Silver Oak College of Engineering & Technology

Department of Examinations

Exam Completed - Question Papers

Mid Semester Exam (Winter-2014 Session)

Branch: Civil Engineering

Semester: III

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GTU COORDINATOR

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SILVER OAK COLLEGE OF ENGINEERING & TECHNOLOGY

B.E. Semester- (III) - MID SEMESTER EXAMINATION (Winter’14 Session)

SUBJECT: Fluid Mechanics (2130602)

Date: 16-10-2014  Time: 11:00 A.M. to 12:30 P.M  Total Marks: 40

Instructions:
1. Question one is compulsory.
2. Attempt any three from rest of the questions
3. Figures to the right indicate full marks.
4. Assume suitable data if required.

Q.1 (1) Ratio of mass per volume is known as:
(a) Density
(b) Weight density
(c) Viscosity
(d) None of above

(2) Specific Volume is the ratio of:
(a) Weight per Volume
(b) Mass per Volume
(c) Volume per Mass
(d) None of above

(3) When the tube is held vertically in the liquid, a phenomenon of rise or fall of a liquid in a small tube is known as:
(a) Viscosity
(b) Specific Gravity
(c) Density
(d) Capillarity

(4) The ratio of actual discharge to the theoretical discharge is known as:
(a) Co-efficient of Contraction
(b) Co-efficient of Velocity
(c) Co-efficient of Discharge
(d) None of above

(5) Relation between \(C_d\), \(C_v\), and \(C_c\) is:
(a) \(C_d = C_c \times C_v\)
(b) \(C_v = C_c \times C_d\)
(c) \(C_c = C_d \times C_v\)
None of above

(6) Venturimeter is used to measure the:
(a) Discharge (b) Velocity
(c) Discharge and Velocity (d) None
of above

(7) Pitot tube is used to measure the:
(a) Pressure (b) Velocity
(c) Discharge and Velocity (d) None
of above

Q.2 (a) State and prove Pascal’s law.
(b) Explain U – tube differential manometer and inverted U – tube manometer.

Q.3 (a) Derive an expression for the total pressure and position of centre of pressure on a plane surface immersed vertically in a liquid.
(b) A rectangular plane surface 3 m wide and 4 m deep lies in water in such a way that its plane makes an angle of 30° with the free surface of water. Determine the total pressure force and position of centre of pressure. When upper edge is 2 m below the free surface.

Q.4 (a) Explain the conditions of equilibrium of a floating and submerged body.
(b) A rectangular block of size 3 m long x 1.5 m wide x 1.0 m high floats in water such that its depth of immersion is 0.8 m. What is the weight of body? Determine its metacentric height also.

Q.5 (a) State the Bernoulli’s equation and obtain Bernoulli’s equation from Euler’s equation of motion.
(b) Classify different types of orifices according to its shapes, size, discharge condition and shape of upstream edge. Explain all in brief.

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Q-1 Select the correct answer from the option given for each question.

(1) \[ \Gamma(n + 1) = \] _______

(a) \(n\Gamma(n)\)  
(b) \(n\Gamma(n + 1)\)  
(c) \((n + 1)\Gamma(n + 1)\)  
(d) \((n - 1)\Gamma(n - 1)\)

(2) Find the Order and Degree of \[ \left[ \frac{dy}{dx} + y \right]^2 = \sin x \]

(a) Order 1, Degree 1  
(b) Order 1, Degree 2  
(c) Order 2, Degree 1  
(d) Order 2, Degree 2

(3) Solve \(xy' + y = 0\).

(a) \(x + y = c\)  
(b) \(xy = c\)  
(c) \(x / y = c\)  
(d) \(x - y = c\)

(4) Two solutions \(y_1(x)\) and \(y_2(x)\) are said to be linearly dependent if?

(a) \(w(y_1, y_2) \neq 0\)  
(b) \(w(y_1, y_2) = 0\)  
(c) \(w(y_1, y_2) = 1\)  
(d) None of these

(5) Laplace of \(\sin t = \) _______
(a) \( \frac{k}{s^2 + k^2} \) \hspace{1cm} (b) \( \frac{s}{s^2 + k^2} \)

(c) \( \frac{k}{s^2 - k^2} \) \hspace{1cm} (d) \( \frac{s}{s^2 - k^2} \)

6. Laplace of \( z' = \) __________

(a) \( \frac{1}{s-3} \) \hspace{1cm} (b) \( \frac{1}{s-\ln 3} \)

