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MAHARASHTRA AGRICULTURAL UNIVERSITIES EXAMINATION BOARD, PUNE
SEMESTER END EXAMINATION

B.Tech. (Agril. Engg.)

Semester	: **III (New)**	**Term**	: **I**	**Academic Year**	: **2013-14**
Course No.	: SWCE 233	**Title**	: **Watershed Hydrology**		
Credits	: 3(2+1)				
Day & Date	: Saturday, 26.10.2013	**Time**	: 9.00 to 12.00	**Total Marks**	: **80**

Note :
1. Solve **ANY EIGHT** 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 function of hydrology in water resources development.

b) Explain the hydrologic cycle in nature with neat sketch indicating it's various phases.

Q.2 a) Explain Isohyetal method of determining the mean areal depth of precipitation over a basin covered by several rain - gauge stations. What are its special features?

b) The normal annual rainfall of stations A, B, C, and D are 106,123, 96 and 103 cm respectively. Amongst three stations, the station 'C' could not record the rainfall due to its failure in particular year, calculate the missing annual rainfall of station "c" if the annual rainfall of stations A, B and D are 91,98 and 83 cm respectively.

Q.3 a) Explain with neat sketch the working principle of tipping bucket type rain gauge

b) Determine the additional number of rain gauge stations required to install in a water-shed if.

1) Number of rain gauges already present in the area =25.

2) Allowable percentage error = 10 per cent.

3) Mean of annual rainfall = 275 mm.

4) Standard deviation of the annual rainfall = 153.

Q.4 a) Explain the factors affecting evaporation.

b) Find the value of daily ET of wheat crop for the month of January, if pan evaporation for this month is 8.5 mm, take value of coefficient as 0.52.

Q.5 a) Describe the components of Hydrograph, with the help of neat sketch.

b) At the outlet of a given watershed the following hydrograph was produced by a storm of 4.2cm. Compute the ordinates of DRH and total volume of surface runoff. Assume the constant base flow of 3.0 m^3/s.

Time (hrs.)	0	3	6	9	12	15	18	21	24
Ordinate of Hydrograph (m^2 /s)	3.0	4.5	7.0	2.0	10.5	7.0	5.0	4.0	3.0

(P.T.O.)

Q.6 a) Explain the factors affecting runoff.

b) Calculate the time of concentration of 300 ha size watershed. The maximum length of drainage course is 350 m and average slope of it is 4m/100m.

Q.7 a) Explain different methods of separating the base flow.

b) Enlist the factors affecting shape of hydrograph.

Q.8 a) What are the assumptions and limitations of rational method?

b) Calculate the peak runoff rate for 10 years return period from a watershed of 175 ha area. The whole area is divided in to three sub parts based of the land use and soil texture. In which, first part of 100 ha land with 1 per cent slope is kept under cultivation, the second part of 45 ha has 7 per cent slope is under pasture farming and remaining land with 12 per cent slope is covered under forest. The other information are as under.

1) Maximum length of channel reach = 2500 m
2) Average channel slope = 5per cent
3) Rainfall depth = 3.58 m

Assume runoff coefficient (C) for cultivated area as 0.50; for pasture as 0.36 and for forest as 0.50.

Q.9 a) What is unit Hydrograph? Give its limitations.

b) What is the purpose of head water flood control technique? Enlist different flood control measures.

Q.10 a) Define drought and describe effect of drought on ground water

b) Explain Intensity-Duration-Frequency relationship.

SECTION "B"

Q.11 Fill in the blanks

1) The leeward orographic precipitation is also known as _____.
2) Rain gauge readings are recorded at_____ hrs IST.
3) Pan coefficient is the ratio of _____.
4) Rainfall is said to be heavy, when its intensity is more than _____cm/hr.
5) The shape factor for the watershed having equal length-width ratio is _____.
6) The curve number method directly computes the runoff for AMC _____.
7) The plot of rainfall intensity against time is called as _____.
8) Non recording type rain gauge measures rainfall in terms of _____.

