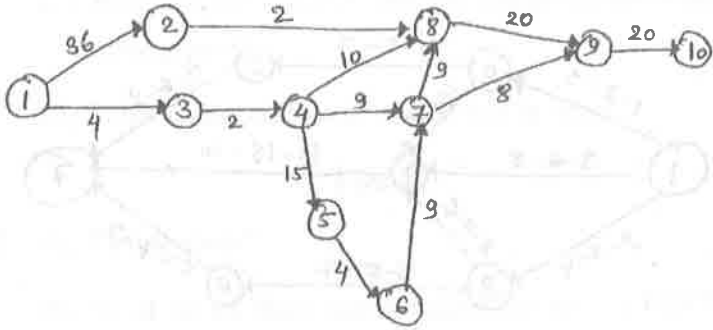
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Unit-III

3. (a) Define Network. 2
- (b) (i) Differentiate between CPM and PERT. 14
- (ii) What is float? What are the different types of float? Explain in brief.
- (c) The network for a certain project is shown below, along with the estimated time of completion of each activity. Compute the activity time, total float, free float and independent float for each activity. Mark the critical path on the network. 14

[4]



Unit-IV

4. (a) What is the objective of cost control? 2
- (b) What is economic analysis of an engineering project. Discuss with suitable example. 7
- (c) Define resource allocation and write the approaches for resource allocation. Write the factors affecting resource allocation. 7
- (d) Write steps of updating process of any project. 7

Unit-V

5. (a) What is the importance of safety? 2
- (b) Discuss various causes of accidents in construction. 7
- (c) What is the importance of quality control in construction? Enumerate the elements of quality? 7
- (d) Explain the safety benefits to employers, employees and customers. 7

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Roll No. :

320671(20)

B.E. (Sixth Semester) Examination April-May 2021

(New Scheme)

(Civil Engg. Branch)

MODERN CONSTRUCTION MATERIAL

(Professional Elective-I)

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

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

Unit-I

1. (a) Define ultra high strength concrete. 2

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[2]

- (b) What is fiber reinforced concrete? Discuss in brief. 7
- (c) Explain in detail about the flow properties of concrete. 7
- (d) What are the application of HPC? 7

Unit-II

2. (a) What is CTD rod? 2
- (b) Explain the different coating materials applied in bars. 7
- (c) Draw a neat sketch of "Cupola Furnace" & explain its working. 7
- (d) What are the necessities of alloy steel? 7

Unit-III

3. (a) What do you understand by Microscopic Composites? 2
- (b) What are the method used for polymerization? Explain. 7

[3]

- (c) What are the different types of reinforcement used in composite material? 7
- (d) Write short notes on the following : 7
- (i) Laminar composite
- (ii) Geotextile and geomembrane
- (iii) CFRP
- (iv) SIMCON

Unit-IV

4. (a) Explain Facade Material. 2
- (b) What are the advantages & use of grant consisting of cement mortar & ad mixtures water proofing? 7
- (c) Write short note on different water proffing compound. 7
- (d) What is Facade? Explain different type of facade. 7

Unit-V

5. (a) What is Smart & Intelligent Material? 2

[4]

- (b) Write short notes on : 7
- (i) Light Sensitive Materials
 - (ii) Electro-Strictive Materials
 - (iii) Thermoresponsive Materials
- (c) Explain the concept of smart brick & advantages of smart brick. 7
- (d) What is Piezometric Materials? Write some applications. 7

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**B. E. (Sixth Semester) EXAMINATION,
April-May, 2021
(New Course)
(Branch : Civil)**

INSTRUMENTATION IN FLUID MECHANICS

Time : Three Hours]

[Maximum Marks : 80

[Minimum Pass Marks : 28

- Note :** (i) Part (a) of each question is compulsory and carries 2 marks.
(ii) Attempt any *two* parts from (b), (c) and (d) of each question and carry 7 marks each.

Unit—I

1. (a) What do you mean by Data Aquisition system ? 2
(b) Explain the basic principle of transducer and also give the importance in the instrumentation system. 7
(c) Write a short note on thermocouple transducer with neat diagram. 7
(d) Explain the term calibration of instruments. How is it important in Instrumentation system ? 7

Unit—II

2. (a) What is pressure measurement system ? 2
- (b) What do you mean by manometer and also describe the U-tube manometer ? 7
- (c) Write a short note on Non contact probes with neat diagram. 7
- (d) The right limb of a simple U-tube manometer containing mercury is open to the atmosphere while the left atmosphere while the left limb is connected to a pipe in which a fluid of Sp. gravity 0.9 is flowing. The centre of the pipe is 12 cm. below the level of mercury in the right limb. Find the pressure of the fluid in the pipe if the difference of mercury level in the two limbs is 20 cm. 7

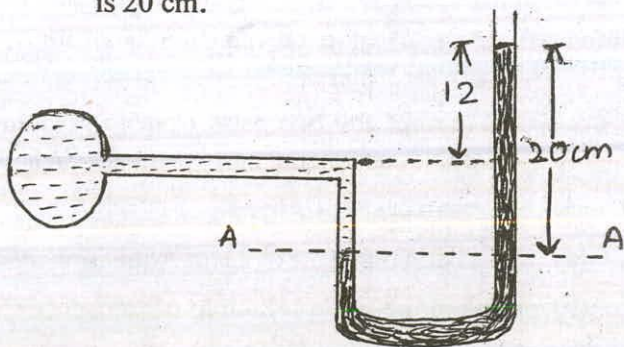


Fig.

