MAHARASHTRA AGRICULTURAL UNIVERSITIES EXAMINATION BOARD, PUNE
SEMESTER END EXAMINATION

B.Tech. (Agril. Engg.)

Semester	: IV	Academic Year	: 2006-2007
Course No.	: EOES-243	Title :	Electrical Engineering-II
Credits	: 3(2+1)		
Day & Date :	MONDAY, 23-04-07	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) Give working principles of d.c. generator. Derive emf equation.

b) How torque is developed in d.c. motor? Derive the torque equation.

Q.2   a) A 4 pole, lap connected, 220 V, shunt motor has 600 armature conductors. It takes 21 A on full load. The flux / pole is 0.05 wb. The armature and field resistances are 220Ω and 0.1Ω respectively. Contact drop per brush is 1 volt. Calculate speed of the motor.

b) A long shunt compound generator has the armature winding resistance of 0.05 Ω, the series field winding resistance of 0.03 Ω and the shunt field winding of 75 Ω. The generator supplies a load of 20 kW at 300 V. Calculate induced emf in the generator. Neglect brush contact drop.

Q.3   a) Give constructional details of d.c. machines.

b) Explain above normal speed control method for d.c. motor.

Q.4   a) Explain power stages in three-phase induction motor.

b) A three phase, 4 pole, 50 Hz induction motor develops 3.75 kW at 1430 rpm. What is the stator input if the stator loss is 0.19 kW? Windage and frictional losses are negligible.

Q.5   a) Explain various types of starters used for induction motor.

b) Compare between three point and four point starters for d.c. motor.

Q.6   a) State significance of power factor. How it can be improved?

b) Explain various illumination schemes.

Q.7   Write short notes on (ANY TWO)

a) Types of winding   b) Electric fencing.   C) Electric heating.

(P.T.O.)

SECTION "B"

Q.8　Do as directed :

a) Draw layout for a.c. power system network.

b) Draw wiring diagram for hospital system.

c) Draw wiring diagram for looping in system.

d) Draw torque – slip characteristics for induction motor.

e) Draw torque-speed characteristics for induction motor.

f) Draw no load characteristics for generator.

g) Draw torque- I_a characteristics for d.c. shunt motor.

h) Draw torque- I_a characteristics for d.c. series motor.

i) Draw diagram for plate earthing.

j) Draw diagram for pipe earthing.

Q.9　State true of false :

1) Single-phase induction motors are self-starting.

2) The resultant flux in case of three phase induction motor is 1.5 times the maximum value of flux due to any phase.

3) Transmission voltage is very high to reduce power factor.

4) In staircase wiring single pole switches are used.

5) Universal motor can run on either ac or dc supply.

6) To determine number of 15A branch circuits required, 8 should divide addition of total outlets.

7) At starting, slip of induction motor is 100 %.

8) The purpose of laminating d.c. armature core is to reduce hysteresis loss.

9) A shunt generator will excite only if the poles have some residual magnetism.

10) Cross sectional area of shunt field winding conductor is always greater than series field winding.

Q.10　a) State the equations for :

1) Synchronous speed
2) Three phase power
3) Single-phase power
4) % Slip
5) Torque equation for three phase induction motor

b) Define the following :

1) Light
2) Plane angle
3) Luminous intensity
4) Brightness
5) Solid angle

❖ ❖ ❖ ❖ ❖ ❖ ❖ ❖ ❖

MAHARASHTRA AGRICULTURAL UNIVERSITIES EXAMINATION BOARD, PUNE
SEMESTER END EXAMINATION
B.Tech. (Agril. Engg.)