Q.12 Match the pairs

"A"		"B"	
1)	Hydrologic cycle	a)	C.F. Izzart
2)	Tipping bucket rain gauge	b)	1 cm of rainfall
3)	Soil evaporation	c)	Double mass curve
4)	Overland flow hydrograph	d)	Time contours of commencement of storms
5)	Unit hydrograph	e)	Can not record snow
6)	Consistency of rainfall	f)	Lysimeter
7)	Snow, hail	g)	Water transfer cycle
8)	Isochrone	h)	Forms of precipitation

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

Semester	:	**III (New)**	**Term**	:	**I**	**Academic Year** :	**2013-14**
Course No.	:	IDE 231	**Title**	:	**Fluid Mechanics**		
Credits	:	3(2+1)					
Day & Date	:	Monday, 28.10.2013	**Time**	:	9.00 to 12.00	**Total Marks** :	**80**

Note :
1. Solve **ANY EIGHT** questions from **SECTION "A".**
2. All questions from **SECTION "B"** are compulsory.
3. All questions carry equal marks.
4. Draw neat diagrams wherever necessary.
5. Make rational assumption, if required.

SECTION "A"

Q.1 a) The left leg of a U- tube mercury manometer is connected to pipe line conveying fluid of sp.gr.0.9, the level of the mercury in the left leg being 0.8 m below the centre of pipe line, and the right leg is open to atmosphere. The level of mercury in the right leg is 0.20 m above that in the left leg. Find the pressure in the pipe. (4)

b) Differentiate between uniform and non- uniform flows. (2)

c) Differentiate between rapidly varied flow and gradually varied flow. (2)

Q.2 a) Prove that for the most economical rectangular channel section, hydraulic mean depth is half the depth of flow.

b) Water flows through a rectangular weir 1 m wide at a depth of 150 mm and then over triangular right angled weir. The discharge co-efficient of the rectangular and triangular weir are 0.62 and 0.59, respectively. Find the depth of water over the triangular weir.

Q.3 a) with the help of neat sketch explain the construction and working of the venturimeter.

b) Find the bottom width and depth of a trapezoidal channel of the most economical section to carry 142 m^3/ minute of water. The bed slope is 1 in 2000; the side slopes at 45^o and Chezy's roughness co-efficient is 55.

Q.4 Derive an equation for measuring fluid pressure difference between two points using an inverted U- tube differential manometer.

b) Calculate the density and weight of one liter of petrol of specific gravity 0.7

Q.5 a) Find the head loss when a pipe of diameter 200 mm is suddenly enlarged to a diameter of 400 mm.The rate of flow of water through the pipe is 250 lps.

b) State Bernoulli's equation for steady flow of an incompressible fluid. Enlist the assumptions made for the same.

Q.6 a) Prove that the a vertical plane surface submerged in a liquid, the center of pressure is always below the centre of gravity.

b) A block of size 2m long x 1m wide x 0.8m deep floats in water. The specific gravity of the block material is 0.7. Determine the centre of Buoyancy and meta-centric height of the floating body.

(P.T.O.)

Q.7 a) Explain different types of similarities that must exist between the model and the prototype.

b) The space between two square flat parallel plates is filled with oil. Length of each side of the plate is 60 cm. The thickness of the oil film is 12.5 mm. The upper plate, which moves at 2.5 m per sec requires a force of 98.1 N to maintain the speed. Determine the dynamic and kinematic viscosity of the oil, if the specific gravity of the oil is 0.95

Q.8 Write short note on: (any two)

1) Types of fluids
2) Conditions of equilibrium of a submerged bodies
3) Hydraulic ram

Q.9 a) Calculate the capillary rise in a 4 mm glass tube when immersed vertically in water. Assume the surface tension for water at 20°C when in contact with air to be 0.073575 N/m and its density as 998 kg/m^3. The angle of contact for water is zero.

b) The power developed by a pump depends on the head, discharge and the specific weight of the fluid. Find an expression for power.

Q.10 a) Derive an equation for estimating theoretical velocity through an orifice.

b) A body of dimension 1.5 m x 1 m x 2 m weighs 1962 N in water. Find its weight in air. What will be its specific gravity?

SECTION "B"

Q.11 Fill in the blanks.

1) _____ number (Inertia force/ surface tension force)$^{1/2}$
2) In case of small orifice the head of liquid from the centre of orifice is more than _____ times the depth of orifice.
3) Pitot tube is used for measuring _____ at any point in a pipe or a channel.
4) _____notch is more accurate for measuring low discharge.
5) A line along which the velocity potential is constant is called _____line.
6) The viscosity of gases _____ with increase in temperature.
7) Loss of head due to obstruction in a pipe is represented as _____.
8) _____ line gives the sum of pressure head and datum head of a flowing fluid in a pipe with reference to some reference line.

Q.12 Define.

