MAHARASHTRA AGRICULTURAL UNIVERSITIES EXAMINATION BOARD, PUNE
SEMESTER END EXAMINATION

B.Tech. (Agril. Engg.)

Semester : IV	**Academic Year** : 2007-08		
Course No. : **SWCE-242**	**Title** : **Hydrology**		
Credits : 3 (2+1)			
Day & Date : Saturday, 26.4.2008	**Time** : 14.00 to 17.00	**Total Marks : 80**	

Note :
1. Solve ANY FIVE questions from **SECTION "A".**
2. All questions from **SECTION "B"** are compulsory.
3. All questions carry equal marks.
4. Draw neat diagrams wherever necessary.

SECTION "A"

Q.1 a) State Dalton's law of evaporation and list the factors affecting evaporation.

b) Describe convectional precipitation and orographic precipitation.

Q.2 a) Explain Thiessen polygon method.

b) Describe working of float type rain gauge.

Q.3 a) Determine the additional number of rain gauges required if

1) Number of rain gauges already present in the area = 25
2) Allowable percentage error = 10%
3) Mean value of normal rainfall = 275 cm
4) Standard deviation of the normal rainfall = 155

b) A catchments area involves 5 rain gauges. During rainy reason the magnitudes of rainfall measured by these gauges are 25 cm, 35cm, 45 cm, 10 cm and 75 cm respectively. Calculate the mean aerial rainfall by using arithmetic mean method.

Q.4 a) Describe different components of hydrograph with the help of neat sketch.

b) Describe rational method of runoff estimation with its limitation.

Q.5 a) Calculate the time of concentration of 100 ha. watershed. The distance and elevation difference between most remote point and outlet of watershed are 900 m and 18 m respectively.

b) Determine 1) form factor 2) compactness coefficient 3) elongation ratio 4) circulatory ratio from the following data.

Area of basin = 25000 km^2

Perimeter of basin = 900 km

Length of main stream = 200 km

Q.6 a) Explain the straight line method of base flow separation of single peaked hydrograph.

b) The ordinate of 3-h unit hydrograph are given below. Compute the ordinates of DRH for 2.5 cm effective rainfall.

Time	0	3	6	9	12	15	18	21	24	27
OUHG(M^3/Sec)	0	20	145	170	220	180	115	70	25	0

P.T.O.

Q.7 a) Explain basic equation used in flood routing

b) Write short note on stage discharge curve.

SECTION "B"

Q.8 Define:

1) Average annual rainfall
2) Isohyet
3) Mass curve
4) Specific retention
5) Hydrograph
6) Subsurface runoff
7) Lapse rate
8) Hydrologic cycle
9) Drainage density
10) Interception loss

Q.9 Fill in the blanks:

1) Intensity of light rain is limited upto _____ mm/hr.
2) Weighing type rain guage is _____ type rain guage.
3) _____ is also known as hurricane or typhoon.
4) Ratio of lake evaporation to pan evaporation is known as _____
5) In humid climate average annual rainfall is greater than _____ cm.
6) _____ is expressed as number of streams per unit area.
7) The total runoff is the sum of surface runoff, subsurface runoff and _____
8) _____ is used as an index of watershed wetness in curve number method.
9) The water present in the unconfined aquifer is at _____
10) The ratio of rainfall in a particular year to the average annual rainfall is called _____

Q.10 Match the pairs:

"A"	"B"
1) Drainage density	a) Auquifuse
2) Isohyet	b) Mechanical lifting of moist air over mountain
3) Orographic precipitation	c) Interception
4) Mean areal depth of precipitation	d) Rational method
5) Confined aquifer	e) Artesian aquifer
6) Water loss	f) Line indicating equal rainfall values
7) Runoff estimation	g) Sherman
8) Unit hydrograph	h) Aquifer characteristic
9) Specific yield	i) Catchment characteristic
10) Impervious formation	j) Isohyetal method

✧ ✧ ✧ ✧ ✧ ✧ ✧ ✧ ✧ ✧

MAHARASHTRA AGRICULTURAL UNIVERSITIES EXAMINATION BOARD, PUNE
SEMESTER END EXAMINATION

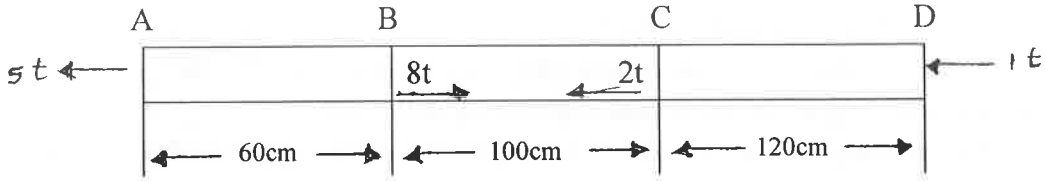
B.Tech. (Agril. Engg.)