Semester	: IV	Academic Year	: 2006-2007
Course No.	: IDE-241	Title	: Fluid Mechanics
Credits	: 3 (2+1)		
Day & Date : TUESDAY, 24-04-2007	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) Define surface tension and determine the relationship between surface tension and pressure inside a droplet of liquid in excess of outside pressure. (5)

b) Calculate the discharge through the pipe of diameter 200 mm. when the difference of pressure head between the two ends of a pipe 500 m apart is 4 m. of water. Take the value of coefficient of friction as 0.009. (3)

c) The head of water over an orifice of diameter 50 mm is 12 m. Find the actual discharge and actual velocity of jet at vena-contracta. (2)

Q.2 a) What is venturimeter? Derive an expression for discharge through a venturimeter.

b) A circular plate of 3.0 m diameter is immersed in water in such a way that its greatest and least depth below the free surface are 4 m and 1.5 m respectively. Determine the total pressure on one side of the plate and position of centre of pressure.

Q.3 a) Define equation of continuity. Obtain an expression for continuity equation for a three dimensional flow. (5)

b) A body of dimensions 2.0 m. x 1.0 m x 3.0 m. weighs 3924 N in water. Find its weight in air. What will be its specific gravity? (3)

c) The velocity potential function $\phi = x^2 - y^2$. Find the velocity components in x and y direction. Also show that the ϕ represents the possible case of fluid flow. (2)

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

b) The water is flowing through a taper pipe of length 50 m having diameter 40 cm at the upper end and 20 cm at the lower end, at the rate of 60 lit/sec. The pipe has a slope of 1 in 40. Find the pressure at the lower end if the pressure at the higher level is 24.525 N/cm^2.

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

b) A pipe contains an oil specific gravity 0.8. A differential manometer connected at two points A and B of the pipe shows a difference in mercury level as 20 cm, Find the difference of pressure at two points. (3)

c) Determine the gauge and absolute pressure at a point, which is 2.0 m below the free surface of water. Take atmospheric pressure as 10.1043 N/cm^2. (2)

(P.T.O.)

Q.6 a) Derive an expression for discharge through open channel by Chezy's formula. (5)

b) A pipe of diameter 300 mm and length 3500 m is used for transmission of power by water. The total head at the inlet of the pipe is 500 m. Find the maximum power available at the outlet of the pipe. Take f=0.006. (3)

c) The capillary rise in the glass tube is not to exceed 9.99 cm of water, determine its minimum diameter, given the surface tension of water is 0.0735 N/m. (2)

Q.7 a) State and prove Pascal's law.

b) A trapezoidal channel has a side slope of 1 horizontal to 2 vertical and the slope of the bed is 1 in 2000. The area of the section is 42 m². Find the dimensions of the section if it is most economical. Determine the discharge of the most economical section if C = 60.

SECTION "B"

Q.8 Fill in the blanks :

1) The condition for the best rectangular section is _____

2) _____ is defined as the similarity between the model and its prototype.

3) 1 poise is equal to _____ N-s/m²

4) Atmospheric pressure held in terms of water column is equal to _____.

5) The hydraulic radius for circular pipe is _____.

6) Theoretical velocity of jet of water from orifice v = _____.

7) Cipolletti writ is a trapezoidal weir having a side slop of _____.

8) If Froude number is equal to 1, then the flow is said to be _____.

9) The point about which a body starts oscillating, when the body is titled by a small angle is known as _____.

10) A grid obtained by drawing a series of equipotnetial lines and stream lines is called as a _____.

Q.9 State whether true or false :

1) Bernoulli's theorem is based on law of conservation of mass.
2) Hydraulic gradient line represents the sum of pressure head and kinetic head.
3) Reynold's number is defined as the ratio of inertia force to viscous force.
4) Differential manometers are used to measure the velocity at a point in a fluid.
5) Head loss through the pipe increases, if the diameter of the pipe decreased.
6) Ventilation is necessary in trapezoidal weirs.
7) Chezy's constant is dimensionless.
8) The product of the slope of equipotential line and the slope of the stream line at a point of intersection is minus (-)1.
9) When the pipes are connected in parallel, the loss of head in each pipe is equal.
10) If the head of the liquid from the centre of the orifice is more than five times the depth of the orifice, the orifice is called a small orifice.

