

PAST PAPERS

<i>Faculty</i>	<i>Department/Section/Division</i>
<i>Not Applicable</i>	<i>Learning Resource Centre</i>

Past Papers

Faculty of Engineering & Technology
Department of Engineering /Electronic

BSc.(Hons) in Engineering(Workshop practice)
(RE-SIT/Final-Examination)

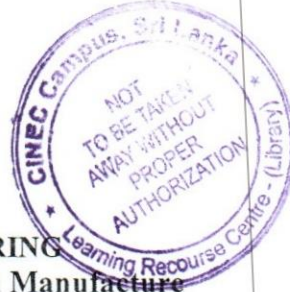
2019 -2020

<i>Document Control & Approving Authority</i>		<i>Senior Director – Quality Management & Administration</i>	
<i>1st Issue Date: 2017.01.30</i>	<i>Revision No.00</i>	<i>Revision Date: 28.07.2020</i>	<i>Validated by: Librarian</i>

librmy

00015

**CINEC CAMPUS
FACULTY OF ENGINEERING & TECHNOLOGY
BACHELOR OF SCIENCE HONOURS IN ENGINEERING
ME 3317- Computer Aided Design & Computer Aided Manufacture
FINAL EXAMINATION PAPER**



17th August 2022

Examiner: Virantha E.A.I

Time Allowed: 3 hours (Additional 15 min is given to upload the file)

INSTRUCTIONS TO CANDIDATES

Use SolidWork software to model the components.

Any dimension or detail which is not given you should assume

Use your Student Number to save the PDF drawing file

Completed Drawing (PDF file) should be uploaded to the CINEC LMS

Examination weighting **55%** marks

Additional 15 min is given to upload the file

Step 1: Complete the following assembly using SolidWorks. Measurements are in inches.

Step 2: Generate the 2D drawings with front elevation, End elevation, Plan, and the isometric views of the Assembly. 2D drawing should include the necessary dimensions and details. To generate the 2D drawing use the A3 size sheet. **Include your name and the student number in the drawing sheet**

Step 3: Save the drawing as a PDF file by giving the name of your student number.

Step 4: Upload your PDF file to CINEC LMS.

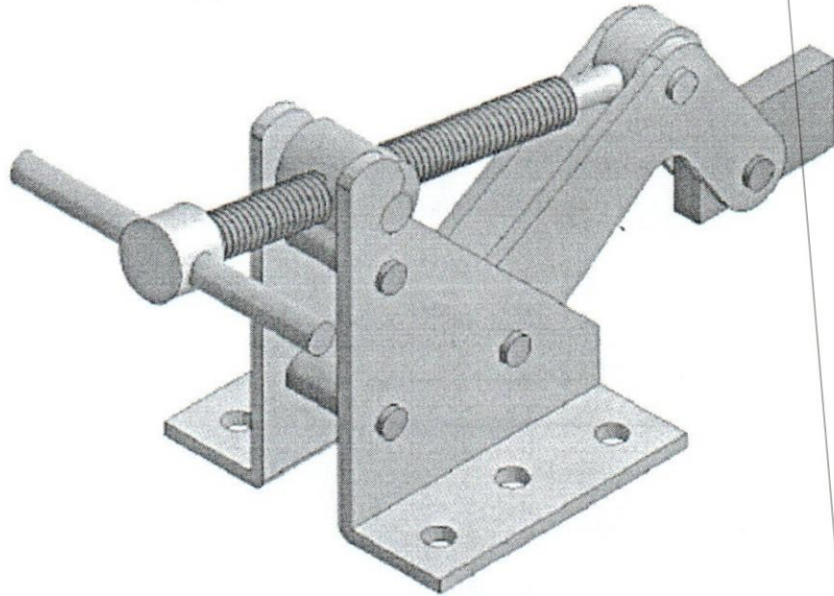


Figure 01: Assembly of a mechanical Clamp

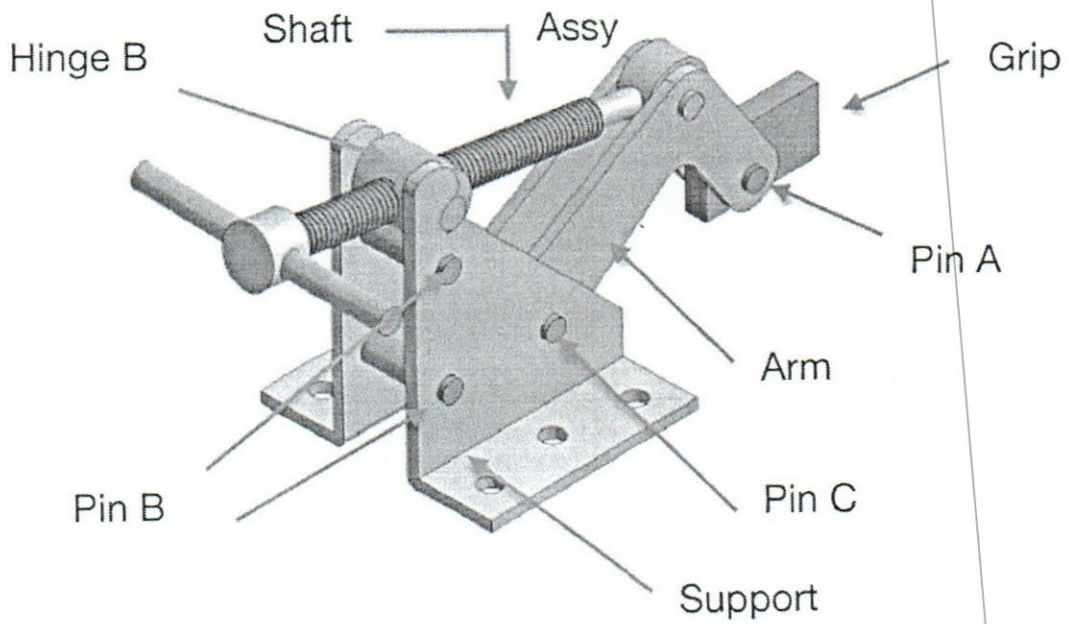
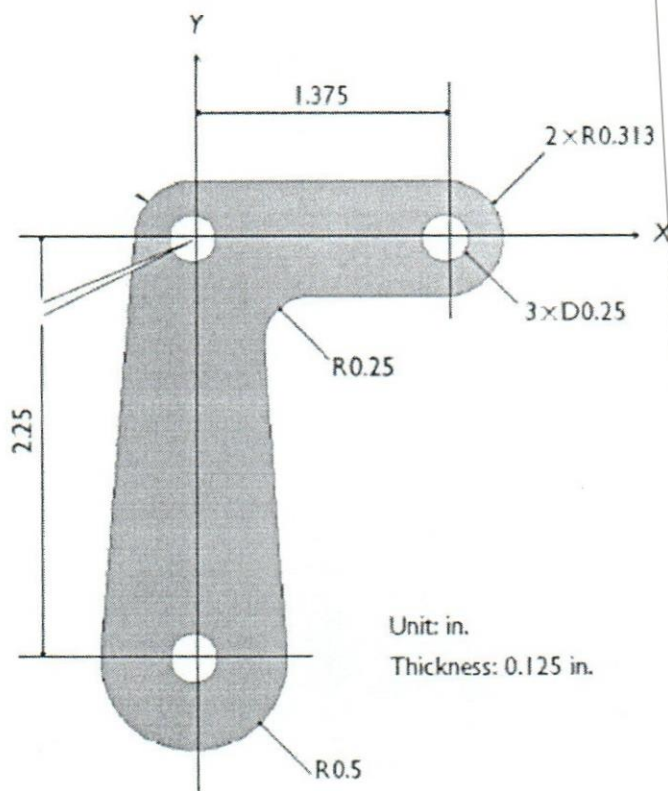


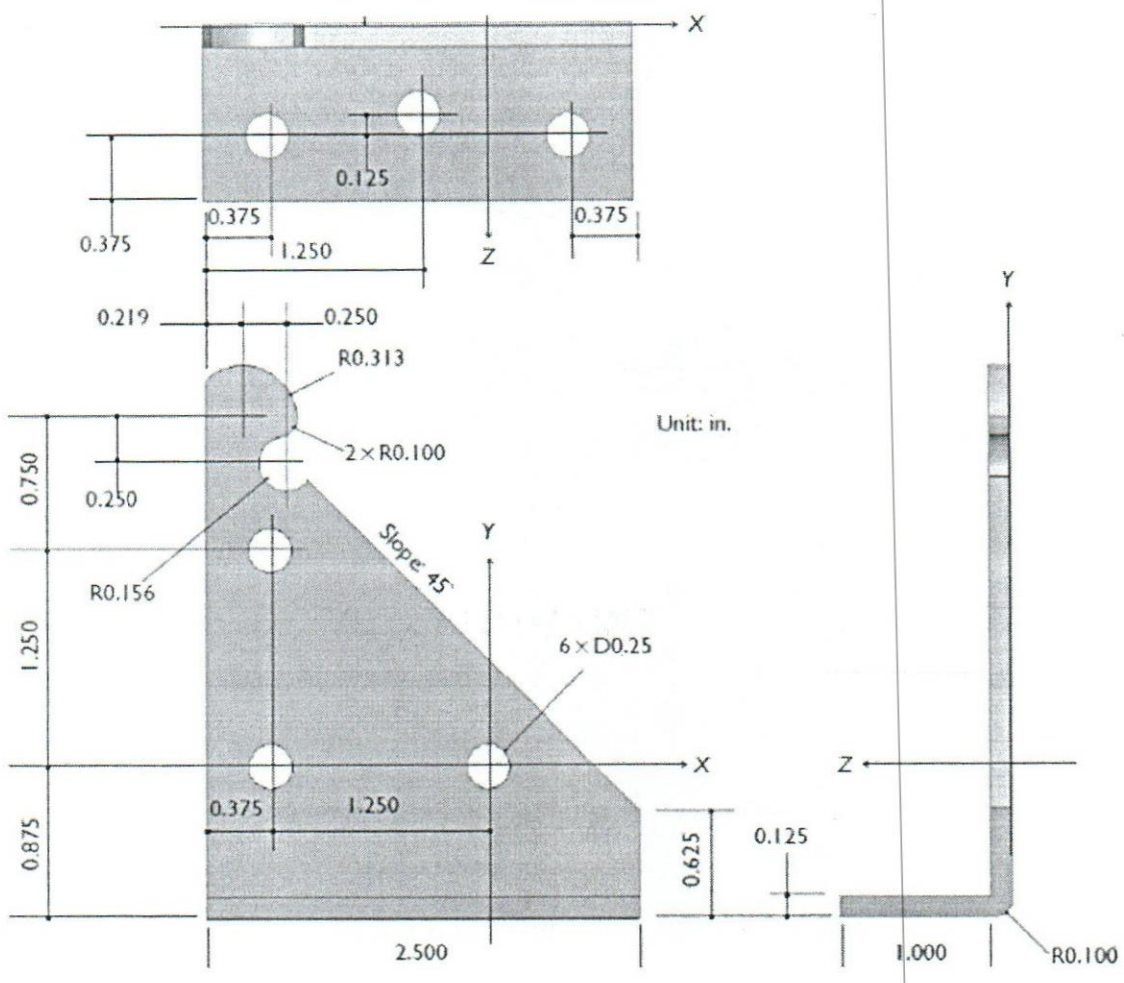
Figure 02: Parts of the Assembly

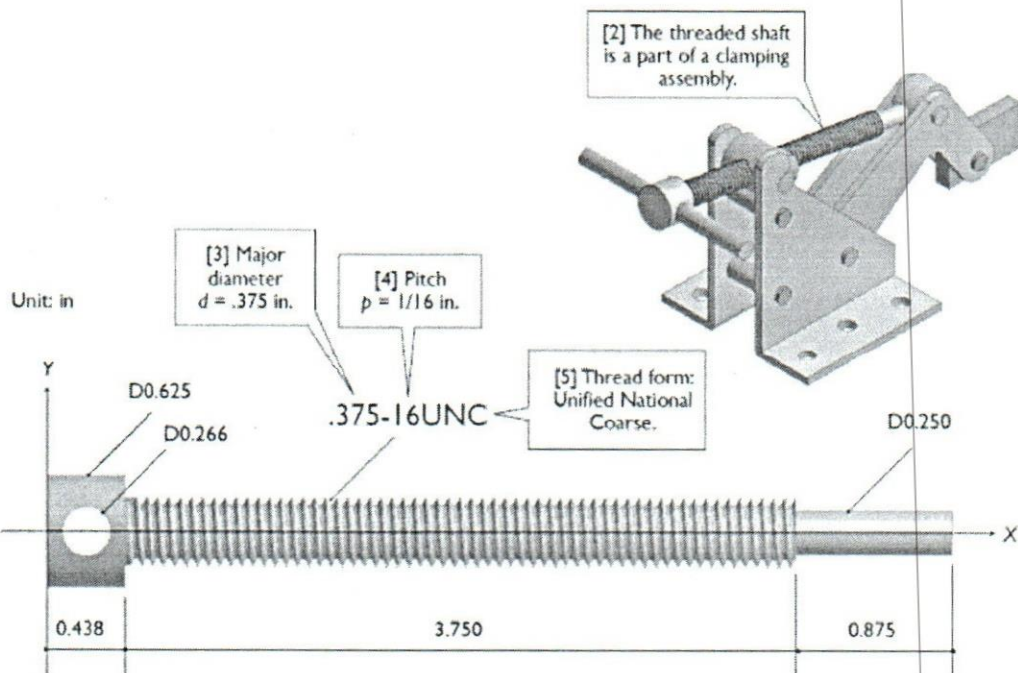
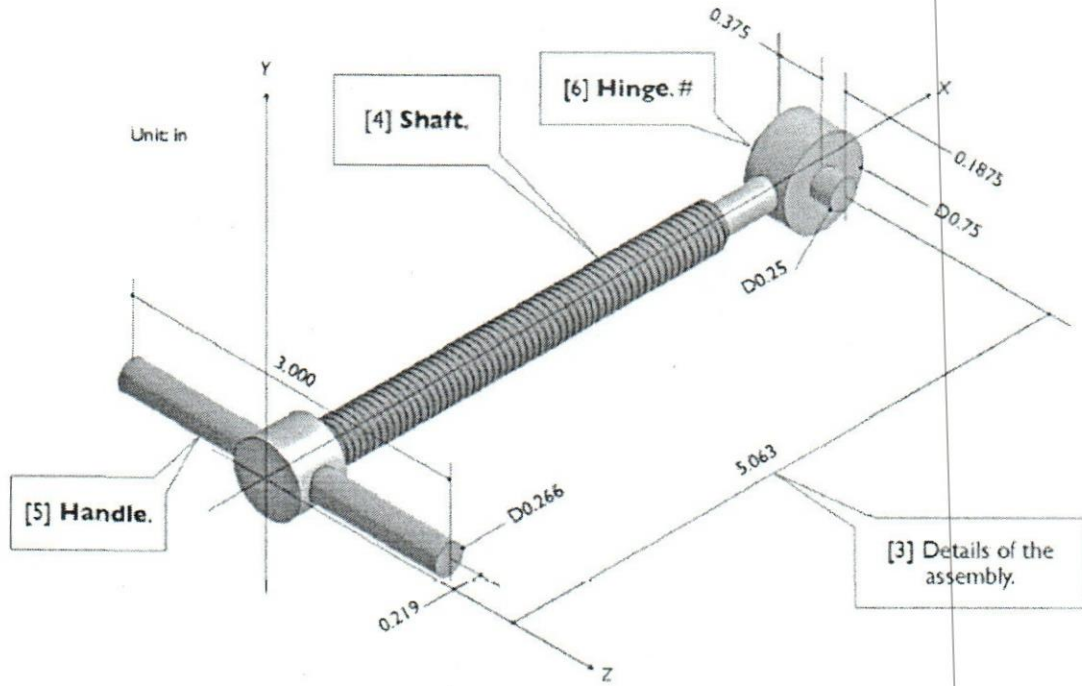
Details of the individual Parts