Semester : IV		**Academic Year** : 2007-08	
Course No. : **FS-242**		**Title** : **Strength of Material**	
Credits : 3(2+1)			
Day & Date : Thursday, 24.4.2008	**Time** : 14.00 to 17.00		**Total Marks:** 80

Note:
1. Solve ANY FIVE questions from **SECTION "A".**
2. All questions from **SECTION "B"** are compulsory.
3. All questions carry equal marks.
4. Draw neat diagrams wherever necessary.

SECTION "A"

Q.1 a) A brass bar, having cross-sectional area of 10 sq. cm, is subjected to axial forces as shown in Fig.



Find the total elongation of the bar. ***Take E=0.8 X 10³ t/cm²***

b) A steel bar 2 m long, 2 cm wide and 1 cm thick is subjected to a pull of 2 tones in the direction of its length. Find the changes in length, breadth and thickness.
Take E = 2.0 X 10⁶ kg/cm² and poisson's ratio = 0.3

Q.2 a) At a point in a strained material the principal stresses are 100 N/mm^2 (tensile) and 60 N/mm^2 (compressive) Determine normal stress, shear stress, resultant stress on a plane inclined at 50^0 to the axis of major principal stress. Also determine the maximum shear stress at that point.

b) An unknown weight falls through 10 mm on a collar rigidly attached to the lower end of a vertical bar, 3m long and 600 mm^2 in section. If the maximum instantaneous extension is known to be 2 mm, what is the corresponding stress and the value of unknown weight. ***Take E=200 KN/mm²***

Q.3 a) A simply supported beam 4 m long is subjected to two point loads of 2 kN and 4 kN each at distances of 1.5 m and 3 m from the left end. Draw S.F. and B.M. diagrams for the beam.

b) A rectangular beam 300 mm deep is simply supported over a span of 4 meters. What uniformly distributed load per meter the beam may carry, if the bending stress is not to exceed 120 N/mm^2? ***Take I = 8 x 10⁶mm⁴***

Q.4 a) A wooden beam 15 cm wide, 30 cm deep and 3 m long is carrying a uniformly distributed load of 3000 kg per metre length. Determine the maximum shear stress and sketch the variation of shear stress along the depth of the beam.

b) A beam of 5 metres span is carrying a point load of 3000 kg at a distance 3.75 metres from the left end. Calculate the slopes at the two supports and deflection under the load. ***Take EI=26x10⁹ kg-cm²***

Q.5a) A shaft is transmitting 100 kW at 180 r.p.m. If the allowable stress in the material is 60 N/mm^2, determine the suitable diameter for the shaft. The shaft is not to twist more than 1^0 in a length of 3 meters. ***Take C=80k N/mm²***.

b) Design a closely coiled helical spring of stiffness 20 kg/cm deflection. The maximum shear stress in the spring material is not to exceed 800 kg/cm^2 under a load of 50 kg the diameter of the coil is to be 10 times the diameter of the wire. ***Take C as 0.84 x 10⁶kg/cm²***.

P.T.O.

Q.6a) A vertical thin-walled standpipe is 4.8 m in diameter and stands 30 meters high. If allowable working stress in tension is 120 N/mm^2, what is the required wall-thickness of t pipe? Assume that the pipe is filled with water of specific weight 10 kN/m^3.

b) A spherical vessel 3 meters diameter is subjected to an internal pressure of 2 N/mm^2. Find thickness of the plate required, if maximum stress is not to exceed 80 N/mm^2.