Q.10   Match the pairs :

"A"   "B"

1) Bernoulli's equation   a) Poise

2) Steady flow   b) Pascal's law

3) Hydraulic press   c) Conservation of energy

4) Orifice meter   d) Measurement of discharge

5) Continuity equation   e) Conservation of mass

6) Non-uniform flow   f) p/w

7) Pressure head   g) $dv/dt=0$

8) Dynamic viscosity   h) $dv/ds \neq 0$

9) Kinematic viscosity   i) $Re > 4000$

10) Turbulent flow   j) Stoke

                                            k) None of the above

✧ ✧ ✧ ✧ ✧ ✧ ✧ ✧ ✧

MAHARASHTRA AGRICULTURAL UNIVERSITIES EXAMINATION BOARD, PUNE
SEMESTER END EXAMINATION

B.Tech. (Agril. Engg.)

Semester : IV   Academic Year : 2006-2007
Course No. : FMP-246   Title : Kinematics of Machines
Credits : 2(1+1)
Day & Date : WEDNESDAY, 25-04-2007   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   a) Explain graphical representation of displacement with respect to time.   (2)

      b) The acceleration "a" of a slider block and its displacement (s) are related by the expression, $a = k\sqrt{s}$, where k is a constant. The velocity 'v' is in the direction of the displacement and the velocity and displacement are both zero, when time 't' is zero. Calculate the displacement, velocity and acceleration as function of time.   (3)

Q.2   a) What is an "inversion of mechanism"? Explain in brief "Slider Crank Mechanism".

      b) Differentiate "Machine and a Structure" giving suitable example.

Q.3   A riveting machine is driven by a 4 kW motor. The moment of inertia of the rotating parts of the machine is equivalent to 140 kg. m^2 at the shaft on which the flywheel is mounted. At the commencement of the operation, the flywheel is making 240 rpm. If closing a rivet occupies 1 second and consumes 10 kN-m of energy, find the reduction of speed of the flywheel. What is the maximum rate at which the rivet can be closed?

Q.4   a) Derive the expression for height of watt governor.   (3)

      b) Calculate the vertical height of a watt governor when it rotates at 60 rpm. Also find the change in vertical height when its speed increases to 61 rpm.   (2)

Q.5   a) What do you understand by gear train and train value?   (2)

      b) Explain Epicyclic gear train.   (3)

Q.6   A Single cylinder reciprocating engine has speed 240 rpm, stroke 300 mm, mass of reciprocating parts and all the revolving parts are to be balanced, find ;

      1) The balance mass required at a radius of 400 mm, and

      2) The residual unbalanced force when the crank has rotated 60$^\mathrm{O}$ from top dead centre.

Q.7   Define "Vibration". Derive expression for natural frequency of transverse vibration.

SECTION "B"

Q.8 Fill in the blanks :

1. _____ deals with forces and their effects while acting upon the machine parts in motion.

2. Rate of change of angular velocity with respect to time, expressed mathematically as _____.

3. Bending stress will be induced in a body subjected to _____ vibration.

4. Bull engine is inversion of _____ mechanism.

5. When the axes of first and last gears are co-axial, the gear train is known as _____ gear train.

Q.9 State true of false :

1) Weight is amount of matter contained in a given body.

2) Members of a structure do not move relative to one another.

3) Screw pair forms lower pairs.

4) Inertia governors work on the principles of centrifugal force.

5) Inversion has no effect on relative motion.

Q.10 Match the pairs :

"A"	"B"
1. Completely constrained motion	a) 895/N2
2. Moment of a couple	b) Sliding pair
3. Height of watt's governor	c) Base circle
4. Size of Cam	d) F x X
5. Epicyclic gear train	e) Wrist Watches.

❖ ❖ ❖ ❖ ❖ ❖ ❖ ❖ ❖

MAHARASHTRA AGRICULTURAL UNIVERSITIES EXAMINATION BOARD, PUNE
SEMESTER END EXAMINATION
B.Tech. (Agri. Engg.)