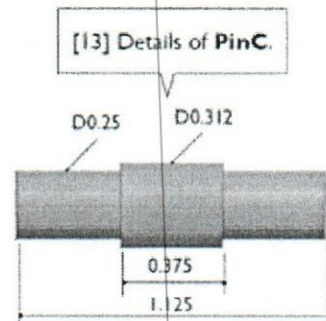
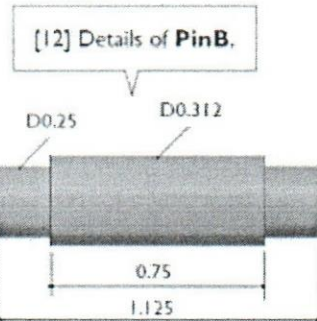
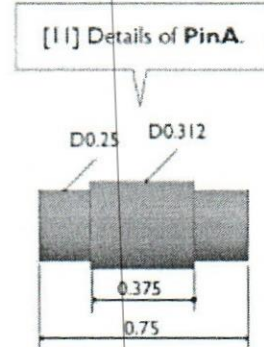
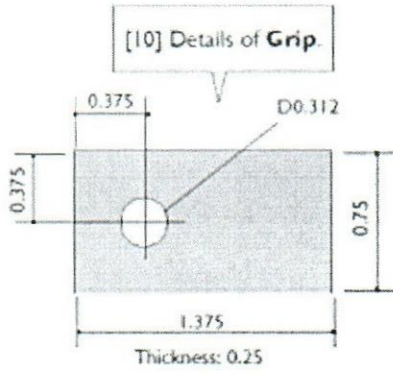
ARM



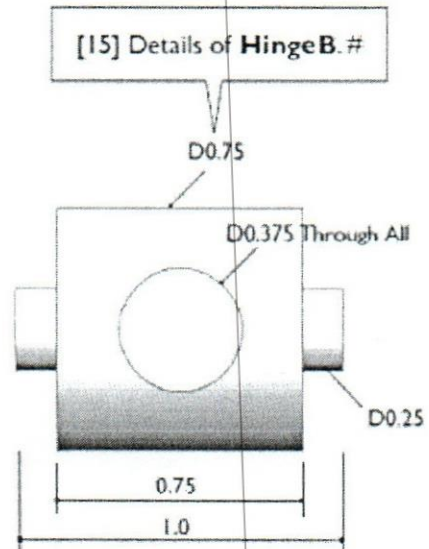
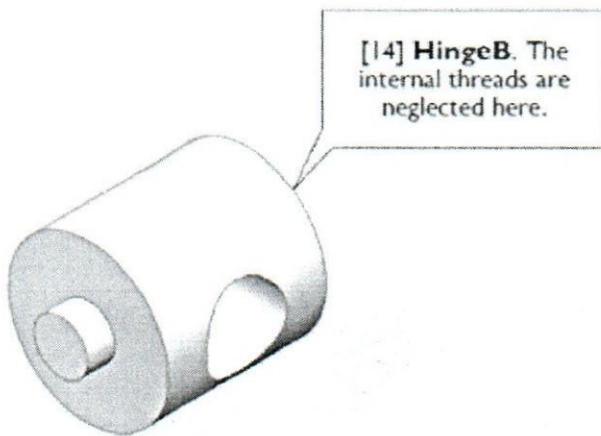
SUPPORT







Unit in.



L. Manay

00051

ME1324

Final examination

Workshop Practice

**COLOMBO INTERNATIONAL NAUTICAL & ENGINEERING
COLLEGE
FACULTY OF ENGINEERING & TECHNOLOGY
BACHELOR OF SCIENCE HONOURS IN ENGINEERING
ME1324- Workshop Practice
FINAL EXAMINATION PAPER (Semester-2)**



Date: January 2020

Examiner: Virantha E.A.I

Time Allowed: Three Hours

INSTRUCTIONS TO CANDIDATES

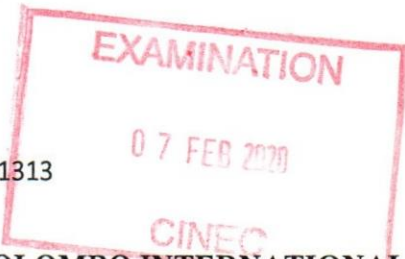
- Answer **all** questions.
- You should write legibly in black or blue ink.
- Non programmable calculators are allowed.
- Closed book examination.
- All questions carry equal marks.
- Any data which is not given should be assumed and clearly mentioned.

Q1.	<p>(a) Generation of Built up Edge (BUE) should avoid in metal cutting operations.</p> <ol style="list-style-type: none"> i. Explain what are the conditions causes to generate the built up edge in metal cutting. ii. Explain why the generation of Built up Edge should avoid in metal cutting. iii. How can built up edge formed during machining be avoided? <p style="text-align: right;">(05 marks)</p> <p>(b) Derive an equation to determine the shear plane angle for orthogonal metal cutting operation. Uncut Chip length=l_1 Chip length=l_2 Rake angle=α</p> <p style="text-align: right;">(05 marks)</p> <p>(c) In an orthogonal metal cutting operation the following data were obtained.</p> <p style="padding-left: 40px;">Uncut chip length =45cm</p> <p style="padding-left: 40px;">Chip length= 30cm.</p> <p style="padding-left: 40px;">With of cut= 2.5mm</p> <p style="padding-left: 40px;">Depth of cut= 0.6mm</p> <p style="padding-left: 40px;">Cutting force= 1200N.</p> <p style="padding-left: 40px;">Thrust force= 795N.</p> <p style="padding-left: 40px;">Cutting speed= 150 m/min.</p> <p style="padding-left: 40px;">Rake angle= $+12^\circ$</p> <p style="padding-left: 40px;">Determine the followings</p> <ol style="list-style-type: none"> i. Shear plane angle. ii. Velocity of chip along tool face. iii. Shear force iv. Material removal rate v. Specific power of material removal <p style="text-align: right;">(15 marks)</p>	25 marks
-----	--	----------

Q2.	<p>(a) What are the essential properties for the cutting tool materials? (5 marks)</p> <p>(b) i. Explain why the toughness property is important for a cutting tool.</p> <p>ii. Graphically represent the variation of hot hardness with the temperature for following cutting tool materials.</p> <p>Alumina based Ceramic tools Carbide tools High speed steel tools High carbon steel tools</p> <p>(10 marks)</p> <p>(c) If in turning of a steel rod by a given cutting tool (material and geometry) at a given machining condition under a given environment (cutting fluid application), the tool life decreases from 80 min to 20 min, due to increase in cutting velocity, V_c from 60 m/min to 120 m/min., then at what cutting velocity the life of that tool under the same condition and environment will be 40 min?</p> <p>(10 marks)</p>	25 marks
Q3.	<p>(a) List the five work holding devices used at the machine shop. (5 marks)</p> <p>(b) Fig Q3 Shown a part drawing. According to the given detail, plan and explain the sequence of operations required to manufacture this component.</p> <div data-bbox="420 1182 1168 1534" style="text-align: center;"> </div> <p style="text-align: center;">Fig Q3</p> <p style="text-align: right;">(10 marks)</p> <p>(c) The 100 mm work piece diameter has to reduce to 80mm using the lathe machine having the spindle speeds of 50 r.p.m to 500 r.p.m in 50 r.p.m divisions (50,100,150.....500). it is proposed to do with two 4mm rough cuts and one 2mm finish cut. Suitable rough cut speed is 60m/min and finish cut speed is 90m/min. The feed rate for both the operations are 0.2mm/rev. If machining length and tool approach lengths are respectively 5cm and 2 cm calculate the total machining time. (neglect the tool over travel and consider the cutting speed variation with the reduction of workpiece diameter in each cut)</p> <p style="text-align: right;">(10 marks)</p>	25marks

Q4.	<p>(a) Scketch the conventional centre lathe machine and name the six main components. (5 marks)</p> <p>(b) What are the taper turning methods available with the conventional lathe machine. (5 marks)</p> <p>(c) Calculate the changing gears and scketch the gear train for cutting the following screws on a lathe machine with Lead-screw of 8mm pitch. (Assume the lathe machine is equipped with a set of gears ranging from 20T to 120T in steps of 5 and 127T gear wheel) i. 6.25mm pitch ii. 1/12 in pitch. iii. 3.5 TPI pitch (15 marks)</p>	25 marks
-----	--	----------

CE1313



Repeat Final Examination

Properties of Materials

COLOMBO INTERNATIONAL NAUTICAL & ENGINEERING COLLEGE

FACULTY OF ENGINEERING & TECHNOLOGY

BACHELOR OF SCIENCE HONOURS IN ENGINEERING



CE1313 PROPERTIES OF MATERIALS

REPEAT FINAL EXAMINATION PAPER (Semester-1)

Date : 07th February 2020
Examiner : Dr. Janaka Liyanagama
Time Allowed : Three Hours

INSTRUCTIONS TO CANDIDATES

- This question paper consists of two sections, **Section-A** and **Section-B**.
- **Section-A** consists of **20 MCQ** type questions and **Section-B** consists of **6 Essay** type questions.
- Answer **all** questions.
- Use a separate answer book to answer Section-B.
- You should write legibly in **black or blue ink**.
- Do not take the exam paper or part of it, out of the examination hall.

SECTION - A MULTIPLE CHOICE QUESTIONS (40 marks)

CHOOSE THE ANSWER YOU BELIEVE TO BE CORRECT.

QUESTION A1

Which of the following properties of a material is most closely related to its elastic modulus?

- (a) Tensile strength
- (b) Melting temperature.
- (c) Ductility
- (d) Fracture toughness

QUESTION A2

Plastic deformation of metals takes place most commonly by:

- (a) Annealing process, involving the removal of dislocations
- (b) Stretching of bonds under the influence of an externally applied stress.
- (c) The slip process, involving the movement of dislocations.
- (d) Work hardening process, involving the entanglement of dislocations.

QUESTION A3

Which of the following statements about fatigue crack growth is true?

- (a) Fatigue is the growth of a crack by cyclic loading.
- (b) Fatigue is the growth of a crack by static loading.
- (c) Fatigue cracks are always above the critical crack size for fast fracture.
- (d) Fatigue cracks grow at any level of applied stress.

QUESTION A4

Which of the following best describes the ductile fracture of metals?

- (a) A mode of fracture characterized by rapid crack propagation. The fracture surfaces are usually shiny and have a granular appearance
- (b) A mode of fracture characterized by slow crack propagation. The fracture surfaces are usually dull with a fibrous appearance.
- (c) The typical mode of fracture when a metal fails at very low temperatures.
- (d) A mode of fracture usually accompanied by little plastic deformation prior to fracture.

QUESTION A5

Which of the following statements is TRUE for solute hardening?

- (a) Impurity atoms hinder the movement of dislocations.
- (b) Impurity atoms aggregate as a separate phase.
- (c) Impurity atoms assist the movement of dislocations.
- (d) Impurity atoms increase the ductility of the alloy.

QUESTION A6

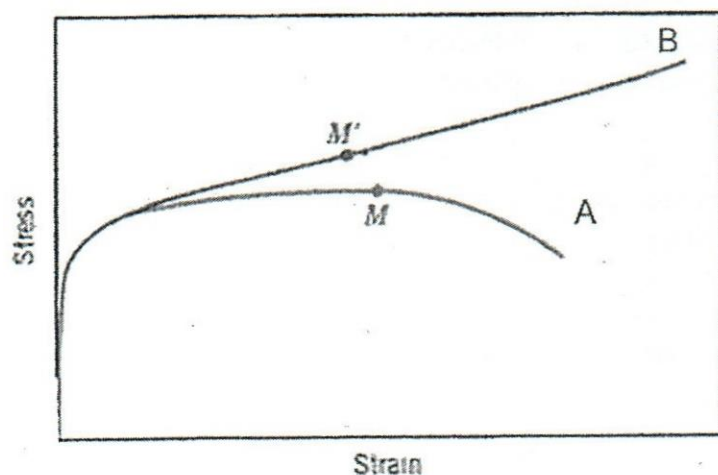
The Hall-Petch equation is given by $\sigma_y = \sigma_0 + k_y d^{-1/2}$

Which of the following statements about the two terms on the right hand side of the equation is correct?

- (a) The first term accounts for recovery and the second term accounts for recrystallization.
- (b) The first term accounts for grain orientation and the second term accounts for alloying.
- (c) The first term accounts for the elastic behaviour and the second term accounts for the plastic behaviour.
- (d) The first term accounts for the “within grain” strengthening and the second term accounts for “grain size” strengthening.

QUESTION A7

Which of the following statements about the stress-strain curves shown below is **not correct**:



- (a) Necking starts at point M on the engineering stress-strain curve
- (b) Line B shows true stress-strain curve.
- (c) The true stress necessary to sustain increasing strain decreases after necking begins.
- (d) The rapid decline in the engineering stress necessary to continue deformation past the maximum engineering stress is mainly due to necking

QUESTION A8

Which of the following is **true** about ductile to brittle transition (DBT) temperature?

- (a) DBT temperature is not an important consideration in materials selection for components that operate in low temperature environments.
- (b) Materials that are used in cold environments should have a DBT temperature that is significantly higher than the service temperature.
- (c) Above DBT temperature, a metal will absorb high amount of energy before fracturing.
- (d) Below DBT temperature, a metal will fail in a ductile manner.

QUESTION A9

Prolonging an age-hardening treatment beyond a certain period of time leads to a progressive decrease in the strength of a precipitation hardenable alloy. This is due to:

- (a) Progressive reduction in the total volume of the precipitates formed.
- (b) Progressive increase in the average distance between the precipitate particles.
- (c) Progressive decrease in the average distance between the precipitate particles.
- (d) The dissolving of some of the precipitates already formed.

QUESTION A10

Annealing a metal that has been cold rolled leads to what combination of changes listed below?

- (a) Increase in dislocation density and increase in yield strength.
- (b) Decrease in dislocation density and increase in yield strength.
- (c) Increase in dislocation density and decrease in yield strength.
- (d) Decrease in dislocation density and decrease in yield strength.

QUESTION A11

Upon heating a metal, the electrical conductivity decreases. This is because:

- (a) The number of charge carriers decreases.
- (b) The number of charge carriers increases.
- (c) The mobility of charge carriers increases.
- (d) The mobility of charge carriers decreases.

QUESTION A12

What happens at the glass transition temperature of semi crystalline polymers?

- (a) the ionic bonds melt.
- (b) the secondary bonds in the amorphous regions melt.
- (c) the covalent bonds melt.
- (d) the secondary bonds in the crystalline regions melt

QUESTION A13

Which of the following is **true** when a continuous fibre reinforced composite is loaded perpendicular to the fibres?

- (a) The fibre phase takes up most of the load.
- (b) The stress is distributed evenly between the fibres and the matrix phases.
- (c) The fibre and matrix phases are under iso strain conditions.
- (d) The modulus of the composite follows the "rule of mixtures" with the volume fraction of fibres.

QUESTION A14

Zinc and iron electrodes are electrochemically coupled in salt water in a H-cell. Zinc is lower than iron in the galvanic series. While agitating the iron electrode, the current rapidly increased. Which of the following is a likely reason for this observation?

- (a) The rate of diffusion of metal ions at the anode surface is increased.
- (b) The rate of passivation of the anode is decreased.
- (c) The rate of diffusion of oxygen at the cathode surface is increased.
- (d) The rate of corrosion in the cell remains constant.

QUESTION A15

The modulus of nylon can be increased by making fibres. This is because:

- (a) The polymer chains become crosslinked during fibre production.
- (b) The polymer chains become more disordered during fibre production.
- (c) The molecular weight increases during fibre production.
- (d) The strong covalent bonds within the polymer align during fibre production.

QUESTION A16

Incorporation of carbon nanotubes (CNTS) into nylon to form a nanocomposite generally results in the following combination of properties:

- (a) an increase in the tensile strength and a drop in the modulus.
- (b) an increase in the modulus and a drop in the tensile strength.
- (c) an increase in the modulus and a drop in the ductility.
- (d) an increase in the tensile strength and an increase in ductility.

QUESTION A17

Recycled polyethylene (PE) typically has a lower impact strength and tensile strength compared to virgin PE. Which of the following is a likely reason for this phenomenon?

- (a) Recycled PE has a much lower molecular weight.
- (b) Recycled PE has become crosslinked.
- (c) Recycled PE has lost its plasticizer during reprocessing.
- (d) Recycled PE has a lower crystalline content.

QUESTION A18

Which one of the following is capable of reducing the extent of corrosion within a pipe carrying a weak acid liquid?

- (a) increase the concentration of oxygen in the water.
- (b) Decrease the temperature of the liquid
- (c) Choose rivets more anodic than the metal tank.
- (d) Increase the liquid pressure in the pipe.