(c) \( e^{-\pi s} \) \hspace{1cm} (d) None of these

7. The Particular Integral of \( (D+1)^2 y = e^{-x} \) is?

(a) \( \frac{x^2}{2} e^{-x} \) \hspace{1cm} (b) \( \frac{x^2}{2} e^x \)

(c) \( x^2 e^{-x} \) \hspace{1cm} (d) \( xe^{-x} \)

Q.2 (a) Using method of undetermined coefficients, find the general solution of \( y'' + 2y' + 10y = 25x^2 + 3 \)

(b) Obtain the Fourier series to represent the function \( f(x) = \frac{1}{4}(\pi - x)^2, 0 < x < 2\pi \)

Q.3 (a) Solve using Laplace Transform

\[ y''' + 2y' + y = e^{-x}, y(0) = -1 \text{ and } y'(0) = 1 \]

(b) Solve \( \frac{d^2 y}{dx^2} + 4y = \tan 2x \) by method of variation parameter.

Q.4 (a) (i) Solve: \( (x + 1) \frac{dy}{dx} - y = e^{3x}(x + 1)^2 \)

(ii) Solve the D.E. by the exact differential.

\[ \left[(x + 1)e^x - e^y\right]dx - xe^ydy = 0, y(1) = 0 \]

(b) Find Fourier Series for \( f(x) = 2x - x^2 \) in the interval \((0,3)\)
Q.5 (a)  
(i) Using convolution theorem, determine \( L^{-1}\left\{ \frac{a}{s^2(s^2+a^2)} \right\} \)  
(ii) Find \( L^{-1}\left\{ \ln \left( 1 + \frac{w^2}{s^2} \right) \right\} \)  

(b) Solve \( (D^2 + 3D + 2)y = \sin(e^x) \)
Enroll. No. ________________

SILVER OAK COLLEGE OF ENGINEERING & TECHNOLOGY

B.E. Semester- (III) - MID SEMESTEREXAMINATION (winter’14 Session)

SUBJECT: Building Construction (2130607)

Date: 15-10-2014                  TIME: 11:00 A.M. to 12:30 P.M      Total Marks: 40

Instructions: 1. Question one is compulsory.
               2. Attempt any three from rest of the questions
               3. Figures to the right indicate full marks.
               4. Assume suitable data if required.

Q.1 (1) A black cotton soil is unsuitable for foundations because it 01
       (a) undergoes volumetric changes with the change of atmospheric conditions
       (b) swells excessively when wet
       (c) shrinks excessively when dry
       (d) All of above

   (2) A brick which is half as wide as a full brick, is called 01
       (b) King closer
           (b) mitred closer
           (d) Beveled closer
           (d) queen closer

   (3) A type of bond in a brick masonry consisting of alternate course of headers and stretchers, is called 01
       (b) English bond
           Flemish bond
           (b) Stretching bond
           Heading bond

   (4) A series of steps without any platform, break or landing in their direction, is called 01
       (b) Riser
           (b) tread
           (c) flight
           (d) Nosing
(5) The projections which help in securing the head of a door frame to the masonry, are called
   (b) Reveals
   (b) Stops
   (c) horns
   (d) Styles

(6) The cement which is commonly used in all types of structures and require no special consideration, is called
   (b) Rapid hardening cement
   (b) normal setting cement
   (c) quick setting cement
   (d) white cement

(7) A fine aggregate is one whose particles are of size
   (b) 4.75 mm
   (b) below 4.75 mm
   (c) 6.75 mm
   (d) above 6.75 mm

Q.2 (a) Describe the causes of failure of foundation and their preventive measures.

   (b) Write a short note on: Raft Foundation

Q.3 (a) Give the classification of lintels and explain one in detail with neat sketch

   (b) Compare between Stone masonry and Brick masonry

Q.4 (a) Write short notes on:
   1. Collapsible steel door
   2. Dormer Window

   (b) Compare between Cast- in –Situ and Precast Concrete

Q.5 (a) Draw and explain five technical terms of stairs.

   (b) Classify different types of floorings and explain Single Joist Flooring with neat sketch
Enroll. No. ______________

SILVER OAK COLLEGE OF ENGINEERING & TECHNOLOGY

B.E. Semester- (III) - MID SEMESTEREXAMINATION (Winter’14 Session)

SUBJECT: SURVEYING (2130601)

Date: DD-MM-YYYY  TIME: 11:00 A.M. to 12:30 P.M  Total Marks: 40

Instructions: 1. Question one is compulsory.
   2. Attempt any three from rest of the questions
   3. Figures to the right indicate full marks.
   4. Assume suitable data if required.