Semester	: IV	Academic Year	: 2006-2007
Course No.	: FS-242	Title :	Strength of Materials
Credits	: 3(2+1)		
Day & Date :	Thursday, 26-04-2007	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 rod 100 cm long and of 2 cm x 2 cm cross section is subjected to a pull of 1000 kg force. If the modulus of elasticity of the material is 2.0×10^6 kg/cm^2 determine the elongation of the road.

b) Two parallel wall 6 m apart, are stayed together by a steel rod 20 mm diameter, passing through metal plates and nuts at each end. The nuts are tightened home, when the rod is at a temperature of 100^0 C. Determine the stress in the rod, when the temperature falls down to 20^0 C, if

    (a) the ends do not yield, and

    (b) the ends yield by 1 mm

    Take E = 2.0×10^6 kg/cm^2 and $\alpha = 12 \times 10^{-6}/^0$C

Q.2   a) Derive an equation showing relation between bulk and Young's modulus.

b) At a point in a strained material the principal normal stresses are 100 N/mm^2 (tensile) and 60N/mm^2 (compressive). Determine normal 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.

Q.3   a) A bar of 12 mm diameter gets stretched by 3 mm under a steady load of 800 kg. What stress would be produced in the bar by a weight of 80 kg which falls through 8 cm before commencing the stretching of the rod, which is initially unstressed? Take E=2.0×10^3 t/cm^2.

b) A beam 6 m long is simply supported at the ends, and carries a uniformly distributed load of 1500 kg/m (including its own weight) and three concentrated loads of 1000, 2000 and 3000 kg acting respectively at the left quarter point, centre point and right quarter point. Draw the S.F. and B.M. diagrams and determine the maximum bending moment.

Q.4   a) A timber beam of rectangular section is to support a load of <u>2 tones</u> uniformly distributed over a span of 3.6 meters. If the depth of the section is to be twice the breadth, and the stress in timber is not to exceed 70 kg/cm^2, find the dimensions of the cross-section.

How would you modify the cross-section of the beam, if it were a concentrated load placed at the centre with the same ratio of breadth to depth?

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

                                                                        (P.T.O.)

Q.5 a) A timber beam of rectangular section has a span of 4.8 meters and is simply supported at its ends. It is required to carry a total load of 4500 kg uniformly distributed over the whole span. Find the maximum values for the breadth (b) and depth (d) of the beam, if maximum bending stress is not to exceed 70 kg/cm^2 and the maximum deflection is limited to 9.5 mm. Take E for timber as 105x10^{3}kg/cm^2.

b) A cantilever projecting 2.5 meters from a wall is loaded with a uniformly distributed load of 8 000 kg. Determine the moment of inertia of the beam section, if the deflection of the beam at the free end be 1 cm. Take E = 2.05 x 10^{6}kg/cm^2.

Q.6 a) 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=80 kN/mm^2.

b) A closely-coiled helical spring of round steel wire 5 mm in diameter having 12 complete coils of 50 mm mean diameter is subjected to an axial load of 100 N. Find the deflection of the spring and the maximum shearing stress in the material. Modulus of rigidity, C=80 kN/mm^2.

Q.7 a) A vertical thin-walled stand pipe is 4.8 m in diameter and stands 30 meters high. If the allowable working stress in tension is 120 N/mm^2, what is the required wall-thickness of the pipe? Assume that the pipe is filled with water of specific weight 10 kN/m^3.

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 2.0x10^6 kg/cm^2.

SECTION "B"

Q.8 State True or False :

1) Planes which carry maximum shear stress are inclined at 45^0 to the principal planes.

2) Point of inflexion is a point at which shear force changes sign.

3) Shear stress at a point in the cross-section is inversely proportional to the width of section.

4) A long column fails mainly due to crushing of material.

5) In simply supported bean carrying central concentrated load, slope at supports, is zero.