Take : efficiency of joint as 75%

Q.7a) A rectangular column 20 cm wide and 15 cm thick is carrying a vertical load of 1000 kg at an eccentricity of 5 cm in a plane bisecting the thickness. Determine the maximum and minimum intensities of stress in the section.

b) A steel rod 5 m long and of 4 cm diameter is used as a column, with one end fixed and the other free. Determine the crippling load by Euler's formula. ***Take E as 2.0 x 10^6 kg/cm^2.***

SECTION "B"

Q.8 State True or False:

1) The property of material to return back to its original position, after removal of external force is known as plasticity.
2) Ratio of Lateral Strain to Linear Strain is called as Poisson's ratio.
3) Plane having shear stress is called as principal planes.
4) Maximum strain energy; which can be stored in the body is called as modulus of resilienc
5) Bending moment may be maximum where shear force changes the sign.
6) Neutral axis of section always passed through centroid.
7) Turing force is always applied to transmit energy by rotation.
8) Load required to produce unit deflection in a spring is called as stiffness of spring.
9) If thickness of wall of shell is less than 1/10 to 1/15 of diameter; it is known as thick shell
10) All short columns fails die to crushing.

Q.9 Fill in the blanks:

1) Stresses developed due to rise or fall in temperature are called as _____ stresses.
2) Ratio of direct stress to volumetric strain is called as _____.
3) Shear stress will be maximum on two planes inclined at _____ and _____ to the normal section.
4) Proof resilience per unit volume of material is known as _____.
5) Point where bending moment changes the sign is called as _____.
6) The layer which is neither compressed nor stretched is known as _____.
7) A spring which is subjected to twisting moment is known as _____
8) A load, whose line of action does not coincide with the axis of column, is known as _____.
9) Columns have slenderness ratio more than 80 are called as _____.
10) Capacity of section to resists moment is called as _____.

Q.10 Define the following:

1) Principle of superposition
2) Shear modulus
3) Principal stress
4) Strain energy
5) Overhanging beam
6) Cantilever beam
7) Bending stress
8) Strength of solid shaft
9) Helical springs
10) Limit of eccentricity

✧ ✧ ✧ ✧ ✧ ✧ ✧ ✧ ✧ ✧ ✧

MAHARASHTRA AGRICULTURAL UNIVERSITIES EXAMINATION BOARD, PUNE
SEMESTER END EXAMINATION

B.Tech. (Agril. Engg.)

Semester : IV	**Academic Year** : 2007-08		
Course No. : **SWCE-243**	**Title** : **Soil Mechanics**		
Credits : 3(2+1)			
Day & Date : Monday, 28.4.2008	**Time** : 14.00 to 17.00	**Total Marks:** 80	

Note:
1. Solve ANY FIVE questions from **SECTION "A".**
2. All questions from **SECTION "B"** are compulsory.
3. All questions carry equal marks.
4. Draw neat diagrams wherever necessary.

SECTION "A"

Q.1a) Derive the Laplace Equation of flow in two dimensions.

b) A 10 m thick bed of sand is underlain by a layer of clay of 6 m thickness. The water table which was originally at the ground surface is lowered by drainage to a depth of 4 m, where upon the degree of saturation above the lowered water table reduces to 20%. Determine the increase in the vertical effective pressure at the middle of the clay layer due to lowering of water table. The saturated unit weights of sand and clay are respectively 20.6 k N/m^3 and 17.6 k N/m^3 and the dry unit weight of sand is 16.7 k N/m^3.

Q.2a) What is consolidation? Explain consolidation process by spring analogy.

b) What is compaction? Explain standard proctor test for plotting proctor test curve.

Q.3a) Derive the functional relationship between e, G, w and S_r.

b) A soil sample has a porosity of 45 per cent. The specific gravity of solid is 2.75. Calculate a) Voids ratio, b) dry density c) unit weight if the soil is 60% saturated and d) unit weight if the soil is completely saturated.

Q.4 Write short notes:

1) Darcy's law
2) Quick sand phenomenon
3) Constant head permeability test
4) Calcium carbide method

Q.5 a) Describe in detail with diagrams, the types of foundations and spread footings.

b) In a falling head permeameter test, the initial head (t=0) is 40 cm. The head drops by 5 cm in 10 minutes. Calculate the time required to run the test for the final head to be at 20 cm. If the sample is 6 cm in height and 50 cm^2 in cross-sectional area, calculate the coefficient of permeability, taking area of standpipe as 0.5 cm^2.