Unit—III

3. (a) Explain the Laser Doppler Anemometer. 2
- (b) What do you mean by Anemometer ? Also explain the Hot wire anemometer. 7

[3]

(c) Write a short note on current meter and its types are also described. 7

(d) A pitot static in the at a 300 mm pipeline has one orifice pointing upstream and other perpendicular to it. The mean velocity in the pipe is 0.8 at the centered velocity. Find the discharge through the pipe if the pressure difference between the two orifice is 600 mm of water. Take $C_v = 0.98$ 7

Unit—IV

4. (a) What do you mean by Discharge of fluid ? 2

(b) Explain the working principle of venturimeter. 7

(c) Write a short note on Thermistor. 7

(d) Explain the orifice meter with the neat diagram. 7

Unit—V

5. (a) What do you mean by accuracy ? 2

(b) What do you understand by the term water level recorder ? Explain the right glass method for liquid level measurement. 7

(c) Write a short note on force measurements. 7

(d) Explain the importance of tracers in dispersion and diffusion studies. 7

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Roll No. :

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**B. E. (Sixth Semester) Examination,
April-May 2021
(New Scheme)**

(Civil Engg. Branch)

WATER POWER ENGINEERING

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

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

Unit-I

1. (a) Explain in short how hydro-power is developed? 2
- (b) State the names of power plants [Classification]
on the basis of fuels used to rotate the prime mover. 7

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[2]

(c) Explain the importance of hydrology for planning of any hydro-power project. 7

(d) The following data of mean monthly flow λ in m^3/sec is available for the driest period/year of the river site for 12 months (Jan. to Dec.)

300, 280, 200, 140, 100, 340, 360, 900, 600, 500, 450, 400.

Assuming the head of 10 m and plant efficiency η as 90%, find out 100% dependable power generation for a base load plant and total energy available in a year with help of flow duration curve. 7

Unit-II

2. (a) Explain Stage Vs. Discharge curve. 2

(b) Explain the method of finding maximum capacity of reservoir at a river site with help of mass curve of discharge. 7

(c) Given below are the observed flows from an isolated storm of 6-hr. duration on a stream with the catchment area of 500 sq.-km.

[3]

Time (hr)	0	6	12	18	24	30	36	42	48	54	60	66	72
Flow (m^3/s)	0	100	250	200	150	100	70	50	35	25	15	05	0

Assume the base flow to be zero, derive the ordinates of a 6 hr. unit hydrograph. 7

(d) Daily flow in river is constant at 15 cumec. What would be firm capacity of a run of river plant to be used as a 8 hour peaking station? What would be the pondage factor and magnitude of pondage required?

Assume the net head to be 10 m and plant efficiency as 80%. 7

Unit-III

3. (a) State the measuring unit and formula for Power and Energy. 2

(b) The load on hydel plant varies from a minimum of 10000 kW to a maximum of 35000 kW. Two turbo generators of capacity 22000 kW each have been installed.

Calculate :

(i) Total installed capacity

[4]

- (ii) Plant use factor
- (iii) Maximum demand
- (iv) Load factor
- (v) Utilisation factor 7
- (c) Describe pumped-storage plant and its advantages. 7
- (d) With help of neat sketch, show the constructional features of Valley Dam Plant and Diversion Canal Plant. 7

Unit-IV

- 4. (a) What is the function of Surge Tank? 2
- (b) A rigid pipe is 3.20 km long. The velocity of the flow is 1.20 m/sec. Calculate the rise in pressure behind a valve at the lower end if it is closed (i) In 20 seconds (ii) In 3 seconds. Take bulk modulus of water $K = 2000 \text{ kN/mm}^2$. 7
- (c) Describe the factors influencing the location and alignment of conveyance pipe. 7
- (d) Describe in brief Wood-stave and Steel Penstocks used in Hydropower plants. 7

[5]

Unit-V

- 5. (a) What is gantri girder? 2
- (b) Discuss the basic objectives of Power House planning. 7
- (c) Discuss the conditions governing for the suitability of a Underground Power House. 7
- (d) Describe in brief components of Intermediate structure of an Indoor Power House. 7