6) An eccentric load acting on a column induces direct stress and bending stress on the cross section of column.

7) In a thin cylindrical pressure vessel, the ratio of hoop stress to longitudinal stress is half.

8) Lateral strain is always opposite in nature to the linear strain.

9) If P1and P2 are the principal stresses then, maximum shear stress is given by $\frac{P_1-P_2}{2}$

10) In a circular section, the maximum shear stress is $\underline{4}$ times the average shear stress.

3

Q.9 Fill in the blanks :

1) Strain energy stored by a body is inversely proportional to _____
2) Euler's critical load for a column with one end fixed and other free can be written as

   _____.

3) The stress induced in a bar due to impact loading is _____.
4) Maximum bending moment occurs where shear force_____.
5) Unit for modulus of section is _____.
6) Deflection at the free end of a cantilever beam carrying uniformly distributed load over entire span is given by _____.
7) Residual strain is a strain observed in a body after _____.
8) The necessary condition to obtain maximum bending moment is _____.
9) The ratio of ultimate stress to working stress is known as _____.
10) When a column is subjected to _____ load, it develops bending stress and direct stress both.

Q.10 Define the following :

1) Principle of superposition
2) Stiffness of spring
3) Point of Contraflexure
4) Thermal Stresses and Strains
5) Mohr's theorem
6) Thin shell
7) Moment of resistance
8) Composite shaft
9) Torsion springs
10) Principal planes.

✧ ✧ ✧ ✧ ✧ ✧ ✧ ✧ ✧

MAHARASHTRA AGRICULTURAL UNIVERSITIES EXAMINATION BOARD, PUNE
SEMESTER END EXAMINATION
B.Tech. (Agril. Engg.)

Semester : IV	Academic Year : 2006-2007
Course No. : BS-CT-247	Title : Computer Literacy
Credits : 3(1+2)	
Day & Date : FRIDAY, 27-04-2007	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 variable? Summarize the grammatical rules for writing variable in BASIC.

Q.2   Draw the block diagram of the computer system and explain each block.

Q.3   Explain the following statements with example :
a) READ_____DATA
b) DO _____ CONTINUE
c) IF _____ THEN
d) FORMAT
e) COPY CON

Q.4   Write a program in BASIC and draw the flow chart for generating the 50 fibonacci numbers. $F = F_{i-1} + F_{i-2}$

Q.5   Explain the FORTRAN coding sheet with an example.

Q.6   Write a program in FORTRAN and draw the flow chart to check whether the given number is prime or not prime.

Q.7   What are the library functions in BASIC? Explain any five library functions with example.

SECTION "B"

Q.8   Fill in the blanks :
a) A SUBROUTINE must have at least one _____ statement.
b) In FORTRAN coding sheet _____ column number is used for continuation of the second line.
c) _____ and _____ are two statements used as the logical and physical end of FORTRAN program respectively.
d) _____ command is used in DOS to create a new text file.

(P.T.O.)

Q.9   Match the pairs :

"A"	"B"
1. Algorithm	a) Operating System
2. Binary numbers	b) DOS Command
3. FORTRAN	c) Step by step description of program
4. Window	d) Scientific language
5. MKDIR	e) Machine language

Q.10   State True or False :

1) RESTORE statement is used with READ statement.
2) Vacuum tube technology used in third generation of computer.
3) LIST command is used to view the list of files and folders.
4) I, J, K, L, M, N among must be the first character of the integer variable, label in FORTRAN.
5) Line number is compulsory as first statement in BASIC program.

✧ ✧ ✧ ✧ ✧ ✧ ✧ ✧ ✧

MAHARASHTRA AGRICULTURAL UNIVERSITIES EXAMINATION BOARD, PUNE
SEMESTER END EXAMINATION
B.Tech. (Agril. Engg.)