Q.6 a) Explain in brief the different types of failures of finite slopes.

b) Compute the intensities of active and passive earth pressure at depth of 8 m in dry cohesion less sand with an angle of internal friction of 30^0 and unit weight of 18 kN/m^3. What will be the intensities of active and passive earth pressures of the water level rises to the ground level? Take saturated unit weight of sand as 22 k N/m^3.

Q.7a) What are Atterberg limits? Explain their significance.

b) The mass specific gravity of a fully saturated specimen of clay having a water content of 38% is 1.86. On oven drying, the mass specific gravity drops to 1.72. Calculate the specific gravity of clay and its shrinkage limit.

P.T.O.

SECTION "B"

Q.8 Define the following terms:

1) Seepage pressure
2) Volumetric shrinkage
3) Capillarity
4) Plasticity
5) Porosity
6) Hydraulic gradient
7) Bulk density
8) Degree of saturation
9) Effective pressure
10) Density index

Q.9 Fill in the blanks:

1) Water held in the interstices of soil due to capillary forces is called_____
2) Coarse grained soils have relatively low hygroscopic moisture due to their limited_____
3) The property of soil mass pertaining to its susceptibility to decrease in volume under pressure is known as _____
4) The failure of a mass of soil located beneath a slope is called _____
5) At any plane, the pore pressure is equal to piezometric head times the _____ of water.
6) Seepage velocity is always _____ than discharge velocity.
7) Classification of composite soil exclusively based on the particle size distribution is known as _____ classification.
8) The delay caused in consolidation by slow drainage of water out of saturated soil mass is called _____ lag.
9) A _____ is the line joining the water levels in the piezometers.
10) The opposite process of consolidation is called a process of _____

Q.10 State True or False:

1) Hygroscopic water is fee to move under gravitational forces.
2) The rate of flow through saturated soil is proportional to the surface tension.
3) The compaction process may be accomplished by rolling, tamping or vibration.
4) The ratio of volume of air voids to the volume of voids.
5) Liquidity index is expressed as a percentage of the natural water content of a soil minus its plastic limit, to its plasticity index.
6) When the soil is at elastic equilibrium, the ratio of horizontal to vertical stress is called the elastic coefficient.
7) Slopes extending to infinity do not exist in nature.
8) In sedimentation analysis, the soil fraction, finer than 75 microns size is kept in suspension in a liquid (usually water) medium.
9) When soil mass is saturated, its bulk density is called submerged density.
10) The D_{10} represents a size in mm such that 10% of the particles are finer than this size.

✧ ✧ ✧ ✧ ✧ ✧ ✧ ✧ ✧ ✧

MAHARASHTRA AGRICULTURAL UNIVERSITIES EXAMINATION BOARD, PUNE
SEMESTER END EXAMINATION

B.Tech. (Agril. Engg.)

Semester : IV		**Academic Year** : 2007-08	
Course No. : **BSCT-247**		**Title** : **Computer Literacy**	
Credits : 3(1+2)			
Day & Date : Friday, 25.4.2008	**Time** : 14.00 to 16.00		**Total Marks:** 40

Note:
1. Solve ANY FIVE questions from **SECTION "A".**
2. All questions from **SECTION "B"** are compulsory.
3. All questions carry equal marks.
4. Draw neat diagrams wherever necessary.

SECTION "A"

Q.1 Explain internal communication of computer with the help of block diagram.

Q.2 Explain arithmetic, logical and relation expression in Fortran language.

Q.3 Explain with example following:
1) Algorithm 2) Interpreter 3) Compiler
4) Constant 5) Operating system

Q.4 Write a BASIC language program to find factorial of given number.

Q.5 Write a BASIC language program to matrix addition.

Q.6 Write a FORTRAN language program to swapping of two nos.

Q.7 Explain with syntax IF statement, Do statement in FORTRAN language.