1) Streaming or tranquil flow
2) Coefficient of contraction
3) Relative density
4) Streamtube
5) Most economical channel section
6) Unsteady flow
7) Open channel flow
8) Meta centre

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

Semester	: **III (New)**	**Term**	: **I**	**Academic Year**	: **2013-14**
Course No.	: EOES 233	**Title**	: **Electrical Circuits**		
Credits	: 3(2+1)				
Day & Date	: Tuesday, 29.10.2013	**Time**	: 9.00 to 12.00	**Total Marks**	: **80**

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

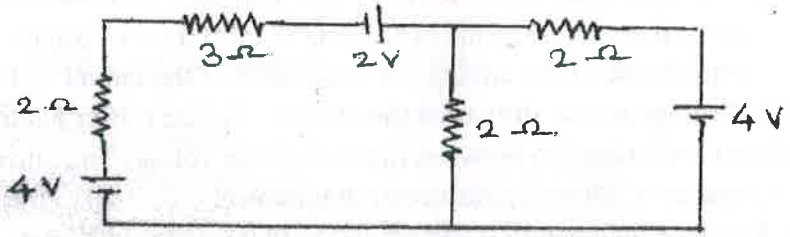
SECTION "A"

Q.1 a) Derive equation for alternating voltage and current and show that $e=2\pi f N Bm A \sin \omega t$.

b) Prove that rms value of current = 0.707 x maximum value of current.

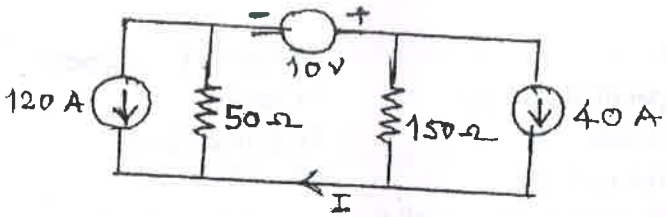
Q.2 a) Describe in detail, the Mesh Analysis method using matrix form.

b) Using Node method, find current in the 3 Ω resistance in the circuit shown below.



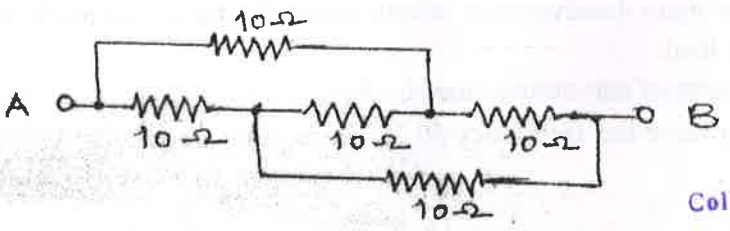
Q.3 a) State Thevenin's Theorem. Describe steps for determination of Thevenin's resistance and current.

b) Using Superposition theorem, find current I in the circuit shown below. All resistances are in Ohms.



Q.4 a) Describe Star/Delta Transformation.

b) Calculate the equivalent resistance between the terminals A and B in the network shown below.



(P.T.O.)

Q.5 a) Derive an expression for the instantaneous value of alternating sinusoidal emf in terms of its maximum value, angular frequency and time.

b) An ac of frequency 60 Hz has a maximum value of 120 A. Write equation for its instantaneous value. Reckoning time from the instant the current is zero and is increasing in positive direction, find

i) The instantaneous value after 1/360 Second.

ii) The time taken to reach 96 A for first time.

Q.6 a) With a neat diagram, Explain measurement of 3- phase power by two wattmeter method.

b) The input power to a 3- phase motor was measured by two wattmeter method. The readings were 10.4 kW and -3.4 kW at 400 V. Calculate the Power Factor and the line current.

Q.7 a) What are main disadvantages of low Power Factor? Describe equipments used for improvement of Power Factor.

b) The Potential difference measured across a coil is 4.5 V when it carries a direct current of 9 A. The same coil, when carries an ac current of 9 A at 25 Hz, the potential difference is 24 V. Find the current, power and Power Factor when it is supplied by 50 V, 50 Hz supply.

Q.8 a) Describe Independent and Dependent sources in detail.

b) In a series circuit with pure resistance and pure inductance, the current and voltage are expressed as $i(t) = 5 \sin (314t + 2\pi/3)$ and $v(t) = 15 \sin (314t + 0.5\pi/6)$. Determine

1) impedance of the circuit 2) Resistance of the circuit 3) Inductance in Henries

4) Average power drawn by the circuit 5) The power Factor.