QUESTION A19

Which of the following is true regarding n-type extrinsic semiconductors?

- (a) There is an equal number of electrons and holes.
- (b) There is a donor energy level just below the conduction band.
- (c) n-type extrinsic semiconductors generally have a lower conductivity than intrinsic semiconductors since they only have one type of charge carrier.
- (d) n-type extrinsic semiconductors are doped with atoms with a valency of 3.

QUESTION A20

Polystyrene ($T_g = 100^\circ\text{C}$) and silicone rubber ($T_g = -80^\circ\text{C}$) are both amorphous polymers. However, only silicone rubber has a service temperature above its T_g (polystyrene can not be used above its T_g). Which of the following provides the best explanation for this?

- (a) silicone rubber has been cross-linked and polystyrene is a thermoplastic.
- (b) polystyrene has been crosslinked.
- (c) both polystyrene and silicone rubber are thermosets.
- (d) silicone is semi-crystalline allowing it to be used above its T_g

END OF SECTION A

PLEASE USE A SEPARATE BOOKLET FOR SECTION B**SECTION B (Total : 10 marks x 6 = 60 marks)****QUESTION B1 (10 marks)**

- (a) Give the commonly accepted ranges for relative differences in atomic radius and electronegativity necessary to form a substitutional solid solution between two metals.
- (b) The aluminium alloy-2014 has a fracture toughness of $24.2 \text{ MPam}^{1/2}$. What is the maximum allowable surface crack size for a design stress of 200 MPa ?
- (c) What is the fatigue life of the material that has following characteristics?
Empirical constants $A = 1 \times 10^{-11} \text{ MPa}^{-2}$, $m = 2.9$, Stress intensity amplitude = $22 \text{ MPam}^{1/2}$, the initial crack size = 0.1 mm and the final crack size = 2 mm .

QUESTION B2 (10 marks)

- (a) Draw Temperature vs Time diagram showing following steps involved in the precipitation-hardening {or age hardening} of an alloy: solution heat treatment (step A), quenching (step B), and precipitation heat treatment (step C)
- (b) Discuss briefly the atomic/microstructural changes occurring in the alloy during solution heat treatment and precipitation heat treatment.
- (c) Explain briefly why precipitation-hardened alloys are used for relatively low temperature applications.

QUESTION B3 (10 marks)

A metal alloy is strengthened by work hardening and grain size strengthening alone. What is the yield strength of the alloy?

The alloy has an average grain size (d) of 10 microns ($10 \times 10^{-3} \text{ mm}$), and a dislocation density (ρ) of 10^{13} m^{-2} . The intrinsic resistance to dislocation motion in the alloy (τ_i) is 20 MPa and the Hall-Petch slope (k_y) is $6 \text{ MPamm}^{1/2}$. $C=13 \text{ Pam}^{-1/2}$

QUESTION B4 (10marks)

A continuous and aligned fiber-reinforced composite is to be produced consisting of **35 vol%** of glass fibers (**$E=69 \text{ GPa}$**) and **65 Vol %** of fully cured polyester resin (**$E=3.3 \text{ GPa}$**). If the composite is subjected to a stress of **40 MPa** parallel to the fibres, calculate the following:

- (a) The modulus of composite..
- (b) Strain experienced by the composite.

QUESTION B5 (10 marks)

- (a) Draw a schematic diagram of an intrinsic semiconductor and explain how it works.
- (b) Draw a schematic diagram of a n-type extrinsic semiconductor and explain how it works.
- (c) Discuss how a p-n rectifying junction can convert automating current (AC) to pulsed direct current (DC). Use diagrams to assist your explanation.

QUESTION B6 (10 marks)

Only small quantities of polymers are successfully recycled. Discuss 4 major challenges facing polymer recycling.

END OF EXAMINATION

FORMULAE WHICH MAY BE OF USE TO YOU

$$\epsilon_t = \ln(1 + \epsilon_n)$$

$$\tau_y = \tau_i + \tau_{WH} + \tau_{sol} + \tau_{pptc} \dots$$

$$\sigma_y = \sigma_o + k_y d^{-1/2}$$

$$\sigma_y = 3\tau_y + k_y d^{-1/2}$$

$$\tau_{sol} = kC^{1/2}$$

$$T = \frac{Gb^2}{2}$$

$$\tau_{WH} = \frac{Gb}{2} \sqrt{\rho}$$

$$\tau_{WH} = C\rho^{1/2}$$

$$\frac{da}{dN} = A\Delta K^m$$

$$\sigma_f = \sqrt{\frac{2E\gamma_s}{\pi a_c}}$$

$$K_{Ic} = 1.12\sigma_f \sqrt{\pi a_c}$$

$$K = 1.12\sigma \sqrt{\pi a}$$

$$E_c = v_f E_f + v_m E_m$$

$$\frac{1}{E_c} = \frac{v_f}{E_f} + \frac{v_m}{E_m}$$

$$\frac{F_f}{F_m} = \frac{E_f \nu_f}{E_m \nu_m}$$

$$E = \frac{F \ell^3}{4 \delta b d^3}$$

$$I = \frac{\pi r^4}{4}$$

$$\frac{\Delta l}{l_0} = \alpha_1 \Delta T$$

$$\sigma = E \alpha_1 \Delta T$$

$$m = \frac{iAtM}{nF}$$

$$m = \frac{ItM}{nF}$$

$$\sigma = n|e|\mu_e$$

$$\sigma = n|e|\mu_e + p|e|\mu_h$$

$$\varepsilon_{thermal} = \alpha(T - T_{room})$$

$$\sigma = E(-\varepsilon_{thermal}) = -E\alpha(T_f - T_0)$$

Galvanic Series (sea water)

Gold
Graphite
Titanium
Silver
316 Stainless steel (passive)
304 stainless steel (passive)
Inconel (80Ni-13Cr-7Fe) (passive)
Nickel (passive)
Monel (70Ni-30Cu)
Copper-nickel alloys
Bronzes (Cu-Sn alloys)
Copper
Brasses (Cu-Zn alloys)
Inconel (active)
Nickel (active)
Tin
Lead
316 stainless steel (active)
304 stainless steel (active)
cast iron
iron and steel
aluminium alloys
cadmium
commercially pure aluminium
zinc
magnesium and magnesium alloys

CINEC Campus
Faculty of Engineering & Technology
Bachelor of Science Honours in Engineering



CE2324 HYDROLOGY

RESIT EXAMINATION

Date : 27th February 2020
Examiner : Ms. Udayanga Edirisooriya
Time Allowed : 3 hours

INSTRUCTIONS TO CANDIDATES

- This question paper consists of **FIVE** questions
- **ANSWER ALL QUESTIONS**
- Marks allocated for each question is given.
- **SHOW ALL STAGES OF YOUR WORK**
- You should write legibly in **BLACK** or **BLUE** ink.

MATERIALS REQUIRED

- Answer booklet.
- Graph papers.
- You may use a scientific calculator. This must not be programmable and may be inspected during the examination. Programmable calculators, PDAs and mobile phones are not permitted in the exam.

Question 1 (15 marks)

- I. Hydrology means the science of water. It is the science that deals with the occurrence, circulation and distribution of water of the earth and earth's atmosphere. It is developed based on the Hydrological cycle.
- a) Draw the hydrological cycle indicating all the important processes (4 marks)
- b) Evaporation is an important process in the water cycle.
- List down 3 factors that affects the rate of evaporation
 - What are the 3 methods available to estimate the evaporation?
 - Give 2 options for each method mentioned in part (ii) (6 marks)
- II. Estimate the constant rate of withdrawal from a 1800 ha reservoir in January 2020 during which the reservoir level dropped by 0.60 m despite an average inflow into the reservoir of $0.5 \text{ Mm}^3/\text{day}$. During the month the average seepage loss from the reservoir was 2.5 cm, total precipitation on the reservoir was 20.5 cm and the total evaporation was 12.0 cm. (5 marks)

Question 2 (15 marks)

- I. For a drainage basin of 600 km^2 , isohyets drawn for a storm gave the data given in Table 2.1. Determine the average precipitation for the catchment. (5 marks)

Isohyetal interval (cm)	Inter isohyetal area (km^2)
15-12	92
12-9	128
9-6	120
6-3	175
3-1	85

Table 2.1

- II. The normal annual precipitation of five rain gauge stations P, Q, R, S and T are respectively 125, 102, 76, 113, and 137 cm. During a particular storm the precipitations recorded by stations P, Q, R and S are 13.2, 9.2, 6.8 and 10.2 cm respectively. The instrument at station T was inoperative during that storm. Estimate the rainfall at station T during that storm. (5 marks)

- III. A catchment area has five rain gauge stations. In a year the annual rainfall recorded by the gauges are given in Table 2.2

Station	A	B	C	D	E
Rainfall (cm)	140.0	146.1	138.2	155.2	143.7

Table 2.2

- a) For a 5% error in the estimation of the mean rainfall, calculate the minimum number of additional stations required to be established in the catchment.

(5 marks)

Question 3 (25 marks)

- I. The data given in Table 3.1 were collected during a stream gauging operation in a river. Compute the discharge of the river.

(10 marks)

Distance from left water edge (m)	Depth (m)	Velocity (m/s)	
		at 0.2d	at 0.8d
0.0	0.0	0.0	0.0
1.5	1.3	0.6	0.4
3.0	2.5	0.9	0.6
4.5	1.7	0.7	0.5
6.0	1.0	0.6	0.4
7.5	0.4	0.4	0.3
9.0	0.0	0.0	0.0

Table 3.1

- II. The ordinates of a 3-hr unit hydrograph are given in Table 3.2.

Time (hr)	0	3	6	9	12	15	18	21	24	27	30	33
Ordinate of 3-hr UH (m^3/s)	0	20	60	150	120	90	66	50	32	20	10	0

Table 3.2

Determine the flood hydrograph due to the storm given in Table 3.3. The base flow and the ϕ -index can be assumed as $10 m^3/s$ and $0.3 cm/hr$ respectively.

Time from start of storm (hr)	0	3	6
Accumulated rainfall (cm)	0	3.9	8.8

Table 3.3

(15 marks)

Question 4 (25 marks)

- I. A 20cm well completely penetrates an unconfined aquifer of saturated depth 50m. after a long period of pumping at a steady rate of 450 lpm, (litres per minute) the drawdown in two observation wells 30m and 70m from the pumping well were found to be 3.0m and 2.5m respectively. The aquifer is made of four layers which are given in the Table 4.1.

Soil Layer	Thickness (m)	Permeability ($\times 10^{-4}$ m/s)
Layer 1	9	5.3
Layer 2	13	4.2
Layer 3	10	4.9
Layer 4	8	5.1

Table 4.1

- a) Mark the given detail in a clear diagram (2 marks)
- b) Determine the equivalent permeability for the aquifer. (5 marks)
- c) Derive the required equation for the steady state flow rate, starting from the first principles. Use the standard notations. (8 marks)
- d) Calculate the drawdown at the pumping well. (5 marks)
- II. Describe the terms aquifer, aquitard, aquiclude and aquifuge based on its porosity and permeability. Indicate the function of each type in the context of groundwater. (5 marks)

Question 5 (20 marks)

A reservoir has the elevation, discharge and storage relationship given in Table 5.1.

Elevation (m)	Storage (10^6 m ³)	Outflow discharge (m ³ /s)
100.00	3.350	0
100.50	3.472	10
101.00	3.880	26
101.50	4.383	46
102.00	4.882	72
102.50	5.370	100
102.75	5.527	116
103.00	5.856	130

Table 5.1

When the reservoir level was at **100.60 m**, the flood hydrograph given in Table 5.2 entered the reservoir.

Time (hr)	0	6	12	18	24	30	36	42	48	54	60	66
Inflow (m ³ /s)	10	30	85	140	125	96	75	60	46	35	25	20

Table 5.2

- a) Draw the graphs Q vs Elevation and $\left(\frac{2S}{\Delta t} + Q\right)$ vs Elevation on the same graph paper.
(8 marks)
- b) Derive the equation for **Goodrich Method** starting from the basic equation.
(4 marks)
- c) Obtain the **ordinates** of the outflow and the reservoir elevation as a result of the passage of flood hydrograph across the reservoir.
(8 marks)



**CINEC Campus
Faculty of Engineering & Technology
Bachelor of Science Honours in Engineering**

CE 2316 CONSTRUCTION MATERIALS

RE SIT EXAMINATION PAPER (Semester-3)

Date : 17th February 2020
Examiner : Ms. Sachindra Hewawitharana
Time Allowed : 3 Hours

Materials Required:

- One eight-page answer book, graph paper
- Supplementary materials

Instructions to Students:

- Answer all questions.
- This is a closed book exam.
- Mobile phones are not permitted in the exam
- Approved calculator only.
- You should write legibly in black or blue ink.
- Check your work carefully for inaccurate spelling, punctuation and grammar.
- You may not leave the examination room during the first hour or last 30 minutes of the exam.
- An announcement will be made when there are 30 minutes of the exam time left

Q1. You are recruited as a site engineer for "Ginasena" construction company and allocated inspections relating to masonry construction

1. Mention four properties of a good brick [4 Marks]
2. Mention four mechanical properties which should exist in bricks and field tests which are used to test those qualities [4 Marks]
3. Mention three differences between
 - (a) Flemish Bond and English Bond [2 Marks]
 - (b) English Bond and Stretcher Bond [2 Marks]
 - (c) Flemish Bond and Stretcher Bond [2 Marks]
4. Mention two defects which is caused in masonry construction [2 Marks]
5. Mention the procedure for making a proper brick wall [4 Marks]

Q2.

1. Calculate the cement and sand for 100 m² plastering area in 1:6 ratio and 12mm thickness? Consider 35% bulkgage of sand and 20% wastage. [6 Marks]
2. Briefly describe how these factors will effect to the strength of the concrete?
 - (a) Water/Cement ratio [2 Marks]
 - (b) Temperature [2 Marks]
 - (c) Grading of aggregate [2 Marks]
 - (d) Humidity [2 Marks]
3. Define the meaning of "Grade 40" concrete? [2 Marks]
4. What are admixtures? Name four types of admixtures [4 Marks]

Q3.

1. Who are internal stakeholders in constriction project? Name three of them. [4 Marks]
2. Mention three types of resources which are used in construction projects with two examples for each. [3 Marks]
3. Name five stages of a construction project [5 Marks]
4. The atomic packing of the exposed planes is important
 - (a) Draw (100) and (111) crystallographic planes for Fe [4 Marks]
5. Calculate Atomic Packing Factor [APF] for Body-Centered Cubic Structure. (Hint: Use Figure 1) [4 Marks]

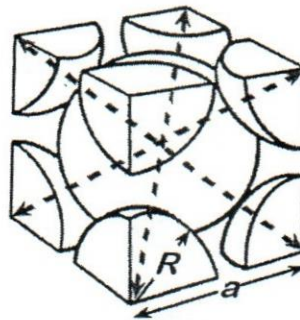


Figure 1: Body-Centered atomic structure

Q4.

1. Describe with three points how the following properties of aggregate effect on properties of fresh concrete.

- (a) Particle shape and Texture [3 Marks]
- (b) Grading of aggregate [3 Marks]
- (c) Moisture content [3 Marks]

2. What is meant by “Hydration of concrete”? [2 Marks]

3. Mention three deterioration methods of steel and three preventive measures [6 Marks]

4. Name three test on bitumen before its application [3 Marks]

Q5.

1. What is meant by “Seasoning of timber” [2 Marks]

2. Name four stresses that need to be considered in timber design [4 Marks]

3. Explain the effect of moisture content when timber is used as a construction material using three factors [4 Marks]

4. Mention four conversion ways of a timber specimen [4 Marks]

5. Explain three methods of deteriorating timber and four ways of preservative methods [6 Marks]

End of questions

ce bray

00004



Colombo International Nautical & Engineering College

Faculty of Engineering & Technology

Bachelor of Science Honours in Engineering

CE2314: Hydraulics

IN-CLASS TEST (Semester-3) – RESIT EXAM PAPER

(100% of weighting)

Date : 14th February 2020

Examiner : Nimali Sugandika

Time Allowed : 2.5 Hours

INSTRUCTIONS TO CANDIDATES

- This question paper consists of **three** questions.
- Answer **all** questions
- Show all stages of your work
- You should write legibly in black or blue ink.
- **Graph sheets** can be requested, if you need it.