Q.1 Answer the following questions:

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1) The face left position is also called
   a. Telescope reversed
   b. telescope inverted
   c. telescope normal
   d. none of this

2) If d is the smallest value of the main scale and v the smallest value of vernier scale, then the least count of the vernier is given by
   a. d - v
   b. d x v
   c. v - d
   d. d / v

3) If N be the numbers of lines of the traverse, then the sum of measured interior angles should be equal to
   a. (2N+4) x 90°
   b. (2N x 4) x 90°
   c. (2N-4) x 90°
   d. (N + 4) x 90°
4) Indirect leveling can be also used where the ground is
a. small
b. flat
c. steeper
d. small and flat

5) The working edge of alidade is known as the
a. fiducial edge
b. parallel edge
c. drawing edge
d. straight edge

6) Which corrections are neglected in plane trigonometric leveling?
a. curvature
b. refraction
c. both (a) and (b)
d. none of above

7) In the trapezoidal formula, the line joining to the top ordinate is assumed to be
a. curved
b. straight
c. circular
d. parabolic

Q.2 (A) Derive formula for height \( h \) and distance \( D \) in trigonometric leveling when two instruments are at same level.

(B) Following are the bearings and length of a traverse ABCD. Find out closing error of traverse.

<table>
<thead>
<tr>
<th>Line</th>
<th>AB</th>
<th>BC</th>
<th>CD</th>
<th>DA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length(m)</td>
<td>105.8</td>
<td>142.5</td>
<td>188.8</td>
<td>188.9</td>
</tr>
<tr>
<td>Bearing</td>
<td>319°15’</td>
<td>51°30’</td>
<td>131°45’</td>
<td>256°45’</td>
</tr>
</tbody>
</table>

Q.3 (A) Explain the procedure of setting up of plane table.

(B) The following are the values of offsets taken from a chain line to an irregular boundary. Calculate the area included between chain line and irregular boundary by Simpson’s rule.

<table>
<thead>
<tr>
<th>Distance(m)</th>
<th>0</th>
<th>50</th>
<th>100</th>
<th>150</th>
<th>200</th>
<th>250</th>
<th>300</th>
<th>350</th>
<th>400</th>
</tr>
</thead>
<tbody>
<tr>
<td>Offset(m)</td>
<td>10.6</td>
<td>15.4</td>
<td>20.2</td>
<td>18.7</td>
<td>16.4</td>
<td>20.8</td>
<td>22.4</td>
<td>19.3</td>
<td>17.6</td>
</tr>
</tbody>
</table>

Q.4 (A) Enlist different forms of curve and explain horizontal curve and vertical curve.

(B) Derive the equation to find out the elevation of the object, if the base of the object inaccessible,
instruments stations and elevated object are in same vertical plane and the instrument axes at same level. Also find out elevation of a hilltop based on the following dataset.

<table>
<thead>
<tr>
<th>Instrument Station</th>
<th>Staff reading on B.M.</th>
<th>Vertical angle To hilltop</th>
<th>R.L. of the B.M. (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>O₁</td>
<td>1.545 m</td>
<td>28°42’</td>
<td>101.505 m</td>
</tr>
<tr>
<td>O₂</td>
<td>1.545 m</td>
<td>18°06’</td>
<td></td>
</tr>
</tbody>
</table>

Distance between O₁ and O₂ is 100 m.

Q.5 (A) Derive the expressions to compute the area from offsets to a base line by (i) Trapezoidal rule, and by (ii) Simpson’s one third rule.

(B) An instrument was set up at P and the angle of elevation of the top of an electric pole QR was 25°30’. The horizontal distance between P and Q, the foot of the pole was 500m. Determine the reduced level of the top of the pole, if the staff reading held on a B.M. (R.L. 100.00m) was 3.532 m, with the telescope in horizontal plane.
SILVER OAK COLLEGE OF ENGINEERING & TECHNOLOGY

B.E. Semester- (III) - MID SEMESTER EXAMINATION (Winter’14 Session)

SUBJECT: GEOTECHNICS & APPLIED GEOLOGY (2130606)

Date: 14-10-2014  Time: 11:00 A.M. to 12:30 P.M  Total Marks: 40

Instructions:
1. Question one is compulsory.
2. Attempt any three from rest of the questions.
3. Figures to the right indicate full marks.
4. Assume suitable data if required.