Q.9 a) Derive relationship between line and phase voltage and current in 3 - phase star connection. Draw a neat vector diagram.

b) Given a balanced 3- phase 3- wire system with star connected load with line Voltage 230 V and impedance of each phase is (6+ j8) ohm. Find the line current and power drawn by each phase.

Q.10 Describe with neat diagrams.

1) Staircase Wiring 2) Flow of ac current through series R-L circuit.

SECTION "B"

Q.11 Define :

1) Mesh 2) Active Component 3) Loop

4) Independent Sources 5) Node 6) Frequency

7) Amplitude 8) Active Power

Q.12 State True or False :

1) The frequency of ac with time period 0.04 sec is 25

2) Thevenin's resistance R_{th} is found by short circuiting the two terminals.

3) In an ac circuit, the ratio of kW/kVA represents Load Factor.

4) The Unit of Inductance is Hertz.

5) The reciprocal of Amplitude is Frequency.

6) The main disadvantage of low Power Factor is that more power is consumed by the load.

7) In case of star connection, $I_L = I_{PH.}$

8) If a wave has frequency 50 Hz, its angular frequency is = 100π.

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

Semester	: **III (New)**	**Term**	: **I**	**Academic Year**	: **2013-14**
Course No.	: BS-MATH 236	**Title**	: **Engineering Mathematics III**		
Credits	: 3(2+1)				
Day & Date	: Wednesday, 23.10.2013	**Time**	: 9.00 to 12.00	**Total Marks**	: **120**

Note : 1. Solve **ANY EIGHT** 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 State Newton's interpolation formula and use it to calculate the value of cosh 0.56, given the following table.

x	0.5	0.6	0.7	0.8
coshx	1.127626	1.185465	1.255169	1.337435

Q.2 a) State and prove first shifting property of Laplace transform.

b) Solve $u_{n+3} - 3u_{n+2} + 4u_n = 0$

Q.3 Evaluate $\int_4^{5.2} \log x \; dx$ by Simpsons $1/3^{rd}$ rule.

Q.4 a) Find Laplace Transform of t sin 3t

b) Find Laplace Transform of $f(t) = \begin{cases} t^2 & , 0 < t < 2 \\ t - 1 & , 2 < t < 3 \\ 7 & , t > 3 \end{cases}$

Q.5 a) Find inverse Laplace transform of $\left[\frac{s+2}{(s+1)(s-2)}\right]$

b) Evaluate $\Delta^2 (ab^x)$

Q.6 Solve $R\frac{dQ}{dt} + \frac{Q}{C} = V$, Q = 0 When t=0 by using Laplace transform.

Q.7 a) Find inverse Laplace transform $\left[\log\left(\frac{s+2}{s-2}\right)\right]$

b) Evaluate $\int_0^6 \frac{dx}{1+x^2}$ by using Trapezoidal rule, where

x	0	1	2	3	4	5	6
f(x)	1	0.5	0.2	0.1	0.0588	0.0385	0.027

Q.8 The following data gives corresponding values of pressure and specific volume of a superheated steam.

V:	2	4	6	8	10
P:	105	42.7	25.3	16.7	13

Find the rate of change of pressure with respect to volume when v =2

(P.T.O.)

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Q.9 Employ Taylor's series method to obtain the approximate value of y at x = 0.2 for the differential equation $\frac{dy}{dx} = 2y + 3e^x, y(0) = 0$

Q.10 Solve the difference equation $y_{n+2} - 6y_{n+1} + 9y_n = 3^n$

SECTION "B"

Q.11 State/ Define the following.

1) Linearity property of Laplace transform
2) Simpson's $3/8^{th}$ rule
3) Difference equation
4) Laplace Transform of unit step function
5) Change of scale property of Laplace transform
6) Solution of difference equation
7) Lagranges interpolation formula
8) Unit impulse function
9) Backward difference
10) Laplace Transform of periodic function
11) Shift operator
12) Convolution theorem

Q.12 Fill in the Blanks.

1) $L(e^{at}) =$ _____, where α is constant.

2) Particular integral of $\frac{1}{E-3}3^n$ is _____.

3) The process of evaluating a definite integral from a set of tabulated values of the integrand f(x) is called _____.

4) $L\left[t^{-1/2}\right] =$ _____.

5) $L^{-1}\left[\frac{1}{s^{n/2}}\right] =$ _____, where n is positive even integer.