MATERIALS REQUIRED

- Answer booklet.
- You may use a scientific calculator. This must not be programmable, and may be inspected during the examination. Programmable calculators, PDAs and mobile phones are not permitted in the exam.

Q1		
a)	Prove that $d_c = \sqrt[3]{\frac{Q^2}{gB^2}}$ and $V_c = \sqrt{gd_c}$ for a rectangular broad crested weir. Where d_c is the critical water depth, V_c is the critical flow velocity, Q is the flow rate and B is the weir width.	30%
b)	Give three practical applications for a rectangular broad crested weir.	10%
c)	Water flows along a rectangular channel at a depth of 1.3 m when the discharge is 8.74 m ³ /s. The channel width (B) is 5.5 m, the same as the weir (b). Ignoring energy losses, what is the minimum height (P) of a rectangular broad crested weir if it is to function with critical depth on the crest?	30%
d)	Water flows over a broad crested weir 0.5 m high that completely spans a rectangular channel 10.0 m wide ($b=B$). when the discharge is 19.0 m ³ /s, estimate the depth of flow upstream of weir. Assume no loss of energy and that critical depth occurs on the weir crest.	30%
Q2		
a)	<ol style="list-style-type: none"> 1. When is the flow in a pipe considered to be an open channel flow, and when it is not? 2. What is meant by the total energy of the flow in an open channel? 3. Define the specific energy. 4. Describe the major differences between the total energy and the specific energy. 5. Define what is meant by the terms wetted perimeter (P) and hydraulic radius (R_h). 	30%
b)	<p>Water flows down a half-full circular pipeline of diameter 1.4m. The pipeline is laid at a gradient of 1 in 250.</p> <ol style="list-style-type: none"> 1. If the Chezy coefficient, C, is 55 m^{1/2}/s, what is the discharge? 2. $C = \alpha R^{1/6}/n$ what value of Manning's n corresponds to $C = 55$ m^{1/2}/s, if $\alpha = 1$. 3. Calculate the discharge in the pipeline using the Manning equation. 	30%

	Chezy equation is $V = C\sqrt{R_h S_0}$ and Manning equation $V = \frac{\alpha}{n} R_h^{2/3} S_0^{1/2}$, where S_0 is the bed slope of the pipeline.	
c)	Water flows down a rectangular channel that has a width of 20 m, a Manning n value of $0.032 \text{ s/m}^{1/3}$ and a slope of 1 in 100. <ol style="list-style-type: none"> 1. Calculate the discharge in the channel when the depth of flow is 0.5 m, 1.0 m, 2.0 m, and 4.0 m. 2. Plot a graph of depth against discharge and describe the shape obtained. 3. Using the graph calculate the depth corresponding to a discharge of $212.5 \text{ m}^3/\text{s}$. 	40%
Q3		
a)	<ol style="list-style-type: none"> 1. Describe what is meant by a 'hydraulic jump'. 2. Explain where, how and why a hydraulic-jump forms. 	20%
b)	A rectangular channel 10 m wide forms part of a dam spillway. The discharge is $36.5 \text{ m}^3/\text{s}$ when the depth of the flow is 0.43 m. At the foot of the spillway the channel is almost horizontal, with a hydraulic jump. Calculate, <ol style="list-style-type: none"> 1. A depth of the flow after the jump. 2. The height of the hydraulic jump. 3. The energy loss at the jump. 	40%
c)	Design a gravity spillway and stilling basin to pass a design flood of $2100 \text{ m}^3/\text{s}$. Dam base elevation = 268 m, dam crest elevation = 300 m and reservoir design water level is 306 m (C is given as $2.0 \text{ m}^{1/2}/\text{s}$).	40%
	$Q = CbH^{3/2}$, where b is the spillway width and H is the water level above the crest. $\frac{y_2}{y_1} = \frac{-1 + \sqrt{1 + 8Fr_1^2}}{2}$, where y_2 is the water depth after the jump and y_1 is the water depth before the jump, Fr_1 is the froud number before the jump. $Fr_1 = \frac{V_1}{\sqrt{gy_1}}$	

COLOMBO INTERNATIONAL NAUTICAL & ENGINEERING COLLEGE
FACULTY OF ENGINEERING & TECHNOLOGY

BACHELOR OF SCIENCE HONOURS IN ENGINEERING

PROGRAMMING FUNDAMENTAL
MODULE CODE:EE1325
PRACTICAL PAPER

Date: 05/03/2020

Time allocated: 03Hr

Student ID:

INSTRUCTIONS

- This is a close book practical exam.
- This paper consists of three (03) questions and answer all.
- Make sure the answer scripts are saved as indicated below:
 1. Create a New Folder in the Desktop. Rename the New Folder as HE_Student ID. Save your answers inside HE_Student ID folder.
- Use separate source files for each question.

Question 01

(40 marks)

- a. Write a program to input number from user and check whether the number is even or odd using **if-else case**. Save the file as **EvenOdd.c** (The output should be like follow)

Output

```
Enter any number to check even or odd: 6
Number is Even
```


(60 marks)

- b. Develop a C program using loop to print the below pattern. Save the file as **Triangle.c**

```
1
1 2
1 2 3
1 2 3 4
1 2 3 4 5
```

Question 02

(100 marks)

Program to take 5 values from the user and find out the largest element present in the array. Save the file as **Array.c**

Question 03

(100 marks)

Write a program to find the square of any number using the function. Save the file as **Function.c**

Hint: square = n*n

END



COLOMBO INTERNATIONAL NAUTICAL & ENGINEERING COLLEGE
FACULTY OF ENGINEERING & TECHNOLOGY

BACHELOR OF SCIENCE HONOURS IN ENGINEERING

PROGRAMMING FUNDAMENTAL
MODULE CODE:EE1325
PRACTICAL PAPER 01A

Date: 14/11/2019

Time allocated: 01Hr

INSTRUCTIONS

- This is a close book practical exam.
- This paper consists of one (01) question.
- Make sure the answer scripts are saved as indicated below:
 1. Create a New Folder in the Desktop. Rename the New Folder as HE_Student ID. Save your answers inside HE_Student ID folder.

Question 01

Create an array called **number**. Insert five (05) integer values to the array using key board. Find the maximum value and minimum value using two functions.

END



COLOMBO INTERNATIONAL NAUTICAL & ENGINEERING COLLEGE
FACULTY OF ENGINEERING & TECHNOLOGY

BACHELOR OF SCIENCE HONOURS IN ENGINEERING

PROGRAMMING FUNDAMENTAL
MODULE CODE:EE1325
PRACTICAL PAPER 01A

Date: 14/11/2019

Time allocated: 01Hr

INSTRUCTIONS

- This is a close book practical exam.
- This paper consists of one (01) question.
- Make sure the answer scripts are saved as indicated below:
 1. Create a New Folder in the Desktop. Rename the New Folder as HE_Student ID. Save your answers inside HE_Student ID folder.

Question 01

Create an array called **number**. Insert five (05) integer values to the array using key board. Find the maximum value and minimum value using two functions.

END

Library

00065



COLOMBO INTERNATIONAL NAUTICAL & ENGINEERING COLLEGE
FACULTY OF ENGINEERING & TECHNOLOGY

BACHELOR OF SCIENCE HONOURS IN ENGINEERING

PROGRAMMING FUNDAMENTAL
MODULE CODE:EE1325
PRACTICAL PAPER 01A

Date: 19/11/2019

Time allocated: 01Hr

INSTRUCTIONS

- This is a close book practical exam.
- This paper consists of one (01) question.
- Make sure the answer scripts are saved as indicated below:
 1. Create a New Folder in the Desktop. Rename the New Folder as HE_Student ID. Save your answers inside HE_Student ID folder.

Question 01

Create an array called **Marks**. Insert five (05) integer values to the array using key board. Find the maximum value and average using two functions.

END



COLOMBO INTERNATIONAL NAUTICAL & ENGINEERING COLLEGE
FACULTY OF ENGINEERING & TECHNOLOGY

BACHELOR OF SCIENCE HONOURS IN ENGINEERING

PROGRAMMING FUNDAMENTAL
MODULE CODE:EE1325
PRACTICAL PAPER 01B

Date: 14/11/2019

Time allocated: 01Hr

Student ID:

IP Address:

INSTRUCTIONS

- This is a close book practical exam.
- This paper consists of two (02) questions and answer both Question 01 and 02.
- Make sure the answer scripts are saved as indicated below:
 1. Create a New Folder in the Desktop. Rename the New Folder as EE1325_Student ID. Save your answers inside EE1325_Student ID folder.
- Use separate source files for each question.

Question 01

(40 marks)

Write a program using **if-else case** to input number from user and check whether the number is divisible by 5 and 11 or not. Save the file as **ifelse.c** (The output should be like follow)

```
Output
Enter any number: 55
Number is divisible by 5 and 11
```

Question 02**(60 marks)**

Develop a C program using loop to print the below pattern. Save the file as **Triangle.c**

```
1 2 3 4 5
1 2 3 4
1 2 3
1 2
1
```

END



COLOMBO INTERNATIONAL NAUTICAL & ENGINEERING COLLEGE
FACULTY OF ENGINEERING & TECHNOLOGY

BACHELOR OF SCIENCE HONOURS IN ENGINEERING

EXAMINATION PAPER

Module Code	: EE1325
Module Title	: Programming Fundamentals
Batch	: 02A_Semester 2
Date	: 12 th December 2019
Examiners	: Thamali Kelegama
Time Allowed	: 3 Hours

INSTRUCTIONS TO CANDIDATES

- This is a closed book examination.
- You should answer for all four (04) questions.
- Each answer should start on a new page.

Total Marks: 100

Question 01

a) What are the three (03) ways that we can use to represent an algorithm? Explain your answer with examples (10 Marks)

b) Draw a flow chart for the following scenario. (15 Marks)

Input the quantity, unit price of an item. Calculate and display the total price. If the total price is more than Rs.2000 give 10% discount of the total bill.

Question 02

- a) Write a program to accept 3 numbers from the user and then find the largest number among them. (15 Marks)
- b) Write the code for following pseudocode. (10 Marks)
Hint: No need to use keyboard input
1. Start
 2. Get mark
 3. IF mark > 45 Then
 4. Display "Pass"
 5. Else
 6. Display "Fail"
 7. Endif
 8. End

Question 03

- a) Develop a C program using a loop to print the below pattern. (25 Marks)

```
*****
```

```
***
```

```
**
```

```
*
```

Question 04

Find the errors in following codes and re-write the corrected codes. Circle the places where you have corrected. (25 Marks)

a)

```
#include <stdio.h>

Int calcMin(int numbers[])
    int i,n,j;
    printf("Enter elements in array : \n")
    for(i=0; i<5; i++){
        scanf(" ",&numbers[i]);
    }
    int min = numbers[0];
    //find min value
    for ( j = 1 , j < 5, j++ ) {
        if (min > numbers[j]){
            min = numbers[j];
        }
    }
    return min
}

int main(){
    int numbers[5];
    int a = calcMin(numbers);
    printf("%",a);
}
```

-----END-----

Cibraway

00021



COLOMBO INTERNATIONAL NAUTICAL & ENGINEERING COLLEGE
FACULTY OF ENGINEERING & TECHNOLOGY

BACHELOR OF SCIENCE HONOURS IN ENGINEERING

EXAMINATION PAPER

Module Code : EE1325
Module Title : Programming Fundamentals
Batch : 02A/02B_ Semester 2
Date : 27th February 2020
Examiners : Sachini Gunasekara / Thamali Kelegama
Time Allowed : 3 Hours

INSTRUCTIONS TO CANDIDATES

- This is a closed book examination.
- You should answer for all four (04) questions.
- Each answer should start on a new page.

Total Marks: 100

Question 01

- a) What is a computer program? Give three (03) examples of computer programs? (06 Marks)
- b) Briefly explain three control structures used in Algorithms. (04 Marks)
- c) Write an algorithm and draw a flow chart to output your name ten (10) times. (15 Marks)

Question 02

- a) Find the value of result and result2.

(10 Marks)

```
int result, result2, a=20, b=4, c=15, d=5;
```

```
result = ++a + b--;
```

```
result2 = c++ - --d;
```

- b) Write a program to accept age from the user and display if age of the user is 25yr or above display "Adult" otherwise display "Younger".

(15Marks)

Question 03

- a) Develop a C program using a loop to print the below pattern.

(25 marks)

```
*****
```

```
*****
```

```
*****
```

Question 04

Find the errors in following codes and re-write the corrected codes. Circle the places where you have corrected. (25 Marks)

```
include<stdio.h

long factorial(int n)

    if (n == 0)
        return 1;
    else
        return(n * factorial(n-1));
}

void main
{
    int number;
    int fact;

    printf( Enter a number: ");
    scanf(" d", number);

    fact = factorial(number);
    printf("Factorial of d is %d\n", number, fact);
    return 0
}
```

-----END-----

**COLOMBO INTERNATIONAL NAUTICAL & ENGINEERING COLLEGE****FACULTY OF ENGINEERING & TECHNOLOGY****BACHELOR OF SCIENCE HONOURS IN ENGINEERING****ME2324 Automobile Technology 2****FINAL EXAMINATION PAPER (Semester- 4)**

Date : **3rd January 2020**
Examiner : **Mr. Dasith Akbo Ranathunga**
Time Allowed : **Three Hours**

INSTRUCTIONS TO CANDIDATES

- This question paper consists of 4 **questions**.
- Answer **All** the questions
- **Marks will be deducted for the incorrect use of “units”**.
- You should write legibly in **black or blue ink**.
- Do not take the exam paper or part of it, out of the examination hall.
- Graph papers and exam scripts will be provided.
- Non programmable calculators are allowed.
- This is a closed book exam.
- Any data which is not given should be assumed and clearly mentioned

QUESTION 01

Clutch assembly and Manual Transmission

1. Explain the need of a transmission system for an automobile?
(10 Marks)
2. Identify the following symptoms and discuss the possible causes for the following causes for a manual transmission.
 - a. Hard shifting
 - b. A hum in neutral
 - c. Grinding Noise in neutral
 - d. Slipping out of gear
 (20 Marks)
3. Identify the H1,H2, ,B,C,D,E,U5 of the 4 speed Synchronmesh Transmission given in figure 01.
(14 Marks)