Q. 1 Seven MCQs (Each Carrying one mark, with 4 options, no negative marking)  07
1) Wind deposited soils are called
   a) Residual
   b) Aeoline
   c) Lacustrine
   d) Drift
2) The maximum size of particle of clay is
   a) 0.02mm
   b) 0.002mm
   c) 0.002cm
   d) 0.075mm
3) The permeability of soil varies from
   a) As square of grain size
   b) as grain size
   c) Inversely as square of grain size
   d) Inversely as void ratio
4) A soil has the liquid limit of 36%. The corresponding plasticity index given by the A-line is
   a) 16%
   b) 15.50%
   c) 11.68%
   d) 20%
5) P waves can travel through
   a) solid
   b) liquid
   c) Both a and b
   d) None of the above
6) The__________ of an Earthquake is a measure of amount of Energy Released during an Earthquake.
   a) Intensity
   b) Magnitude
   c) both a and b
   d) None of the above

7) The main Reactions involved in chemical Weathering are
   a) Oxidation
   b) Hydration
   c) Carbonation
   d) All of the Above

Q.2 (a) Give types of Weathering. And explain any one type of Weathering.
(b) What is scope of Geotechnical Engineering in field of Civil Engineering?

Q.3 (a) What are different types of soil structure which can occur in nature? Describe any two.
(b) Soil has been compacted in Embankment at a bulk density of 2.15 gm/cm$^3$ and water content of 12%. The value of specific gravity of soil solid is 2.65. Estimate the dry density, void ratio, degree of saturation and air content of compacted soil.

Q.4 (a) What is Darcy’s law? What are its Assumptions.
(b) A moist sample of soil has a mass of 630 gm. and volume of 300cm$^3$ at a water content of 10%. Taking G=2.7, determine e, Sr and na.

Q.5 (a) Define Earthquake. Explain causes of Earthquake.
(b) Define the terms
   1) Focus
   2) Epicenter
   3) Focal depth
   4) Epicentral distance
   5) Earthquake
   6) Aftershocks
Q.1  

1) Lami’s theorem is widely used when a body is acted upon by:
   a) more than two forces   b) two forces   c) only collinear forces   d) three forces

2) The slope of the curve of B.m.diagram gives
   a) S.F at the section   b) B.M at the section
   c) S.F is maximum   d) None of both (a) and (b)

3) M.I of any axis other than the centriodal axis is given by :
   a) varignon’s 1st theorem   b) pappus guldinus theorem
   c) perpendicular axis theorem   d) parallel axis theorem

4) The resistance to deformation of a body per unit area is known as:
   a) stress   b) strain   c) modulus of elasticity   d) modulus of rigidity

5) A lifting machine having an efficiency less than 50% is known as:
   a) reversible machine   b) non reversible machine
   c) ideal machine   d) none of the above

6) Lateral strains are ___________________________ longitudinal strains.
   a) always less than   b) sometimes less than   c) never less than   d) equal to

7) The value of Poisson’s ratio for steel varies from
   a) 0.20 to 0.25   b) 0.25 to 0.35   c) 0.35 to 0.40   d) 0.40 to 0.55
Q.2  
(a) Find magnitude and direction of resultant for a concurrent force system as shown in Fig.1  (4 Marks)
(b) Find equilibrant of the force system shown in Fig.2 also show the position of the resultant about point “O”. (4 Marks)
(c) Write down the assumption in the theory of torsion. (3 Marks)

Q.3  
(a) Find out Lxx & lyy for a section shown in Fig. 3. (6 Marks)
(b) Determine the centroid of the wire bent as shown in Fig. 4. (5 Marks)

Q.4  
(a) Draw S.F. & B.M. diagram for a beam as shown in Fig. 5. (6 Marks)
(b) Find out support reaction at A & B as shown in Fig. 6. (5 Marks)

Q.5  
(a) A steel rod of 16mm diameter and 5m length, is connected to two grips at each end at a temperature of 1500° C. Find the pull exerted when the temperature falls to 40° C. If the ends (i) Do not yield (ii) Yield by 1.0 mm (6 Marks)
(b) A stepped bar made of steel, copper and brass is under axial force as shown in Fig.7 and is equilibrium. The diameter of steel is 12mm diameter of copper is 16mm and the diameter of brass is 20mm. Determine (i) Magnitude of unknown force P (ii) Stresses in each material and (iii) Total change in length of the bar. Take E_{steel} = 200GPa, E_{copper} = 100GPa and E_{brass} = 80GPa. (5 Marks)