Semester : IV
Course No. : SWCE-242
Credits : 3(2+1)
Day & Date : SATURDAY, 28-04-2007

Academic Year : 2006-2007
Title : Hydrology
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 hydrologic cycle with the help of neat sketch.
b) The following are the monthly pan evaporation data (Jan-Dec) in a certain year in cm, in the vicinity of reservoir 16.7, 14.3, 17.8, 25.0, 28.6, 21.4, 16.7, 16.7, 16.7, 21.4, 16.7 and 16.7. The water spread area in lake nearby in the beginning of January in that year was 2.80 km^2 and at the end of December it was measured as 2.55 km^2. Calculate the loss of water due to evaporation in that year. Assume pan coefficient as 0.7.

Q.2 a) Describe sea breeze and land breeze with the help of neat sketch.
b) In a watershed, the average annual precipitation for four sub basins was recorded as 100.84, 112.27, 84.84 and 73.406 cm. the areas of the sub basins were 93264.3, 71243.5, 108808.2 and 168393.8 ha. Calculate the average precipitation of the total watershed by using the Thiessen method.

Q.3 a) Discuss in brief different forms of precipitation.
b) Rain gauge station D was inoperative for part of a month during which a storm occurred. The storm rainfall recorded in three surrounding stations A, B and C were 8.5, 6.7 and 9.0 cm respectively. If the a.a.r. for stations are 75,84,70 and 90 cm respectively, estimate the storm rainfall at station D.

Q.4 a) Explain the Intensity-Duration-Frequency relationship.
b) Determine: 1) Form factor 2) Compactness coefficient 3) Elongation ratio 4) Circulatory ratio from the following data. Area of basin=62200 Km^2, Perimeter of basin=1840 km, Length of main stream=720 km.

Q.5 a) Write the empirical formulae of runoff estimation.
b) Calculate the time of concentration of 306 ha land of watershed, if the maximum length of drainage course is 350 m and effective slope of water course is about 4m/100m.

Q.6 a) Discuss the factors affecting the shape of hydrograph.
b) The following are the ordinates of a 3 hour unit hydrograph. Derive the ordinates of 6 hr. unit hydrograph.

Time (hr)	0	3	6	9	12	15	18	21	24
3 hr UGO (Cumec)	0	1.5	4.5	8.6	12	9.4	4.6	2.3	0.8

Q.7 Write short note on :
1) Stage discharge relationship.   2) Flood routing.

(P.T.O.)

SECTION "B"

Q.8   Define :
1) Subsurface runoff   2) Inversion   3) Dew point   4) Drainage density
5) Catchment area   6) Evaporation 7) Specific retention   8) Isohyet
9) Hydrograph   10) Interception

Q.9   Fill in the blanks :

1) The average annual rainfall of India is around _____ cm.
2) Intensity of light rain is limited upto _____ mm/hr.
3) The ratio of rainfall in a particular year to the average annual rainfall is called____.
4) The consistency of rainfall record is tested by _____.
5) _____ is expressed as the total length of all stream channels per unit area of the basin.
6) Convectional precipitation accompanied by destructive winds are known as _____.
7) Float type rainguage is _____ type rain guage.
8) The time from centre of a unit storm to the peak discharge of the corresponding unit hydrograph is called_____.
9) In arid zone average annual rainfall is _____ than that of humid climate Zone.
10) In unconfined aquifer water is present at pressure equal to _____.

Q.10   Match the pairs :

"A"	"B"
1) Runoff estimation	a) Evaporation
2) Normal ratio method	b) Stream density
3) Dalton's law	c) Isohyetal method
4) Sherman	d) Missing rainfall data.
5) Kirpich formula	e) Tropical cyclone
6) Catchment characteristics	f) Time of concentration
7) Impervious formation	g) Unit hydrograph
8) Mean areal depth of precipitation	h) Rational method
9) Hurricane	i) Specific yield
10) Aquifer characteristics	j) Aquifuse
	k) None of above

✧ ✧ ✧ ✧ ✧ ✧ ✧ ✧

MAHARASHTRA AGRICULTURAL UNIVERSITIES EXAMINATION BOARD, PUNE

SEMESTER END EXAMINATION

B.Tech. (Agril. Engg.)