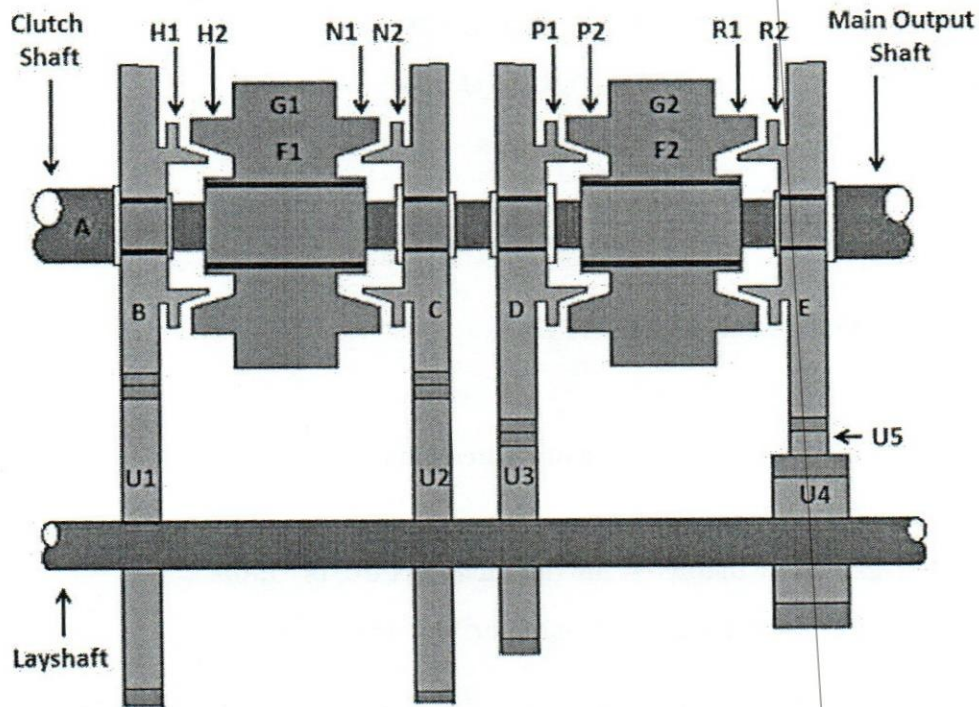
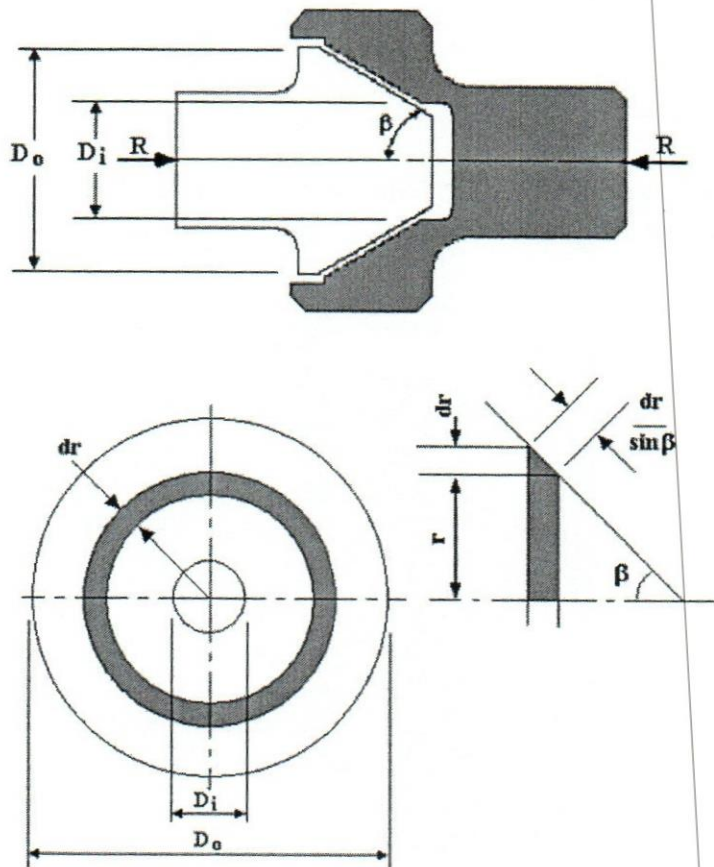


Figure 1- Synchronmesh Gear Box

4. Explain the power flow using the letters in figure 01,
 - a. 1st Gear
 - b. 2nd Gear
 - c. Top Gear
 - d. Reverse Gear
 (16 Marks)

5. Derive the *Uniform Pressure theory* (below equation) for a conical clutch using following figures.

$$T = \frac{\mu R}{3 \sin \beta} \left[\frac{D_o^3 - D_i^3}{D_o^2 - D_i^2} \right]$$



T – Torque
 β – Half angle
 μ – friction Coefficient
 p – uniform pressure
 R – Clutch pressing force

(40 Marks)

QUESTION 02*Automatic Transmission & CVT*

1. List the three types of holding devices which uses to hold sun gear, carrier in an automatic Transmission System?

(10 Marks)

2. Explain the following modes in an automatic transmission
- Under drive
 - Direct drive
 - Over Drive
 - Reverse

(40 Marks)

3. Design a CT gear box by Calculating the “Highest ratio” and the “lowest ratio” using Following data. (*Refer the Data sheet for the equations*)

P_e (Max. engine power)	99hp
T_m (Max. Engine Torque)	170Nm
E_t (Transmission Efficiency)	68%
E_c (Clutch Efficiency)	60%
C_d (Drag Coefficient)	0.4
ρ (Air Density)	1.2kg/m ³
A (Frontal Area)	2 m ²
Wheel Diameter	18 inch
Max power R.P.M	5000 rpm
Differential Ratio	3.8 : 1
Vehicle Mass	1250 kg
Maximum Load	750 kg
Slope inclination	10%
Safety Factor	2

(50 Marks)

QUESTION 03-Braking System

1. Compare and Contrast Disk brakes & Drum Breaks

(14 Marks)

2. What are two types of Brake calipers.

(6 Marks)

3. What is the difference between “wet ERPB” and “ERPB” in brake fluid?

(10 Marks)

4. What are grades of brake fluid? Describe using Color, ERPB and base components.

(10 Marks)

5. Explain the operation principal of a Tandem master cylinder with the help of the following diagram.

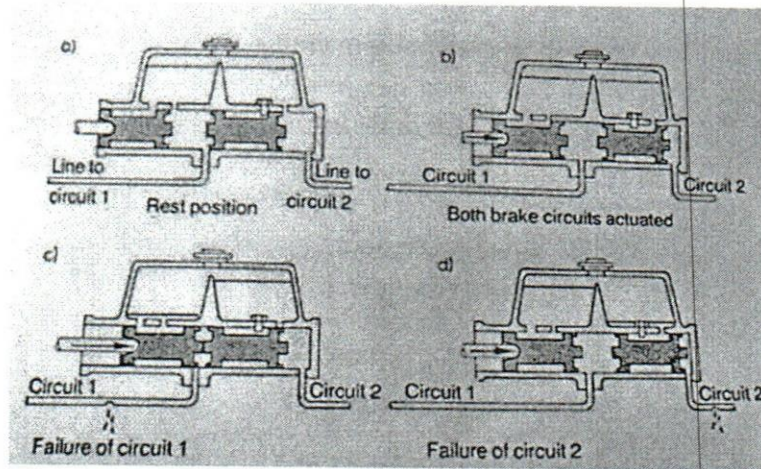


Figure 2- Tandem Master Cylinder

(40 Marks)

6. Identify the Components of a disk brake

(20 Marks)

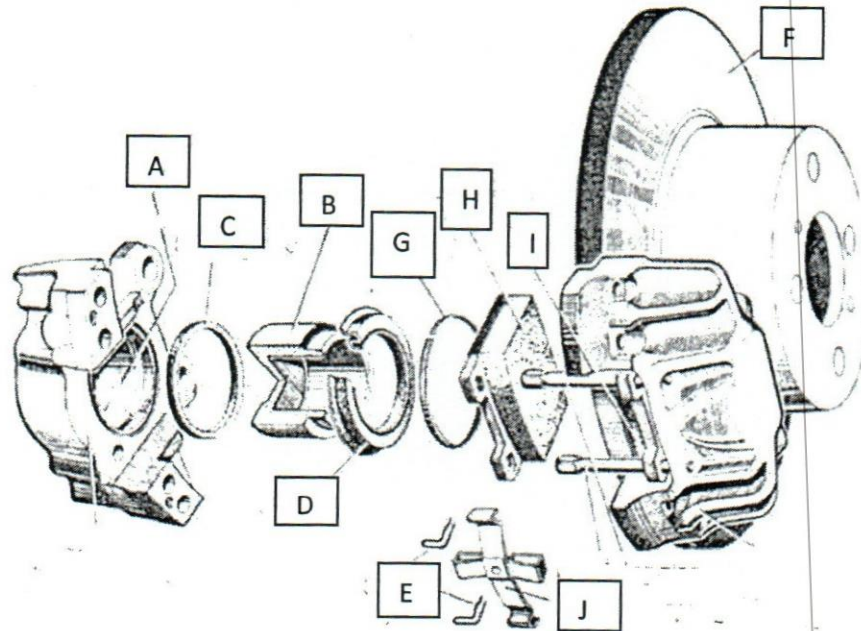


Figure 3 - Exploded view of a disk brake system

QUESTION 04 -Wheel Alignment & Tire Wear

1. What is the difference between “Wheel Alignment” and “Wheel Balancing”?
(10 Marks)

2. What are the 2 types of 4-wheel alignment?
(10 Marks)

3. Define the following terms (use diagrams when needed).

- I. Camber
 - a. Positive Camber
 - b. Negative Camber
- II. Caster
 - a. Negative Caster
 - b. Positive Caster
- III. Toe
 - a. Toe in
 - b. Toe out
- IV. Steering axis inclination
- V. Included Angle
- VI. Scrub Radius
- VII. Set Back
- VIII. Trust Angle

(40 Marks)

4. explain the cause and the corrective actions of the following tire wear pattern

- a. Feathering
- b. One Side Wear
- c. Center Wear
- d. Edge Wear
- e. Cup Wear

(40 Marks)

Data sheet

Drag Force(F_D)

$$F_D = \frac{1}{2} * C_d * A * \rho * V^2$$

 C_d – Drag Coefficient ρ – Air Density A – (Frontal AreaTrust Force(T_F)

$$T_F = \frac{P_t}{V}$$

 V – Velocity P_t – Available PowerHighest Ratio(R_H)

$$V_{max} = \left(\frac{R.P.M * 2 * 3.1416}{60} \right) * \frac{D * 0.0254}{R_H * R_f}$$

 $R.P.M$ – Rev. Per. Minutes @ maximum power D – Wheel Diameter R_f – Differential RatioLowest Ratio (R_H)

$$\frac{F * D * 0.0254 / 2}{T * E_c * R_f}$$

 F – Force due to slope T – Torque E_c – Clutch Efficiency

-The end-



**Faculty of Engineering & Technology
Bachelor of Science Honours in Engineering**

ME2325 STRENGTH OF MATERIALS

FINAL EXAMINATION PAPER (Semester-4)

Date : 06th January 2020
Examiner : Kapila Khemaratne
Time Allowed : Three Hours

INSTRUCTIONS TO CANDIDATES

- This question paper consists of **six** questions.
- Answer all **Six** questions.
- Show all stages of your work
- You should write legibly in black or blue ink
- All questions carry equal marks.

MATERIALS REQUIRED

- Eight-page answer booklets.
- You may use a scientific calculator. This must not be programmable and may be inspected during the examination. Programmable calculators, PDAs and mobile phones are not permitted in the exam.

Q.01 A bar of cross-section 7mm * 7mm is subjected to an axial pull of 7kN. The lateral dimension of the bar is found to be changed to 6.99 mm * 6.99mm. if the modulus of rigidity of the material is 0.8×10^5 N/mm², determine the Poisson's ratio and modulus of elasticity.

Q. 02 An overhanging beam of length 8m carrying uniformly distributed load of 200N/m over a 4m length from extreme right end and 1800 Nm anti-clockwise couple at 2m from left end as shown in **Figure-1**. Draw the shear force and bending moment diagrams for the beam.

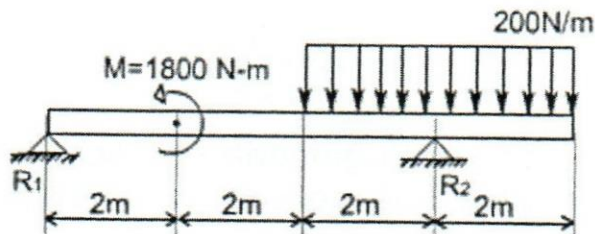


Figure-1

Q.03 A beam is simply supported and carries a uniformly distributed load of 40 kN/m over the whole span. The section of the beam is rectangular having depth as 500mm. If the maximum stress in the material of the beam is 120 N/mm^2 and moment of inertia of the section is $7 \times 10^8 \text{ mm}^4$, find the span (length) of the beam.

Q.04 The shear force acting on a section of a beam is 50 kN. The section of the beam is of T-shaped of dimensions $100 \text{ mm} \times 100 \text{ mm} \times 20 \text{ mm}$ as shown in **Figure-2**. The moment of inertia about the horizontal neutral axis is $314.221 \times 10^4 \text{ mm}^4$. Calculate the shear stress at the neutral axis and at the junction of the web and the flange.

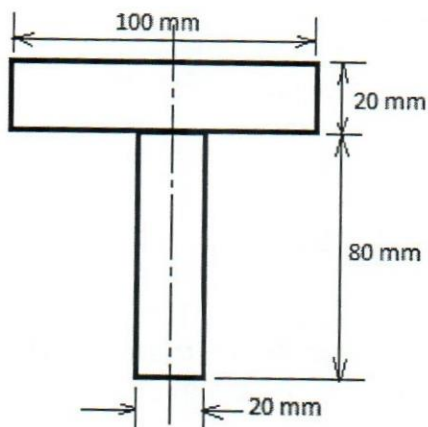


Figure-2

Q.05 A column of timber section $10 \text{ cm} \times 15 \text{ cm}$ is 5 m long both ends being fixed. If the young's modulus for timber = 16 kN/mm^2 , determine;

- Crippling load and
- Safe load for the column if factor of safety = 3.

Q.06 A boiler shell is to be made of 15mm thick plate having a limiting tensile stress of 120 N/mm². If the efficiencies of the longitudinal and circumferential joints are 70% and 30% respectively. Determine;

- The maximum permissible diameter of the shell for an internal pressure of 2 N/mm²,
- Permissible intensity of internal pressure when the shell diameter is 1.5m.

End of Questions

Some useful Formulae

Poisson's ratio, ν = Lateral strain / Longitudinal strain

$$\text{Modulus of rigidity } C = \frac{E}{2(1+\nu)}$$

$$\text{Bending Equation } \frac{M}{I} = \frac{\sigma}{y} = \frac{E}{R}$$

$$\text{Shear stress } \tau = F * \frac{A\bar{y}}{Ib}$$

$$\text{Crippling load for both ends are fixed } P = \frac{4\pi^2}{l^2} EI$$

$$\text{Circumferential stress } \sigma_1 = \frac{p*d}{2\eta_l*t}$$

$$\text{Longitudinal stress } \sigma_2 = \frac{p*d}{4\eta_c*t}$$

Index No:

**Colombo International Nautical & Engineering College
Faculty of Engineering & Technology
Bachelor of Science Honours in Engineering**



CE 2325 SOIL MECHANICS & ENGINEERING GEOLOGY I

EXAMINATION PAPER (Semester-2)

Date : 3rd January 2020
Examiner : Iromi Diyes/Supun Walpita
Time Allowed : 2.5 Hours

Materials Required:

- One eight page answer book, graph paper
- Supplementary materials

Instructions to Students:

- This is a closed book exam.
- Mobile phones are not permitted in the exam
- Approved calculator only.
- You should write legibly in black or blue ink.
- Check your work carefully for inaccurate spelling, punctuation and grammar.
- You may not leave the examination room during the first hour or last 30 minutes of the exam.
- An announcement will be made when there are 30 minutes of the exam time left

1)

- a) With aid of a diagram, show the relationship among the stages of soil consistency and their consistency limits

(10 marks)

- b) Define the term "shrinkage limit"

(10 marks)

- c) The results of the cone penetration test on the portion passing 425 μ m were:

Run	Mass of empty tin (g)	Cone penetration (mm)	Mass of wet soil and tin (g)	Mass of Dry soil and tin (g)
1	20	16	78	70
2	21	19	67	56
3	22	22	79	63
4	21	26	72	54

The results from the plastic limit test were:

Test	Mass of empty tin (g)	Mass of wet soil and tin (g)	Mass of Dry soil and tin (g)
1	52	57.5	56.5
2	51	56.3	55.4

Determine the liquid limit, plastic limit and the plasticity index of the soil

(30 marks)

- d) The soil portion tested in part c) was derived through the sieve analysis given below

Sieve size (mm)	4.75	2	0.85	0.425	0.25	0.15	0.075	Pan
Mass retained on each sieve (g)	0	21	45	96	88	98	60	31

Plot the particle size distribution curve and determine the uniformity coefficient and Coefficient of Curvature of the soil. **(35marks)**

e) Classify and describe the soil sample using provided plasticity chart and classification tables (supplementary data)

(15 marks)

2)

a) Explain why falling head is preferred for clay soils over constant head permeability test **(10 marks)**

b) Explain the nature of hydraulic conductivity of a soil with respect to its degree of saturation **(10 marks)**

c) During a falling head permeability test, the water in the stand-pipe falls from a height of h_1 to a final height h_2 in a time interval t . show that the saturated permeability can be expressed as

$$k = \frac{al}{At} \ln \frac{h_1}{h_2}$$

Whereas

A = cross-sectional area of sample

a = cross-sectional area of stand pipe

l = length of sample.

(30 marks)

d) A falling head permeability test was conducted on a sample with a diameter 84mm and length 100mm. The stand pipe diameter was measured as 3.5 mm. If the test was done to a soil which has a saturated permeability of 3×10^{-6} m/s, find what time would be taken for the head to fall from 150 to 100 cm.