SECTION "B"

Q.8 Fill in the blanks:
1) TYPE command is used to _____
2) _____ symbol is used in flow chart for decision making.
3) VLSI technology is used in _____ generation of computer.
4) This _____ is used for remark in BASIC language programs.
5) In 'BASIC' F1 key is used _____

Q.9 Match the pairs:

"A"	"B"
1) REM	a) Control statement
2) FORMAT	b) Output statement in BASIC
3) A[][]	c) Remark statement in BASIC
4) LPRINT	d) Two dimensional array
5) For…..next	e) DOS command

Q.10 State True or False:
1) Dimension is used for declaring the array in Fortran language.
2) Goto is unconditional branching.
3) Compiler is used for compilation of FORTRAN language program.
4) BASIC is case sensitive language.
5) VLSI technology used in fourth generation of computer.

✧ ✧ ✧ ✧ ✧ ✧ ✧ ✧ ✧ ✧ ✧

MAHARASHTRA AGRICULTURAL UNIVERSITIES EXAMINATION BOARD, PUNE
SEMESTER END EXAMINATION

B.Tech. (Agril. Engg.)

Semester : IV		**Academic Year** : 2007-08	
Course No. : **FMP-246**		**Title** : **Kinematics of Machines**	
Credits : 2(1+1)			
Day & Date : Wednesday, 23.4.2008	**Time** : 14.00 to 16.00	**Total Marks:** 40	

Note:
1. Solve ANY FIVE questions from **SECTION "A".**
2. All questions from **SECTION "B"** are compulsory.
3. All questions carry equal marks.
4. Draw neat diagrams wherever necessary.

SECTION "A"

Q.1 What is inversion of mechanism? Explain crank and slotted lever quick return motion mechanism.

Q.2 A flywheel of a steam engine has a radius of gyration of 1.5 m and mass 2000 kg. The starting torque of the engine is 1200 N-m and may be assumed constant. Determine angular acceleration of flywheel and kinetic energy after 10 seconds from the start.

Q.3 Write short notes on:
1) Moment of momentum 2) Gyroscopic couple

Q.4 Four masses m_1, m_2, m_3 and m_4 are 200 kg, 300kg, 240kg and 260 kg respectively. The corresponding radii of rotation are 0.2 m, 0.15m, 0.25m and 0.3 m respectively and the angles between successive masses are 45^0, 75^0 and 135^0. Find the position and magnitude of the balancing mass required, if its radius of rotation is 0.2 m (Solve by analytical method).

Q.5 Derive the expression for height of Porter governor.

Q.6 Derive the relation for natural frequency of free longitudinal vibration.

Q.7 Derive the relation for total vertical reaction at each of outer as well as inner wheel of the four-wheeler negotiating a turn.

SECTION "B"

Q.8 Fill in the blanks:
1) Hartnel governor is a _____type governor.
2) _____ is the smallest circle that can be drawn to the cam profile.
3) The primary unbalanced force is maximum when the angle of inclination of crank with the line of stroke is _____
4) Piston and cylinder forms _____ type of kinematics pair.
5) The relation between the number of pairs(p) forming a kinematics chain and a numer of links(l) is _____

Q.9 Define:
1) Dynamics 2) Height of governor
3) Reverted gear train 4) Torsional vibrations 5) Precessional angular motion

P.T.O.

Q.10 State True or False:

1) Three links connected with each other by means of rotating joints forms a good kinematics chain.
2) The partial balancing means balancing partially the revolving masses.
3) The lead screw of a lathe with nut forms a rolling pair.
4) The balancing of rotating as well as reciprocating masses is necessary for slow speed engines.
5) In simple gear train only one gear has been mounted on each shaft.

✧ ✧ ✧ ✧ ✧ ✧ ✧ ✧ ✧ ✧

MAHARASHTRA AGRICULTURAL UNIVERSITIES EXAMINATION BOARD, PUNE
SEMESTER END EXAMINATION

B.Tech. (Agril. Engg.)

Semester : IV		**Academic Year** : 2007-08	
Course No. : **EOES-243**		**Title** : **Electrical Engineering - II**	
Credits : 3 (2+1)			
Day & Date : Monday, 21.4.2008	**Time** : 14.00 to 17.00		**Total Marks: 80**

Note:
1. Solve ANY FIVE questions from **SECTION "A".**
2. All questions from **SECTION "B"** are compulsory.
3. All questions carry equal marks.
4. Draw neat diagrams wherever necessary.