6) $L[t^n f(t)] =$ _____, if $L[f(t)] = \varphi(s)$

7) $\Delta \cos 2x = \cos 2(x+h) -$ _____.

8) The order of the difference equation in $u_n - 5u_{n-1} + 9u_{n-2} - 7u_{n-3} + 2u_{n-4} = 0$ is _____.

9) If E is the shift- operator and Δ the forward difference operator then $E - \Delta =$ _____.

10) The factorial [x] = _____.

11) If $L^{-1}[\Phi(s)] = f(t)$ then $L^{-1}\left[\Phi(s+a)\right] =$ _____ f(t).

12) $L^{-1}\left[\frac{1}{s+12}\right] =$ _____.

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MAHARASHTRA AGRICULTURAL UNIVERSITIES EXAMINATION BOARD, PUNE
SEMESTER END EXAMINATION

B.Tech. (Agril. Engg.)

Semester	:	**III (New)**	**Term**	:	**I**	**Academic Year** :	**2013-14**
Course No.	:	SWCE 232	**Title**	:	**Soil Mechanics**		
Credits	:	3(2+1)					
Day & Date	:	Friday, 25.10.2013	**Time**	:	9.00 to 12.00	**Total Marks** :	**80**

Note :
1. Solve **ANY EIGHT** 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 r, r_d and w

b) A soil sample has a porosity of 40per cent. The specific gravity of solids is 2.70. Calculate

a) voids ratio b) dry density c) unit weight if the soil is 50 per cent saturated and d) unit weight if the soil is completely saturated.

Q.2 In a falling head permeameter test, the initial head is 40 cm. The head drop by 5 cm in 10 minutes. Calculate the time required to run the test for final head to be 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 stand pipe as 0.50 cm^2 .

Q.3 a) Explain textural soil classification with triangular chart.

b) Compute the maximum capillary tension for a tube of 0.05mm in a diameter.

Q.4 Define the process of compaction. State different tests of compaction to find water density relationship. Explain Standard Proctor Test to find optimum water content of soil.

Q.5 a) Define permeability. Derive expression for average permeability of soil deposit parallel to bedding planes.

b) derive an expression of Rankine's theory of active earth pressure on cohesion less dry backfill with surcharge.

Q.6 Compute the intensities of active and passive earth pressure at depth of 8 meters in dry cohesion less sand with an angle of internal friction of 30°C and unit weight of 18 KN/m^3. What will be the intensities of active and passive earth pressure if the water level rises to the ground level? Take saturated unit weight of sand as 22 KN/m^3.

Q.7 Draw various field compaction methods and suitability of various equipments.

Q.8 a) Derive Laplace equation for two dimensional flow.

b) What is soil water? Explain in detail different modes of occurrence of soil water.

Q.9 Derive a relationship for determination of velocity of sinking of spherical particle in sedimentation analysis.

Q.10 a) State the procedure and derive the relationship to determine the relationship of specific gravity of soil using pycnometer method.

b) Write note on quick sand phenomenon.

(P.T.O.)

SECTION "B"

Q.11 Define the following terms.

1) Placement water content
2) Backfill
3) Shear strength
4) Voids ration
5) Apparent specific gravity
6) Liquid limit
7) Compressibility
8) Adsorbed water

Q.12 Fill in the blanks.

1) Seepage velocity is always _____ than discharge velocity.
2) Darcy's law is valid for _____.
3) When natural state of soil is in its densest state, density index ID=_____.
4) The value of density index varies between _____ and _____.
5)_____ is the ratio of the volume of air voids of the total volume of the soil mass.
6) If the flow occurs in the downward direction. Then the effective pressure _____.
7) The delay caused in consolidation by slow drainage of water out of saturated soil mass is called _____.
8) Weight of solids per unit of its total volume of the soil mass prior to drying is called _____.

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MAHARASHTRA AGRICULTURAL UNIVERSITIES EXAMINATION BOARD, PUNE
SEMESTER END EXAMINATION

B.Tech. (Agril. Engg.)