(25 marks)

e) Figure below shows an aquifer inclined at 100 to the horizontal. The difference of water levels in two observation wells at a horizontal distance of 60 m is 5m. Determine the discharge Through the aquifer per unit width if $k = 0.7$ mm/sec. The depth of aquifer normal to the direction of flow is 2. 951m **(25 marks)**

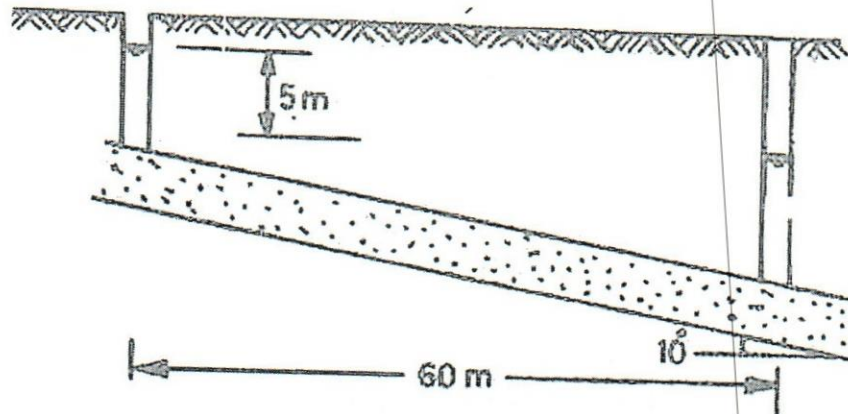


Figure 1

3)

- a) State the factors that affect the degree of compaction (10 marks)
- b) Explain why dry density decreases with moisture content, beyond the wet of optimum water content (10 marks)
- c) The following data have been obtained in a standard laboratory Proctor compaction test

Attempt	1	2	3	4	5	6
Mould + wet soil (g)	2800	3112	3241	3285	3221	3100
M/C (%)	8	10	12	14	16	18

The specific gravity of the soil particles is 2.70. The weight of container is 1100g and its volume is 1000 cm³. Plot the compaction curve and determine

- I. Optimum moisture content and maximum dry density (40 marks)
- II. Void ratio at maximum dry density (10 marks)
- d) A 9m thick layer of sandy silt soil overlies an impermeable bedrock. The initial Groundwater level is at a depth of 2m below the ground surface. Water was pumped out of the soil from a central well at the rate of 400 m³/hr. Two observation wells were setup on a radial line from the center of the main well at distances of 2m and 15m and the top of each well located at same elevation. During pumping the water level in the well nearest to the pump was 3.8 m below ground level and in the furthest well was 2.1m below ground level. Determine an average value for the permeability of the soil in m/s (30 marks)

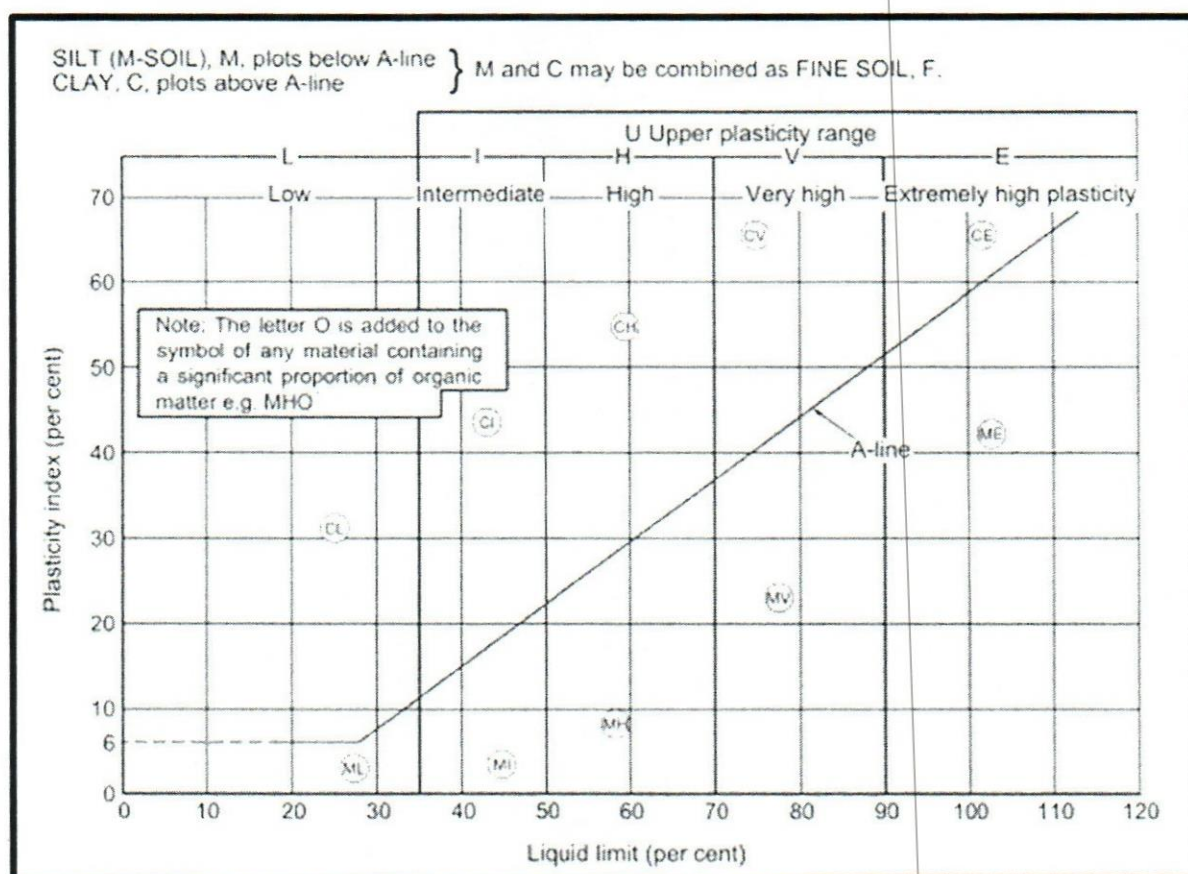
End of questions

Supplementary data

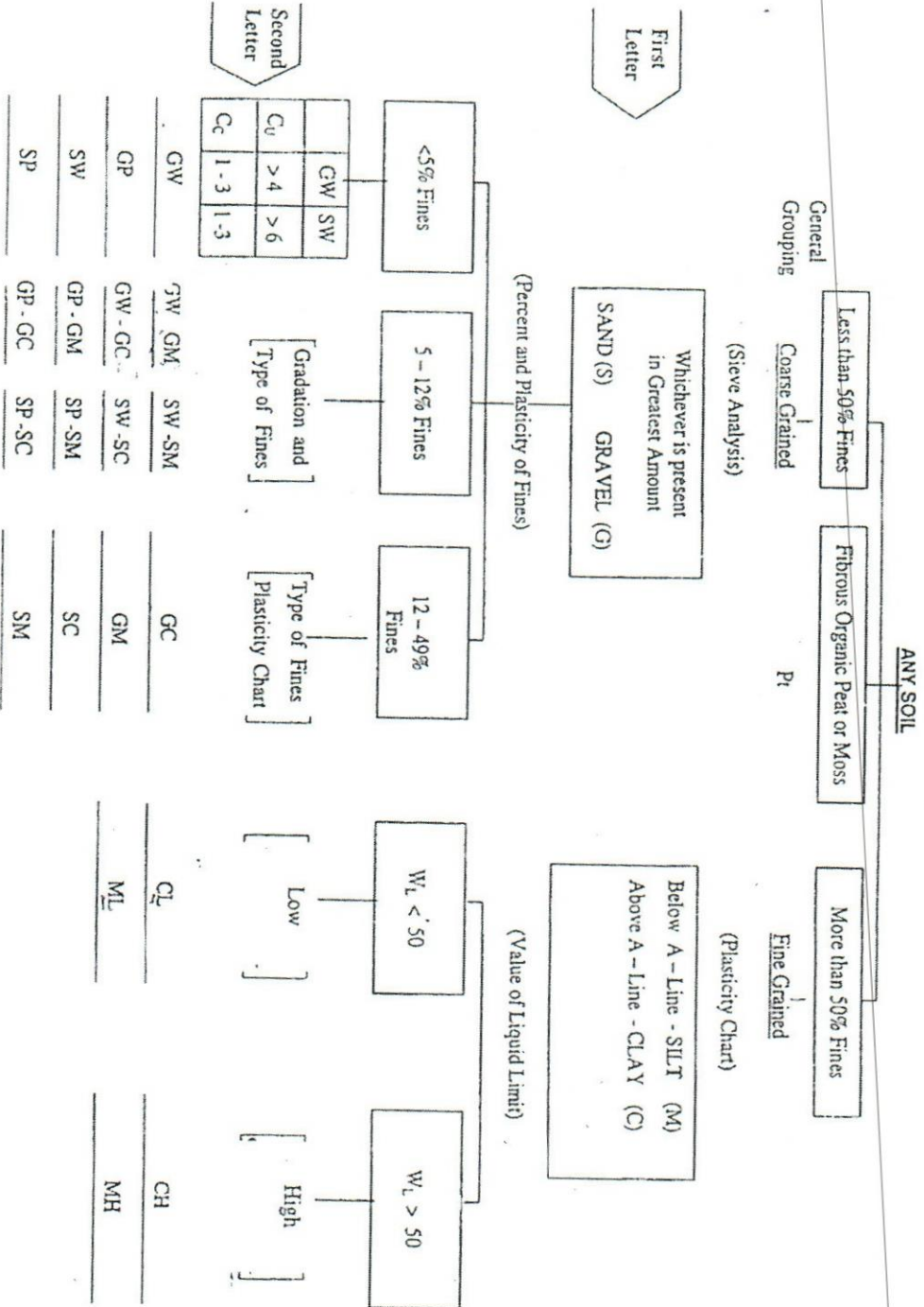
$$k = \frac{al}{At} \ln \frac{h_1}{h_2}$$

$$k = \frac{Ql}{tAh}$$

$$q = Aki$$



UNIFIED SOIL CLASSIFICATION SYSTEM
CLASSIFICATION PROCEDURE



First Letter

<5% Fines	GW	SW
5 - 12% Fines	GW	SW
12 - 49% Fines	GW	SW

Gradation and Type of Fines

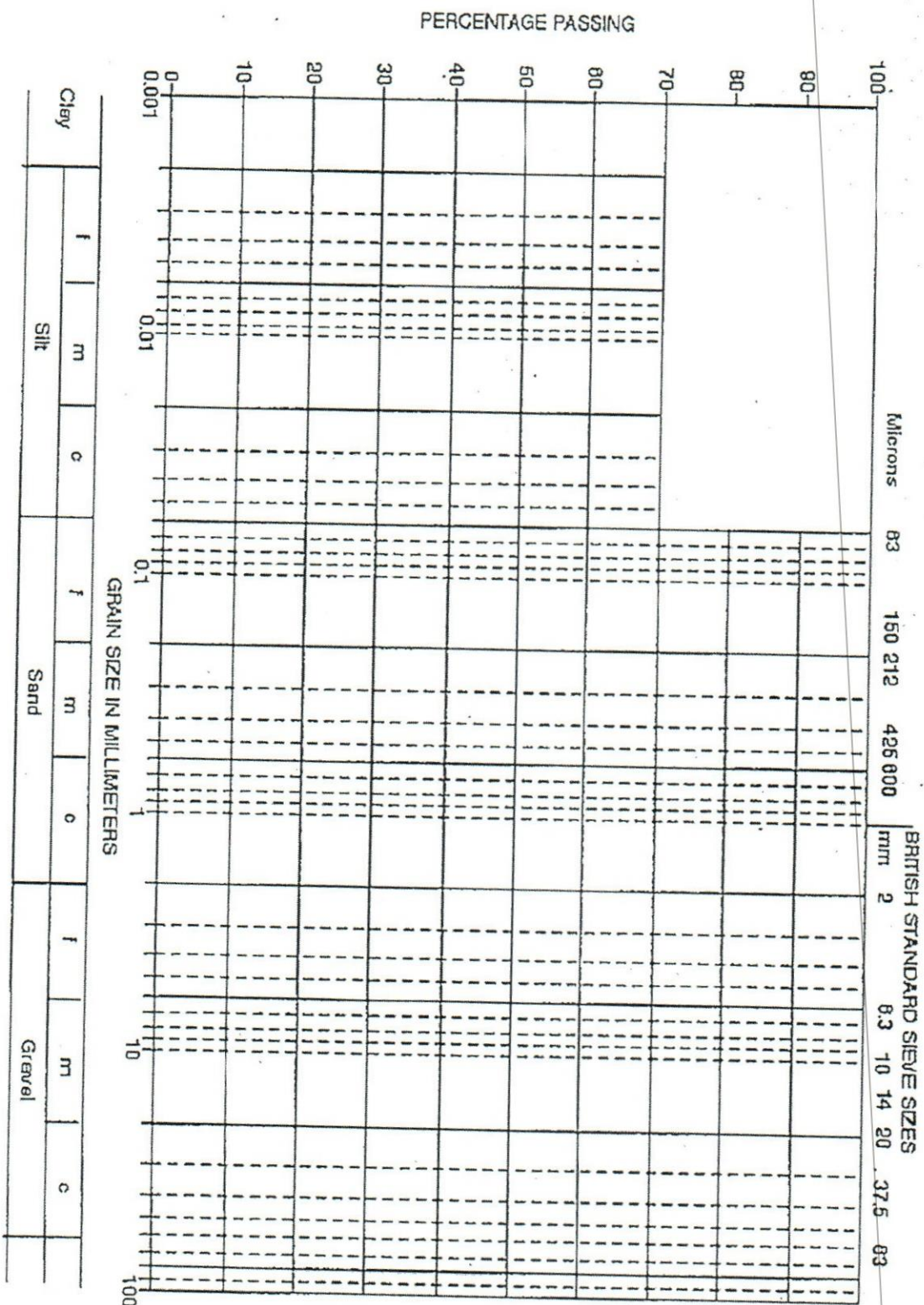
Type of Fines Plasticity Chart

Low

High

Second Letter

GW	GP	SW	SP
GW - GM	GP - GC	SW - SM	SP - SC
GC	GM	SC	SM
CL	ML	CH	MH



00013

ME2323

Final Examination

Dynamics of Mechanical system

CINEC CAMPUS

FACULTY OF ENGINEERING & TECHNOLOGY

BACHELOR OF SCIENCE HONOURS IN ENGINEERING



ME2323 DYNAMICS OF MECHANICAL SYSTEM

FINAL EXAMINATION PAPER (Semester- 4)

Date : 23rd December 2019
Examiner : Mr. Hasitha Wipulaguna
Time Allowed : Three Hours

INSTRUCTIONS TO CANDIDATES

- This question paper consists of **6 questions**.
- Answer **5** questions out of 6.
- You should write legibly in **black or blue ink**.
- Do not take the exam paper or part of it, out of the examination hall.
- Graph papers and exam scripts will be provided.
- Non programmable calculators are allowed.
- This is a closed book exam.
- Any data which is not given should be assumed and clearly mentioned

QUESTION 01

- a) A metallic particle is subject to the influence of a magnetic field as it travels downward through a fluid that extends from plate A to plate B in Figure 1. If the particle is released from rest at the mid point C, $s = 100\text{ mm}$ and the acceleration is $a = (4s) \text{ m/s}^2$. Determine the velocity of the particle when it reaches plate B, $s=200\text{ mm}$ and the time it takes to travel from C to B. [10 marks]

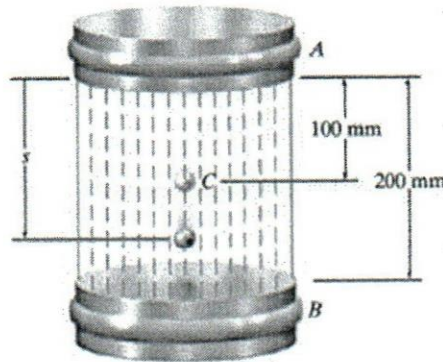


Figure 1

- b) At any instant the horizontal position of the weather balloon in Figure 2 is defined by $x=(8t) \text{ ft}$ where t is in seconds. If the equation of the path is $y = x^2/10$, determine the magnitude and direction of the velocity and the acceleration when $t= 2\text{ s}$. [10 marks]