SECTION "A"

Q.1 a) Explain power stages in case of D.C. generator with the help of block diagram and state three generator efficiencies.

b) A 10 k W, 250-V, D.C. 6 pole shunt generator runs at 1000 rpm when delivering full load. The armature has 534 lap-connected conductors. Full load Cu loss is 0.64 kW. The total brush drop is 1 Volt. Determine the flux per pole. Neglect shunt current.

Q.2 a) Explain with neat sketch about Torque-slip curves of induction motor.

b) A 12 pole, 3-phase alternator driven at a speed of 500 rpm supplies power to an 8 pole, 3-phase induction Motor. If the slip of the motor, at full load is 3% calculate the full load speed of motor.

Q.3 a) Prove the condition for maximum torque under running condition of 3-phase induction motor.

b) A 3-phase slip ring induction motor with star connected rotor has an induced emf of 120 Volts between slip-rings at standstill with normal voltage applied to the stator. The rotor winding has a resistance per phase of 0.3 Ohm and standstill leakage reactance per phase of 1.5 Ohm. Calculate (i) rotor current per phase when running short circuited with 4% slip and (ii) the slip and rotor current per phase when the rotor is developing maximum torque.

Q.4 a) What is significance of back emf in case of D.C. motor? (2)

b) Explain characteristics of series motor. (3)

c) A 25 kW 250 Volt, DC shunt generator has armature and field resistance of 0.06 Ohm and 100 Ohm respectively. Determine the total armature power developed when working (i) as a generator delivering 25 kW output and (ii) as a motor taking 25 kW input. (5)

Q.5 a) How single-phase motors are made self starting? Explain split phase type induction motor. (5)

b) What is necessity of starter for D.C. motor? (2)

c) Draw well labeled diagram of 3 point starter. (3)

Q.6 a) How the electricity is transmitted from generating station to consumers' connection point? Explain with the help of neat sketch.

b) Explain in brief about systems of A.C. distribution with circuit diagrams.

P.T.O.

Q.7 Write short notes on **any four** of the following:

a) Uses of lap and wave winding
b) Power stages of 3 phase induction motor
c) Lighting schemes
d) Electric fencing
e) Electric safety rules

SECTION "B"

Q.8 a) Define/state

i) Luminous flux
ii) Self excited generator
iii) Critical resistance
iv) Conduction motors
v) Electric earthing

b) Write the function of following in one sentence.

i) Brushes
ii) Commutator
iii) Two way switch
iv) Feeder
v) Centrifugal switch

Q.9 a) Choose the correct answer from the bracket.

i) In simple house wiring all appliances are connected in _____
(Series, Parallel, Series-parallel, None of these)

ii) Capacitor in a capacitor start induction run A.C. motor is connected in series with ____winding. (Starting, Running, Squirrel case, Compensating)

iii) The unit of illuminance is _____
(Lumen, cd/m^2, lux, steradian)

iv) The speed of D.C.motor can be controlled by varying _____
(its flux per pole, resistance of armature, applied voltage, all the above)

v) In electrical fencing, during on period the maximum value of current must not exceeds_____ (0.08 amp, 0.008 amp, 8.00 amp, None of these)

b) State the equations for following:

i) Voltage equation of D.C. generator
ii) Armature Cu loss
iii) Slip speed
iv) Synchronous speed
v) Voltage equation of D.C.motor

Q.10 State true or false:

1) Slip ring motors have phase wound rotors.
2) Starting torque of squirrel cage induction motor is high.
3) Resultant flux incase of three phase supply is 1.5 times maximum value of flux due to any phase.
4) Three phase induction motor can be treated as rotating transformer.
5) Constructionally, there is no basic difference between a D.C. generator and a D.C. motor.
6) D.C. series motors should always be started on no load condition.
7) Fuses are used for regulating current in circuit.
8) Universal motor can run on AC or DC supply.
9) The purpose of laminating DC armature core is to reduce eddy current losses.
10) Shunt motors are approximately constant speed motors.

✧ ✧ ✧ ✧ ✧ ✧ ✧ ✧ ✧ ✧

MAHARASHTRA AGRICULTURAL UNIVERSITIES EXAMINATION BOARD, PUNE
SEMESTER END EXAMINATION

B.Tech. (Agril. Engg.)