Semester : IV   Academic Year : 2006-2007
Course No. : SWCE-243   Title : **Soil Mechanics**
Credits : 3(2+1)
Day & Date : MONDAY, 30-04-2007   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) Derive the relationship between γ, G, e, and Sr.

      b) Explain in brief the different types of failures of finite slopes.

Q.2   a) The *in situ* percentage voids of sand deposit is 34% for determining the density index, dried sand from the stratum was first filled loosely in a 1000 m^3 mould and was the vibrated to give maximum density. The loose dry mass in the mould was 1610 gm and the dense dry mass at maximum compaction was found to be 1980 gm. Determine the Density Index if the specific gravity of the sand particles is 2.67.

      b) Define consistency limits. Explain in brief different Attenberg limits and plasticity.

Q.3   a) Give the different systems of soil classification and explain any one of them.

      b) Derive the Laplace equation of flow in two dimensions.

Q.4   a) Discuss the factors affecting permeability.

      b) A cylinder of soil fails under an axial vertical stress of 160 kN/m^2, when it is laterally unconfined. The failure plane makes an angle of 50^0 with horizontal. Calculate the value of cohesion and angle of internal friction of the soil.

Q.5   a) Explain in brief consolidation settlement with expression.

      b) Derive an expression of Rankine's Theory of active earth pressure on cohesionless dry backfill with no surcharge.

Q.6   a) Calculate the coefficient of permeability of a soil sample, 6 cm in height and 50 cm^2 in cross-sectional area, if a quantity of water equal to 430 ml passed down in 10 minutes, under an effective constant head of 40 cm. On oven-drying the test specimen has mass of 498 gm. Taking the specific gravity of soil solids as 2.65, calculate the seepage velocity of water during the test.

      b) Explain effective pressure and neutral pressure. Develop an expression for effective pressure in soil mass with surcharge.

Q.7   a) Discuss various field compaction methods and suitability of various compaction equipments.

      b) What is soil, soil mechanics and soil engineering? Explain the fields of application of soil mechanics.

(P.T.O.)

SECTION "B"

Q.8   Define the following :

1) Consolidation (by Tarzaghi)   2) Shrinkage limit
3) Shear strength   4) Density Index
5) Density of solids   6) Coefficient of uniformity
7) Capillarity   8) Coefficient of permeability
9) Spread footing   10) Placement water content.

Q.9   Fill in the blanks :

1) Sedimentation analyses is based on _____ law.
2) For well graded soil coefficient of curvature ranges between _____ and _____.
3) Stone of flow curve is called _____
4) Shrinkage ratio of a soil is equal to the _____ of soil in its dry state.
5) Highway Research Board classification system is based on _____ and _____.
6) From the point of view of interparticle forces soil water can be divided into _____ and _____.
7) Total head at any point in the saturated soil mass consist of
    i) Piezometric head,   ii) _____   iii) _____
8) When the column loads are unequal with other column carrying heaving load _____ types of combined tooling is provided.
9) Seepage velocity is _____ than discharge velocity.
10) Coefficient of surface tension of water is = _____ dynes/cm.

Q.10   State True or False :

1) Seepage pressure always acts in the direction of flow.
2) In consolidation, loading is long term and static.
3) For a given difference in pressure the value of coefficient of compressibility decreases as pressure increases.
4) Water content used in the field compaction is called placement water content.
5) Sedimentation analysis is based on Darcy's law.
6) The failure of a mass of soil located beneath slope is called slide.
7) Most common type of foundation is spread footing.
8) For the footing on cohesive soil, edge stresses are very large.
9) Strap footing is used where the distance between the columns is very large.
10) Direction of seepage is always perpendicular to equipotential lines.

✧ ✧ ✧ ✧ ✧ ✧ ✧ ✧ ✧