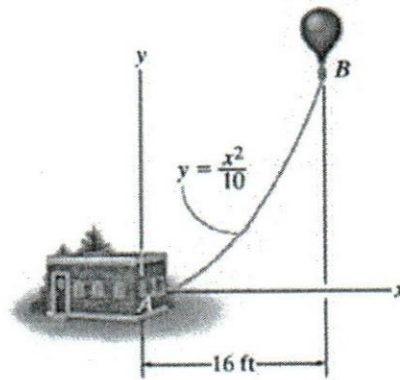


Figure 2

QUESTION 02

- a) A 10kg projectile is fired vertically upward from the ground, with an initial velocity of 50m / s, figure 3. Determine the maximum height to which it will travel if
- Atmospheric resistance is neglected. [5 marks]
 - Atmospheric resistance is Measured as $F_D = 0.01V^2$ Newtons. (V is the speed of the projectile at any instant measured in m/s. [10 marks]

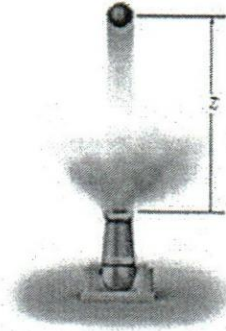


Figure 3

- b) Determine the banking angle θ for the race track so that the wheels of the racing cars will not have to depend upon friction to prevent any car from sliding up or down the track. Assume the cars have negligible size . The cars have a mass m and travel around the curve radius of ρ with a constant speed of v . [5 marks]

QUESTION 03

- a) The gearing of a machine tool is shown in Figure 4. 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 numbers of teeth on each gear are as given below: [5 marks]

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

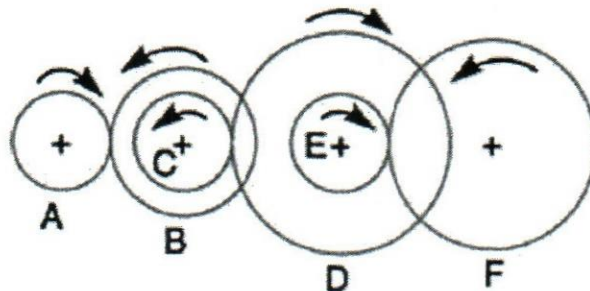


Figure 4

QUESTION 03

- b) In an epicyclic gear train, an arm carries two gears A and B having 36 and 45 teeth respectively. If the arm rotates at 150 r.p.m. in the anticlockwise direction about the centre of the gear A which is fixed, determine the speed of gear B. If the gear A instead of being fixed, makes 300 r.p.m. in the clockwise direction, what will be the speed of gear B? [15 marks]

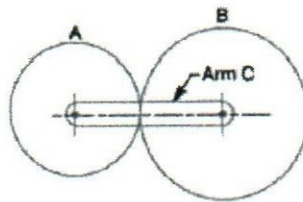


Figure 5

QUESTION 04

The crank and connecting rod of a theoretical steam engine are 0.5 m and 2 m long respectively. The crank makes 180 r.p.m. in the clockwise direction. When it has turned 45° from the inner dead center position, determine :

- i) velocity of piston, [6 marks]
- ii) angular velocity of connecting rod, [4 marks]
- iii) velocity of point E on the connecting rod 1.5 m from the gudgeon pin, [2 marks]
- iv) velocities of rubbing at the pins of the crank shaft, crank and crosshead when the diameters of their pins are 50 mm, 60 mm and 30 mm respectively [4 marks]
- v) position and linear velocity of any point G on the connecting rod which has the least velocity relative to crank shaft. [4 marks]

(Hint: Draw the velocity diagram to Scale)

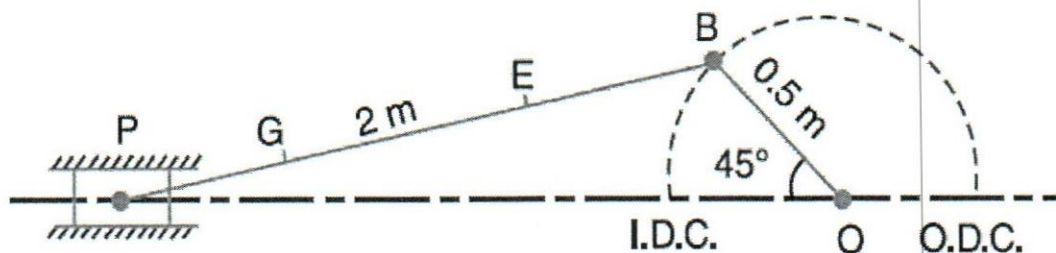


Figure 6

QUESTION 05

- a) A prime mover running at 300 r.p.m drives a D.C generator at 500 r.p.m by a belt drive. Diameter of the pulley on the output shaft of the prime mover is 60cm. Assuming a slip of 3 percent, determine the diameter of generated pulley, if the belt running over is 6mm thick. [10 marks]
- b) A car engine has its rated output of 10 KW. Maximum torque developed is 100 Nm. The clutch used is of single plate type having two active surfaces. Axial pressure is not to exceed 0.85 bar. External diameter of the friction plate is 1.25 times the internal diameter Determine the dimension of the friction plate and the axial force exerted by the springs. Assume uniform wear and $\mu = 0.3$. [10 marks]

QUESTION 06

- a) A mass-spring system has a mass of 3 kg and a stiffness of 300 N/m. If the damping ratio is known to be 0.5 determine for the system:
(i) the natural frequency
(ii) the damped frequency [10 marks]
- b) A mass of 10 kg is mounted with a damper on a spring of stiffness 5000 N/m. Measurement shows that the damped frequency is 3 Hz. Calculate for the damper:-
(i) the damping ratio
(ii) the damping coefficient [10 marks]

Useful formulae

$$dS = v dt$$

$$v dv = a ds$$

$$v = u + at$$

$$v^2 = u^2 + 2as$$

$$F = m a$$

$$\text{Speed ratio} = \frac{\text{Speed of driver}}{\text{Speed of driven}} = \frac{\text{No. of teeth on driven}}{\text{No. of teeth on driver}}$$

Conditions of motion	Revolutions of elements		
	Arm C	Gear A	Gear B
Arm fixed-gear A rotates through +1 revolution i.e. 1 rev. anticlockwise	0	+1	$-\frac{T_A}{T_B}$
Arm fixed-gear A rotates through +x revolutions	0	+x	$-x\frac{T_A}{T_B}$
Add +y revolutions to all elements	+y	+y	+y
Total motion	+y	+x+y	$y - x\frac{T_A}{T_B}$

Table 1 : Table of motions

Rubbing velocity at the pin joint = $\omega.r$

$$\frac{N_2}{N_1} = \frac{t + d_1}{t + d_2} \left(\frac{100 - s}{100} \right)$$

00013

ME2323

Final Examination

Dynamics of Mechanical system

$$p.r = c$$

$$W = 2\pi c(r_1 - r_2)$$

$$T = \frac{\mu W(r_1 + r_2)}{2}$$

$$2\zeta\omega_n = \frac{c}{m}$$

$$\omega_n^2 = \frac{k}{m}$$

$$\frac{d^2x}{dt^2} + \omega^2 x = 0$$

$$\frac{d^2x}{dt^2} + \frac{c}{m} \frac{dx}{dt} + \frac{k}{m} x = 0$$

ME1324

Lehmann
Re-sit examination

Workshop Practice

**COLOMBO INTERNATIONAL NAUTICAL & ENGINEERING
COLLEGE**

**FACULTY OF ENGINEERING & TECHNOLOGY
BACHELOR OF SCIENCE HONOURS IN ENGINEERING**

ME1324- Workshop Practice

RE-SIT EXAMINATION PAPER (Semester-2)



Date : 30th January 2019

Examiner : Virantha E.A.I

Time Allowed : Three Hours

INSTRUCTIONS TO CANDIDATES

- Answer **all** questions.
- You should write legibly in black or blue ink.
- Non programmable calculators are allowed.
- Closed book examination.
- All questions carry equal marks.
- Any data which is not given should be assumed and clearly mentioned.

Q1.	<p>(a) List the five potential hazards that exist in a mechanical machining workshop with relevant to the following operations.</p> <ul style="list-style-type: none">i. Lathe machine operations.ii. Milling machine operations. <p style="text-align: right;">(20 marks)</p> <p>(a) Explain the functional difference between the three jaw chuck and the four jaw chuck use in the lathe machine operations.</p> <p style="text-align: right;">(30 marks)</p> <p>(b) The following data relate to an orthogonal cutting process</p> <p>Chip length obtained-----96mm Uncut chip length-----240mm Rake angle used-----20° Depth of cut-----0.6mm Horizontal(Cutting force) and vertical(Thrust force) component of cutting force 400N and 240N respectively</p> <p>Determine the followings</p> <ul style="list-style-type: none">i. Chip thicknessii. Shear plane angleiii. Friction angleiv. Shear force <p style="text-align: right;">(50 marks)</p>	(100%)
-----	---	--------

Q2.	<p>(a) What are the types of tool wear and describe.</p> <p>(b) How the temperature is effected to the tool wear in each case</p> <p>(c) A mild steel work piece is being machined by two different tools A and B under identical machining condition. The tool life equation for these tools are For tool -A $VT^{0.32} = 42.5$ For tool -B $VT^{0.45} = 88.6$ Where V and T are in m/s and s respectively Determine the cutting speed above which tool B will give better tool life.</p>	<p>(20marks)</p> <p>(30 marks)</p> <p>(50 marks)</p>	<p>(100%)</p>
Q3.	<p>(a) What are the furnaces are used to melt metals in casting operations and explain with diagrams.</p> <p>(b) Compare and contrast the following casting Processes. i. Centrifugal casting. ii. Investment casting iii. Die casting.</p> <p>(c) What will be the solidification time for a 1100mm diameter and 33 mm thick casting of aluminium if the mold constant is 2.2 sec/mm².</p>	<p>(20 marks)</p> <p>(30 marks)</p> <p>(50 marks)</p>	<p>(100%)</p>

Q4.

(a) Figure Q4(a) shows a conventional Milling machine. Name the components A to J given in the figure. (20 marks)

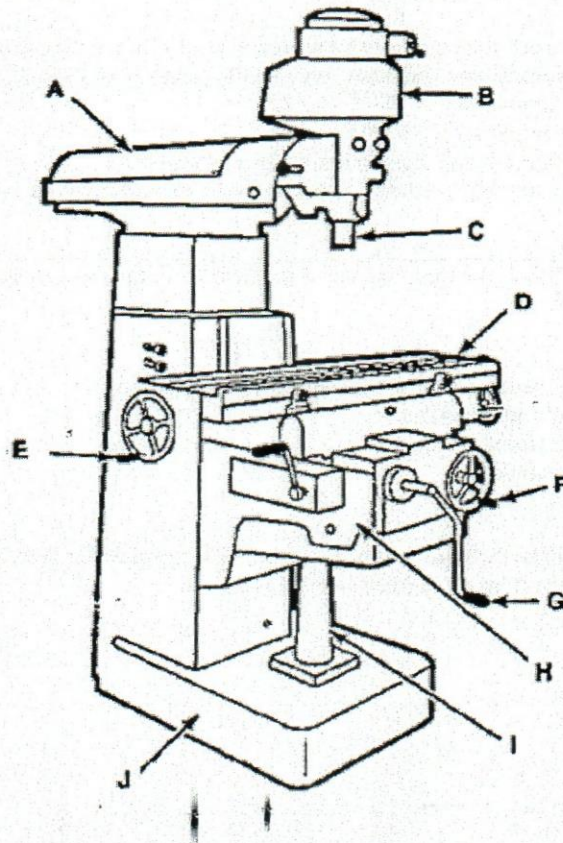


Figure Q4(a)

(b) Explain the **up milling** operation and **down milling** operation and discuss the advantages and dis-advantages in both cases. (30 marks)

(c) The following data is refers to the orthogonal slab milling operation

Cutter diameter = d in
 Number of cutting edge = n
 Cutter rotational speed = N r.p.m
 Depth of cut = a in
 Feed rate = v in/min

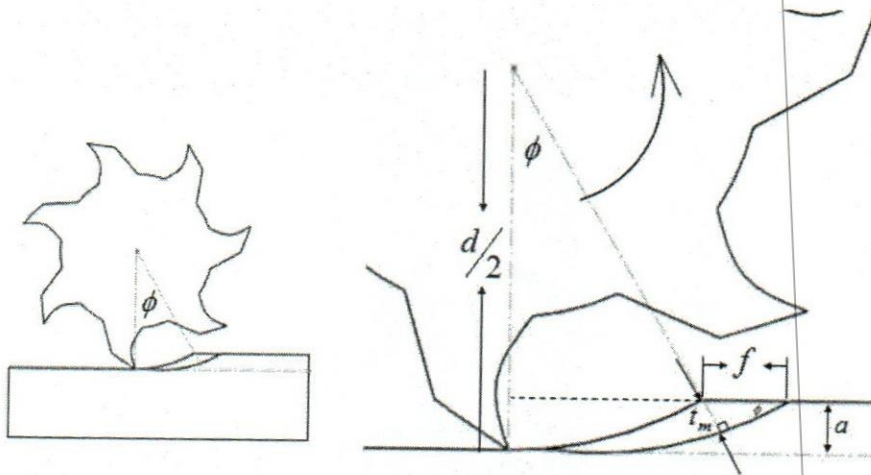


Figure Q4(c)

- i. Obtain an expression for feed per cutting edge(f).
- ii. Obtain an expression for maximum chip thickness(t_m)

(100%)

(50 marks)

Library

ME1324

Final examination

Workshop Practice

**COLOMBO INTERNATIONAL NAUTICAL & ENGINEERING
COLLEGE
FACULTY OF ENGINEERING & TECHNOLOGY
BACHELOR OF SCIENCE HONOURS IN ENGINEERING
ME1324- Workshop Practice
FINAL EXAMINATION PAPER (Semester-2)**



**Date : 28th November 2018
Examiner : Virantha E.A.I
Time Allowed : Three Hours**

INSTRUCTIONS TO CANDIDATES

- Answer all questions.
- You should write legibly in black or blue ink.
- Non programmable calculators are allowed.
- Closed book examination.
- All questions carry equal marks.
- Any data which is not given should be assumed and clearly mentioned.

47

Q1.

- (a) Assign the suitable machine tool types to machining the following components and geometries.
- Gear wheel
 - Stepped shaft with fillet corner
 - Key way in sprocket
 - Key way in shafts
 - Screw threads

(20 marks)

- (b) Figure Q1b Shown a square head bolt, plan and explain the sequence of operations required to produce this component.

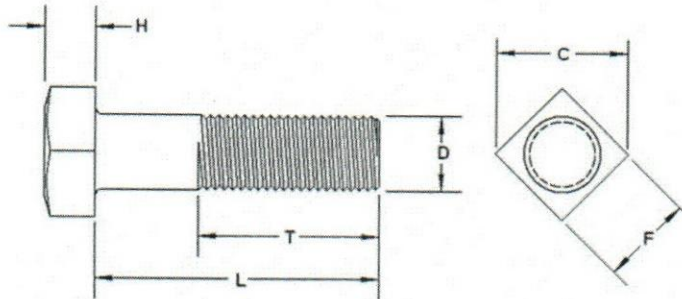


Figure Q1(b)

(30 marks)

- (c) In an orthogonal turning operation the following data were obtained.

Chip thickness= 0.45mm.

Depth of cut =0.3mm

With of cut= 2.5mm

Feed= 0.25mm/rev

Cutting force= 1130N.

Thrust force= 295N.

Cutting speed= 150 m/min.

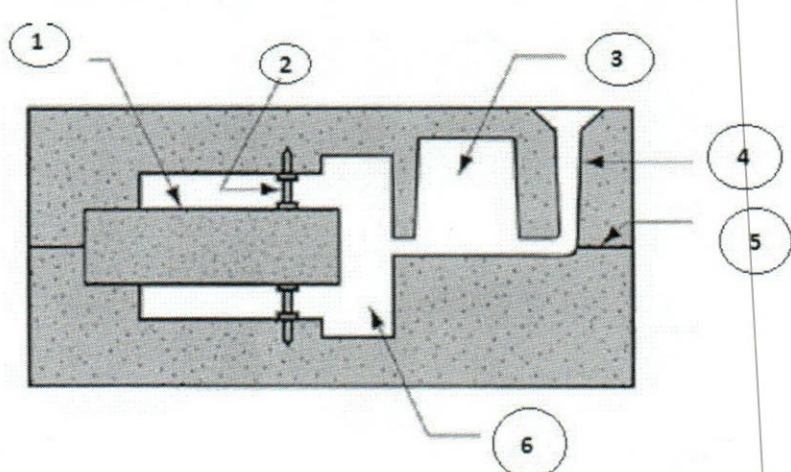
Rake angle= $+10^\circ$

Determine the followings

- Chip thickness ratio.
- Shear angle.
- Velocity of chip along tool face.