Semester	:	**III (New)**	**Term**	:	**I**	**Academic Year** :	**2013-14**
Course No.	:	FMP 235	**Title**	:	**Theory of Machines**		
Credits	:	3(2+1)					
Day & Date	:	Monday, 21.10.2013	**Time**	:	9.00 to 12.00	**Total Marks** :	**80**

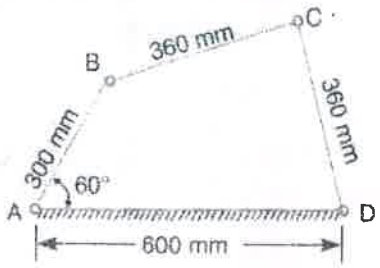
Note :
1. Solve **ANY EIGHT** questions from **SECTION "A".**
2. All questions from **SECTION "B"** are compulsory.
3. All questions carry equal marks.
4. Draw neat diagrams wherever necessary.

SECTION "A"

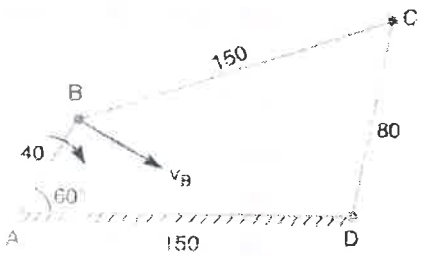
Q.1 a) What is meant by a machine and a structure? Differentiate between a Machine and a structure.

b) Classify the kinematic pairs according to the type of relative motion between the elements, the type of contact between the elements and the type of closure.

Q.2 In a pin jointed four bar mechanism, as shown in below figure, AB= 300 mm, BC= CD = 360 mm, and AD = 600 mm.The angle BAD = 60°. The crank AB rotates uniformly at 100 r.p.m. Locate all the instantaneous centres and find the angular velocity of the link BC.



Q.3 In a four bar chain ABCD, AD is fixed and is 150 mm long. The crank AB is 40 mm long and rotates at 120 r.p.m. clockwise, while the link CD = 80 mm oscillates about D.BC and AD are of equal length. Find the angular velocity of link CD when angle BAD = 60°.



Q.4 Explain with the neat sketch the procedure for acceleration in the slider crank Mechanism.

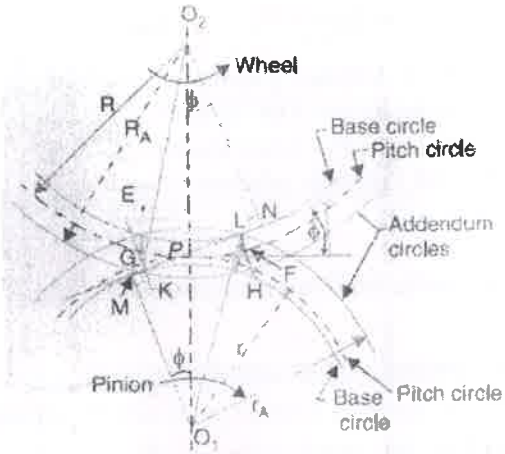
Q.5 a) An engine, running at 150 r.p.m., drives a line shaft by means of a belt. The engine pulley is 750 mm diameter and the pulley on the line shaft being 450 mm. A 900 mm diameter pulley on the line shaft drives a 150 mm diameter pulley keyed to a dynamo shaft. Find the speed of the dynamo shaft. When 1. There is no slip, and 2. There is a slip of 2 per cent at each drive.

b) Write the advantages and disadvantages of chain drive over belt or rope drive.

(P.T.O.)

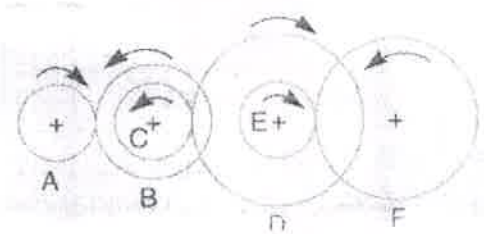
Q.6 a) Give the classification of toothed wheels on the basis of 1. The position of axes of the shafts 2. The peripheral velocity of the gears, 3. The type of gearing and 4. Teeth on the gear surface.

b) Deduce the equation for the length of an arc of contact with the help of figure shown below.



Q.7 a) The gearing of a machine tool is shown in the figure below. The motor shaft is connected to gear A and rotates at 975 r.p.m. The gear wheels B, C, D and E are fixed to parallel shafts rotating together. The final gear F is fixed on the output shaft. What is the speed of gear F ? The number of teeth on each gear are as given below:

Gear	A	B	C	D	E	F
No. of teeth	20	50	25	75	26	65



b) Two parallel shafts, about 600 mm apart are to be connected by spur gears. One shaft is to run at 360 r.p.m. and the other at 120 r.p.m. Design the gears, if the circular pitch is to be 25 mm.