Semester : IV	**Academic Year** : 2007-08		
Course No. : **IDE-241**	**Title** : **Fluid Mechanics**		
Credits : 3(2+1)			
Day & Date : Tuesday, 22.4.2008	**Time** : 14.00 to 17.00	**Total Marks:** 80	

Note:
1. Solve ANY FIVE questions from **SECTION "A".**
2. All questions from **SECTION "B"** are compulsory.
3. All questions carry equal marks.
4. Draw neat diagrams wherever necessary.

SECTION "A"

Q.1 a) Explain the phenomenon of capillarity. Obtain an expression for capillary rise of a liquid.

b) The velocity potential function ϕ is given by an expression

$$\phi = -\frac{xy^3}{3} - x^2 + \frac{x^3y}{3} + y^2$$

i) Find the velocity components in x and y directions.

ii) Show that the ϕ represents the possible case of flow.

Q.2 a) What is Cipolletti weir? Prove that the discharge through the Cipolletti weir is given by

$$Q = \frac{2}{3} CdL\sqrt{2g}H^{\frac{3}{2}}$$

b) A pipe of diameter 400 mm carries water at a velocity of 25 m/s. The pressures at the point A and B are given as 29.43 N/cm^2 and 22.563 N/cm^2 respectively, while the datum head at A and B are 28 m and 30 m. Find the loss of head between A and B.

Q.3 a) Derive an expression for discharge through a large rectangular orifice.

b) Water flows over a rectangular weir 1 m wide at a depth of 150 mm and afterwards passes through a triangular right-angled weir. Taking Cd for the rectangular and triangular weir as 0.68 and 0.59 respectively, find the depth over triangular weir.

Q.4 a) Derive an expression for force exerted on submerged vertical plane surface by the static liquid and locate the position of center of pressure.

b) 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.

Q.5 a) Derive an expression for discharge over a triangular notch.

b) Calculate the density, specific weight and weight of one liter of liquid of specific gravity = 0.7

Q.6 a) Derive an expression for discharge through open channel by Chezy's formula.

b) Water discharge at the rate of 98.2 liter/s through a 120 mm diameter vertical sharp-edged orifice placed under a constant head of 10 meters. A point, on the jet measured from the vena-contracta of the jet has co-ordinates 4.5 m horizontal and 0.54 m vertical. Find the coefficients C_v, C_c and C_d of the orifice.

(P.T.O.)

Q.7 Write short notes:

1) Flow through siphon
2) Bourdon tube pressure gauge.
3) Orifice meter
4) Water hammer in pipes

SECTION "B"

Q.8 Fill in the blanks:

1) The line which gives the sum of pressure head and datum head of a flowing fluid in a pipe with respect to some reference line is called as _____
2) The _____ notch is more suitable to measure low discharges in channel.
3) Specific volume is the reciprocal of _____
4) The gauge pressure at a point 5.0 m below the free surface of water is equal to _____ N/m^2.
5) One poise is equal to _____ Ns/m^2.
6) The ratio of inertia force of a flowing fluid and viscous force of the fluid is known as _____
7) Continuity equation deals with the law of conservation of _____
8) The coeeficient of discharge (C_d) in terns of C_v, and C_c is C_d = _____
9) Power transmitted through the pipe is maximum, when the head loss due to friction is _____ at the inlet.
10) When the fluid is at rest, the shear stress is _____

Q.9 State True or False:

1) The hydraulic radius for circular pipe is d/2.
2) Chezy's constant is dimensionless.
3) Ventilation is necessary in suppressed rectangular weir.
4) A most economical section is one, which for a given cross sectional area, slope of the bed and coefficient of resistance has maximum depth of flow.
5) Atmospheric pressure held in terms of water column is 76 cm.
6) Inverted U tube manometer use mercury to measure the pressure.
7) Major energy loss in pipes is due to various pipefittings.
8) Centre of pressure of liquid is found by using the principle of energy conservation.
9) In venturimeter convergent side is used for pressure measurement.
10) For uniform flow dv/dt=0.

Q.10 Define:

1) Equivalent pipe
2) Coefficient of contraction
3) Wetted perimeter
4) Velocity potential function
5) Vena contracta
6) Specific gravity
7) Pascal's law
8) Ideal fluid
9) Compound pipe
10) Stream line

✧ ✧ ✧ ✧ ✧ ✧ ✧ ✧ ✧ ✧ ✧