(50 marks)

(100%)

<p>Q2.</p>	<p>(a) What are the type of tool failure and describe. (20 marks) (b) What are the type of tool wear and describe. (30 marks) (c) A carbide tool with mild steel work-piece was found to give tool life of 2 hours while cutting at 48m/min. If Taylor's exponent $n=0.27$, determine i. The tool life if the same tool is used at a speed of 20 percent higher than the previous one. ii. The value of cutting speed if the tool is required to have tool life of 3 hours (50 marks)</p>	<p>(100%)</p>
<p>Q3.</p>	<p>(a) Figure Q3(a) shows a cross-section of a sand mold. Name the components one to six given in the figure. (20 marks)</p>  <p style="text-align: center;">Figure Q3(a)</p> <p>(b) Compare and contrast the following casting Processes. i. Centrifugal casting. ii. Investment casting iii. Die casting. (30 marks)</p> <p>(c) Calculate the ratio of solidification times of two steel cylindrical risers of size 36cm in diameter by 72cm height and 72cm in diameter by 36cm in height subjected to identical conditions of cooling. (50 marks)</p>	<p>(100%)</p>

47

Q4.

(a) Figure Q4(a) shows a conventional centre lathe machine. Name the components one to ten given in the figure. (20 marks)

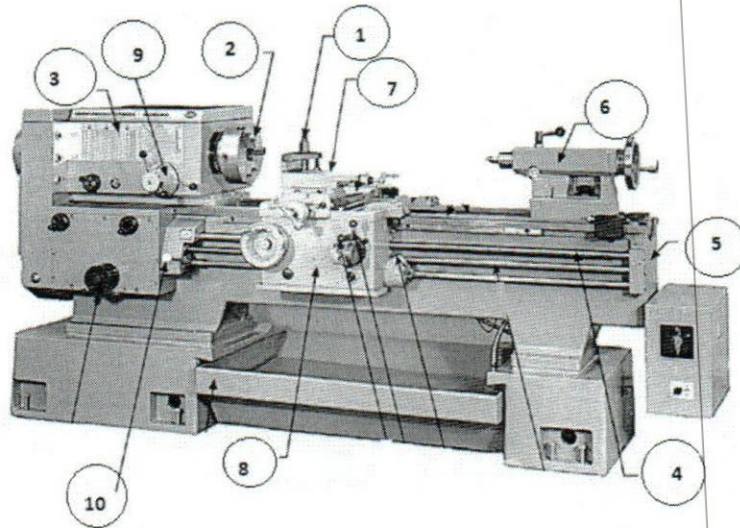


Figure Q4(a)

(b) Name the 12 operations can done on Lathe machine. (30 marks)

(c) Calculate the changings gears and sketch the gear train for cutting the following screws on a lathe machine with Lead-screw of 6mm pitch. (Assume the lathe machine is equipped with a set of gears ranging from 20T to 120T in steps of 5 and 127T gear wheel)

- i. 6.25mm pitch
- ii. 1/16 in pitch.
- iii. 2.25 TPI pitch

(50 marks)

(100%)

Library

06



Colombo International Nautical and Engineering College
Faculty of Engineering & Technology

EXAMINATION PAPER

Module Code : EE1326
Module Title : ELECTRONICS
Academic Year : Semester 2/2018
Date : 26th November 2018
Examiners : Srimal Punchihewa
Time Allowed : 3 Hours

INSTRUCTIONS TO CANDIDATES

- This is a closed book examination
- Please select any four questions. All questions carry equal marks
- Each question should be answered starting on a separate page

MATERIAL REQUIRED

- Two six-page answer booklets
- You may use a scientific calculator. This must not be programmable type and may be inspected during the examination

1. (a) Show all the steps and convert decimal 41 to binary. (15 marks)
- (b) Show all the steps and convert $(0.6875)_{10}$ to binary. (15 marks)
- (c) A certain digital processor uses a keypad for uploading numbers to it. The keypad is having only three keys, namely 0, 1 and the symbol “.”
- The decimal number 455.109375 is to be entered to the digital processor.
- Find the keypad sequence for entering the number. Please show all the steps enabling you to score maximum marks. (25 marks)
- (d) A certain digital computer uses a computer language for its software which requires all operands (numbers, memory addresses etc) to be inserted as hexadecimal quantities.
- The decimal number 4522239.05859375 is to be included as an operand in the above software program.
- Convert the decimal number to hexadecimal. (25 marks)
- (e) Convert the binary number 10001010000.11111111 to hexadecimal avoiding conversion of the binary number to decimal and then to hexadecimal (20 marks)

2. (a) Simplify the following Boolean expressions using three-variable maps 06
- i. $F(x, y, z) = \sum(1, 2, 3, 6, 7)$ (15 marks)
- ii. $A'B + BC' + B'C'$ (20 marks)

- (b) Simplify the following Boolean expressions using four-variable maps
- i. $F(A, B, C, D) = \sum(0, 2, 4, 5, 6, 7, 8, 10, 13, 15)$ (15 marks)
- ii. $AB'C + B'C'D' + BCD + ACD' + A'B'C + A'BC'D$ (20 marks)

- (c) Rearrange the following expression using Boolean algebra and draw a logic diagram to implement it using only two-input NAND gates
- $(AB + A'B')(CD' + C'D)$ (30 marks)

3. (a) Draw a Bohr model of an atom showing electrons in orbits around the nucleus, which consists of protons and neutrons. (10 marks)

- (b) Write short notes on the following.

Your brief notes should cover their ability to conduct electricity under normal conditions, types of material which constitute them, how valence electrons are bound to the nucleus and energy band diagrams.

- i. Insulator
ii. Semiconductor
iii. Conductor

(30 marks)

- (c) Draw a diagram showing an impurity atom in a silicon crystal structure producing an n-type semiconductor.
Name majority carriers and minority carriers in this semiconductor and state how they are generated. (20 marks)
- (d) Draw a diagram showing an impurity atom in a silicon crystal structure producing an p-type semiconductor.
Name majority carriers and minority carriers in this semiconductor and state how they are generated. (20 marks)
- (e) Using suitable sketches explain briefly how Electron and hole currents flow when a voltage is applied to intrinsic silicon (20 marks)
4. (a) Draw the complete V-I characteristics of a diode and name important areas and important parameters. (10 marks)
- (b) Draw suitable diagrams illustrating the ideal diode model and draw the ideal V-I characteristics (10 marks)
- (c) Draw suitable diagrams illustrating the practical diode model and draw the practical model V-I characteristics for silicon (15 marks)
- (d) Draw suitable diagrams illustrating the complete model of a diode and draw the V-I characteristics of complete model for silicon (15 marks)

(e)

1) Determine the forward voltage and forward current for the diode in Figure 4.1 (a) for each of the diode models. Also, find the voltage across the limiting resistor in each case. Assume $r'_d = 10 \Omega$ and determine the value of forward current

(25 marks)

2) Determine the reverse voltage and reverse current for the diode in Figure 4.1 (b) for each of the diode models. Also, find the voltage across the limiting resistor in each case. Assume $I_R = 1 \mu A$

(25 marks)

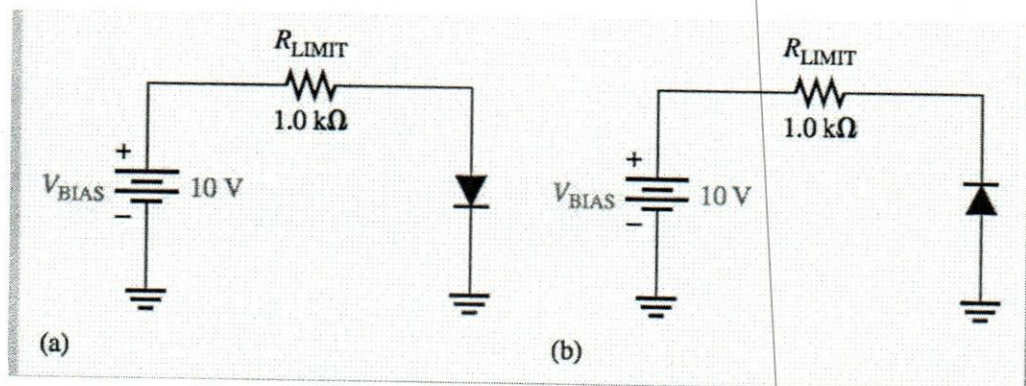


Figure 4.1

5. (a) Draw sketches showing the bias arrangement for npn and pnp transistors for operation as amplifiers. Indicate how base-emitter and base-collector junctions should be biased.

(30 marks)

(b) Determine I_B , I_C , I_E , V_{BE} , V_{CE} , and V_{CB} in the circuit of Figure 5.1. The transistor has a $\beta_{DC} = 150$.

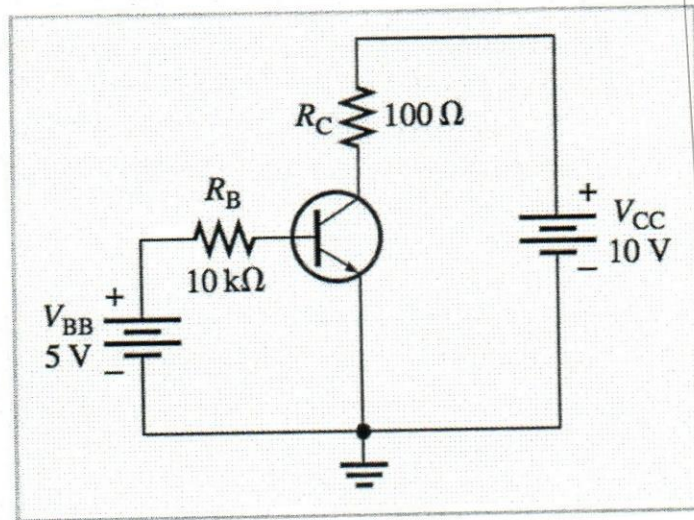


Figure 5.1

(35 marks)

- (c) Determine V_{CE} and I_C in the voltage-divider biased transistor circuit of Figure 5.2 if $\beta_{DC} = 100$

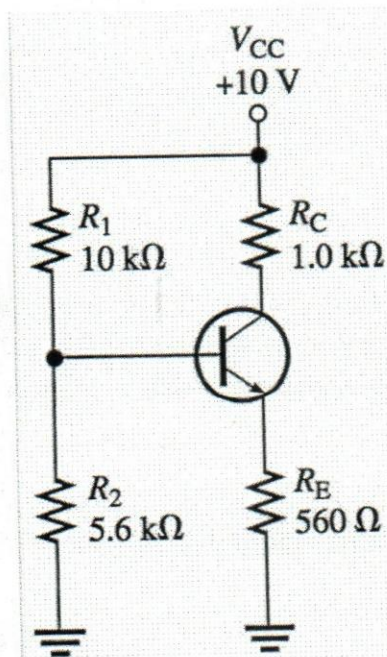


Figure 5.2

(35 marks)

6. (a) Using suitable sketches state the characteristics of an ideal operational amplifier (10 marks) 06
- (b) Draw the sketch of a non-inverting amplifier using an ideal operational amplifier. Calculate the closed loop gain. Please show all the steps. (20 marks)
- (c) Draw the sketch of an inverting amplifier using an ideal operational amplifier. Calculate the closed loop gain. Please show all the steps. (20 marks)
- (d) Use first principles to determine the closed-loop voltage gain of the amplifier in Figure 6.1. The Op-amp is ideal.

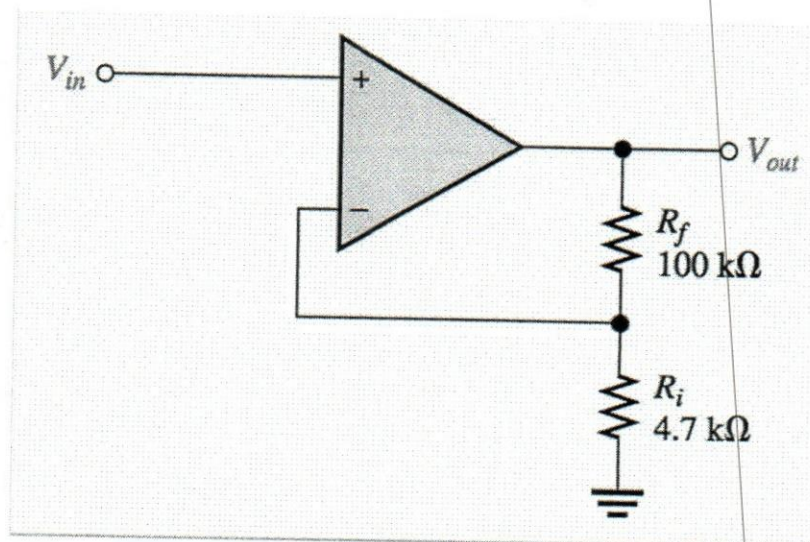


Figure 6.1

(25 marks)

- (e) Given the Op-amp configuration in Figure 6.2, use first principles to determine the value of R_f required to produce a closed-loop gain of -100 . The Op-amp is ideal.

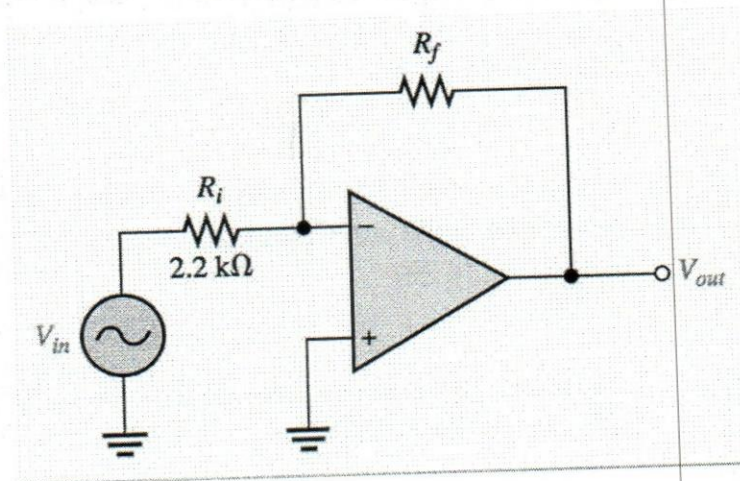


Figure 6.2

(25 marks)



COLOMBO INTEERNATIONAL NAUTICAL & ENGINEERING COLLEGE
FACULTY OF ENGINEERING & TECHNOLOGY

BACHELOR OF SCIENCE HONOURS IN ENGINEERING

PROGRAMMING FUNDEMENTAL
MODULE CODE:EE1325
PRACTICAL PAPER 01A

Date: 17/09/2019

Time allocated: 01Hr

INSTRUCTIONS

- This is a close book practical exam.
- This paper consists of two (02) questions and answer both Question 01 and 02.
- Make sure the answer scripts are saved as indicated below:
 1. Create a New Folder in the Desktop. Rename the New Folder as EE1325_Student ID. Save your answers inside EE1325_Student ID folder.
- Use separate source files for each question.

Question 01

- (a) Write a program to display the total of two numbers. Go through bellow steps.
1. Use correct header file (05 marks)
 2. Declare two integer type variables and assign values. (10 marks)
 3. Write the equation to get the sum of above values. (05 marks)
 4. Write the equation to get the multiplication of above values (05 marks)
 5. Display the output.
Ex: $50 + 20 = 70$
 $50 * 20 = 1000$ (20 marks)
 6. Save your program as **Question1.c** (05 marks)

Question 02

- (b) You have been asked to implement a program to check the weather condition. You should be able to print the output according to the temperature ($^{\circ}\text{C}$) value. Use following outputs for temperature values.

Temperature ($^{\circ}\text{C}$)	Output
≥ 35	Hot
≥ 28	Warm
≥ 20	Cool
≥ 0	Cold

1. Declare the variable.
2. Give the command to user to insert temperature value
3. Use keyboard to input temperature value.
4. Print the output using if-else if- else conditions
5. Save your program as **Question2.c**

(05 marks)

(05 marks)

(10 marks)

(25 marks)

(05 marks)