Q.8 a) The mass of flywheel of an engine is 6.5 tonnes and the radius of gyration is 1.8 meters. It is found form the turning moment diagram that the fluctuation of energy is 56 kN-m. If the mean speed of the engine is 120 r.p.m., find the maximum and minimum speeds.

b) Work out the equation for the coefficient of fluctuation of speed.

Q.9 Explain in brief any four types of flat belt drives with neat sketches for each.

Q.10 a) Explain different types of friction.

b) A vertical shaft 150 mm in diameter rotating at 100 r.p.m. rests on a flat end footstep bearing. The shaft carries a vertical load of 20 kN. Assuming uniform pressure distribution and coefficient of friction equal to 0.05, estimate power lost in friction.

SECTION "B"

Q.11 Choose the correct answer

1) When the sleeve of a Porter governor moves upwards, the governor speed_____.

a) increases b) decreases c) remains unaffected d) disturbs

2) The sensitiveness of a governor is given by _____.

a) $\frac{\omega_{mean}}{\omega_2 - \omega_1}$ b) $\frac{\omega_2 - \omega_1}{\omega_{mean}}$ c) $\frac{\omega_2 - \omega_1}{2\omega_{mean}}$ d) none of these

3) The balancing of rotating and reciprocating parts of an engine is necessary when it runs at _____.

a) slow speed b) medium speed c) high speed d) zero motion

4) The partial balancing means _____.

a) balancing partially the reciprocating masses
b) balancing partially the reciprocating masses
c) best balancing of engines
d) all of the above

5) The process of providing the second mass in order to counteract the effect of the centrifugal force of the first mass, is called _____.

a) balancing of rotating masses.
b) balancing of reciprocating masses
c) counter balancing
d) mass addition

6) The frictional torque transmitted by a disc or plate clutch is same as that of _____.

a) flat pivot bearing
b) flat collar bearing
c) conical pivot bearing
d) trapezoidal pivot bearing.

7) The frictional torque transmitted by a cone clutch is same as that of _____.

a) flat pivot bearing
b) flat collar bearing
c) conical pivot bearing
d) trapezoidal pivot bearing

8) The maximum fluctuation of energy is the_____.

a) sum of maximum and minimum energies
b) difference between the maximum and minimum energies
c) ratio of the maximum energy and minimum energy
d) ratio of the mean resisting torque to the work done per cycle

Q.12 Define

1) Kinematic chain
2) Space centrode
3) Gear
4) Reverted gear train
5) Fluctuations of energy
6) Solid friction
7) Equilibrium speed of governor
8) Pitch circle

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

Semester	: **III (New)**	**Term**	: **I**	**Academic Year**	: **2013-14**
Course No.	: APE 232	**Title**	: **Engineering Properties of Biological Materials and Food Quality**		
Credits	: 2(1+1)				
Day & Date	: Thursday, 24.10.2013	**Time**	: 9.00 to 11.00	**Total Marks**	: **40**

Note : 1. Solve **ANY EIGHT** 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 in brief sphericity and roundness.
b) Explain platform scale method for determination of volume and density.

Q.2 a) Explain the laws of friction.
b) Explain in brief the measurement of coefficient of static friction.

Q.3 Explain Jenson's theory for determination of lateral pressure for shallow and deep bins.

Q.4 Explain terminal velocity with expression.

Q.5 What are mechanical models interpret the rheological behavior of linear visco-elastic materials? Give electrical equivalence of those mechanical models.

Q.6 Enlist various methods for measurement of specific heat and explain any one in detail.

Q.7 The sieve analysis conducted using Ro-tap sieve shaker, given the following data for particle size distribution.

Mesh size	2	4	8	14	28	48	100	pan
% material retained	1.0	2.5	7.0	24.0	35.5	22.5	7.5	0.0

Calculate fineness modulus (F.M.) and average size of particles.

Q.8 Explain textural properties of bio materials.

Q.9 Classify rheological behavior of biological materials.

Q.10 Explain sorting of bio materials by reflectance method.

SECTION "B"

Q.11 Define the following terms.
1) Hardness
2) Poisson's ratio
3) Thermal conductivity
4) Young's modulus

Q.12 State units of the followings.
1) Latent heat
2) Specific heat
3) Thermal conductivity
4) Thermal diffusivity

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MAHARASHTRA AGRICULTURAL UNIVERSITIES EXAMINATION BOARD, PUNE
SEMESTER END EXAMINATION

B.Tech. (Agril. Engg.)

Semester	: **III (New)**	**Term**	: **I**	**Academic Year**	: **2013-14**
Course No.	: FMP 236	**Title**	: **Farm Power**		
Credits	: 2(1+1)				
Day & Date	: Tuesday, 22.10.2013	**Time**	: 9.00 to 11.00	**Total Marks**	: **40**

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

SECTION "A"

Q.1 a) Compare mechanical and animal power.
b) Classify the wind mills based on rotors and blades.

Q.2 a) Draw chart showing the occurrence of events (power balance sheet) occurring in 4 stroke 4 cylinder diesel engine having firing order 1-3-4-2.
b) Compare diesel engine and petrol engine.

Q.3 Derive the expression for thermal efficiency of Otto cycle. State the assumptions. How the actual PV diagram deviate from the ideal one?

Q.4 a) Find the air fuel ratio for complete combustion petrol which approximates to hexane C_6H_{14}, assuming air contains 19 per cent oxygen.
b) Calculate IHP of 2 cylinder 4 stroke I.C. engine 12 x 18 cm. Mean effective pressure 600 kPa and speed of crankshaft is 1300 RPM.

Q.5 A four cylinder, four stroke engine has bore dia. 12 cm and stroke length 18 cm running at 2200 rpm consumes 500 cu.m.air per hour. Find volumetric efficiency of engine.

Q.6 State different types of governor and explain pneumatic type governor

Q.7 a) State the functions of carburetor. State the function of different components of carburetor.
b) Describe valve timing diagram of four stroke diesel engine.

Q.8 a) State different types of lubrication system and explain gear type pump.
b) State different types of thermostat valves. Explain the general principle of working of thermostat valve.

Q.9 a) Describe dry type air cleaner and discuss its advantages and disadvantages.
b) Describe hot plug and cold plug with neat sketch.

Q.10 a) Explain the working of magneto type ignition system.
b) Explain in brief about working of 2 stroke SI engine.

SECTION "B"

Q.11 Define the following.
1) Volumetric efficiency
2) Firing order
3) Mean effective pressure
4) Bottom dead centre

Q.12 Fill in the blank.
1) _____ is a butterfly valve between mixing chamber of carburetor and inlet manifold of SI engine.
2) Supercharger is used to increase _____ into the cylinder.
3) The level of electrolyte in battery should be _____ mm above battery plate.
4) _____ head engine is also known as overhead valve engine.

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

Semester	: **III (New)**	**Term**	: **I**	**Academic Year**	: **2013-14**
Course No.	: BS-STAT 237	**Title**	: **Statistical Methods**		
Credits	: 2(1+1)				
Day & Date	: Wednesday, 30.10.2013	**Time**	: 9.00 to 11.00	**Total Marks**	: **40**

Note : 1. Solve **ANY EIGHT** 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 Define and state the formulas of Arithmetic Mean, Median and Mode for continuous frequency distribution. Write properties of Arithmetic mean.

Q.2 What is the need of measures of dispersion. Define standard deviation for ungrouped data and coefficient of variation.

Q.3 Explain Skewness and Kurtosis with its measures.

Q.4 Define Karl- Pearson's co-efficient of correlations between X and Y and state its formula. Explain rank correlation in detail.

Q.5 Explain concept of simple linear regression and describe the method of fitting line of regression Y on X.

Q.6 What is null and alternate hypothesis? Define 't' test for testing correlation coefficient and describe how to test the significance of it.

Q.7 Define the following terms.
1) Mutually exclusive event
2) Probability
3) Type I error
4) Level of significance

Q.8 Write short notes on-
1) Poisson distribution
2) Binomial distribution

Q.9 Define Normal distribution. State its properties and applications.

Q.10 Explain :
1) Chi- square test for testing independence of attributes.
2) F- test

SECTION "B"

Q.11 Fill in the blanks.
1) Probability of impossible event is _____.
2) Small sample test is applied when sample is less than_____.
3) Number of accidents is a _____ variable.
4) If variable X ~N(0,1) then X is called _____.

Q.12 Do as Directed.
1) Find Geometric Mean of 2, 4, and 8.
2) Calculate variance of Binomial distribution with n=10 and p = 0.4.
2) Calculate number of ways of selecting 4 students out of 6 students.
4) Define harmonic mean for continuous frequency distribution.

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