

Sylhet Engineering College, Sylhet
 (Shahjalal University of Science & Technology)
 Department of Electrical & Electronic Engineering

Final Examination, 2023
 Course No: EEE 301
 Time: 03 (Three) hours

2nd year 1st Semester
 Course Title: Electronics I
 Full Marks: 60

N.B. : (i) Answer any three questions from each PART
 (iii) Marks allotted are indicated in the margin

(ii) Use separate answer scripts for each PART
 (iv) Special Instruction (if any)-----N/A-----.

PART-A

(Answer any **three** questions)

1. (a) Write short notes on the following : 03
 - (i) Breakdown voltage
 - (ii) Knee voltage
- (b) What do you understand by intrinsic and extrinsic semiconductors? 03
- (c) An AC voltage of peak value 20 V is connected in series with a silicon diode and load resistance of 500 ohm. If the forward resistance of diode is 10 ohm, find :i) peak current through diode (ii) peak output voltage 04
2. (a) Describe a half-wave rectifier using a crystal diode. 05
- (b) Derive an expression for the efficiency of a half-wave rectifier. 05
3. (a) What is Clipper circuit ? Determine v_o for the network of Fig. 3(a) 05

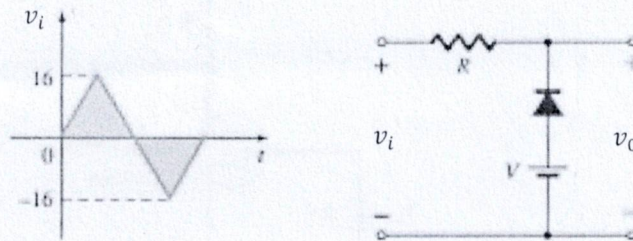


Fig. 3(a)

- (b) Describe the action of the following filter circuits : (i) capacitor filter (ii) choke input filter (iii) capacitor input filter 05
- 4 (a) What is Clamper circuit? 02
- (b) What is Zener Diode? Discussed the characteristics of Zener diode 04
- (c) For the circuit shown in Fig. 4(c), find the maximum and minimum values of zener diode current. 04

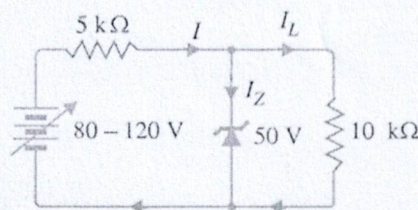


Fig. 4(c)

PART-B

(Answer any **three** questions)

5. (a) Write short notes on the following : 04
(i) Transistor as a switch
(ii) d.c. load line
- (b) Explain the operation of transistor as an amplifier. 06
6. (a) Define β . Show that : $\beta = \frac{\alpha}{1-\alpha}$ 05
- (b) In the circuit diagram shown in Fig. 6(b), if $V_{CC} = 12V$ and $R_C = 6 k\Omega$, draw the d.c. load line. What will be the Q point if zero signal base current is $20\mu A$ and $\beta = 50$? 05

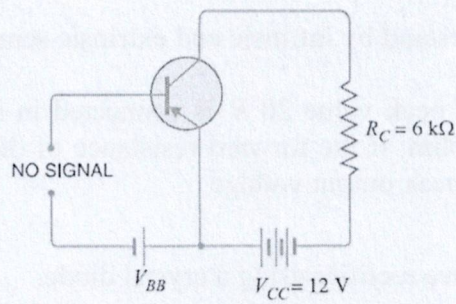


Fig. 6(b)

7. (a) Determine the value of drain current for the circuit shown in Fig. 7(a). 04

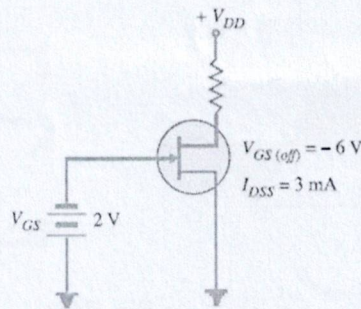


Fig. 7(a)

- (b) Briefly describe some practical applications of JFET. Why JFET is called “Field Effect Transistor”? 06
8. (a) What is MOSFETS? Discuss the Types of MOSFETs and draw their symbols. 04
- (b) Discuss the working principle of E-MOSFET. 06

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Final Examination, 2023

Course No: HUM 301

Time: 03 (Three) hours

2nd year 1st Semester

Course Title: English Language

Full Marks: 60

N.B.: (i) Answer all the questions from each PART.

(ii) Use separate answer scripts for each PART

(iii) Marks allotted are indicated in the margin

(iv) Special Instruction (if any)-----N/A-----

PART-A

(Answer all the questions)

Read the following passage and answer the questions below.

Fishbourne Roman Palace is located in the village of Fishbourne, West Sussex, England. This large palace was built in the 1st century AD, around thirty years after the Roman conquest of Britain, on the site of Roman army grain stores, which had been established after the invasion, in the reign of the Roman Emperor Claudius in 43 AD. The rectangular palace was built around formal gardens, the northern half of which have been reconstructed. There were extensive alterations in the 2nd and 3rd centuries AD, with many of the original black and white mosaic floors being overlaid with more sophisticated coloured ones, including a perfectly preserved mosaic of a dolphin in the north wing. More alterations were in progress when the palace burnt down in around 270 AD, after which it was abandoned.

Local people had long believed that a Roman palace once existed in the area. However, it was not until 1960 that the archaeologist Barry Cunliffe, of Oxford University, first systematically excavated the site, after workmen had accidentally uncovered a wall while they were laying a water main. The Roman villa excavated by Cunliffe's team was so grand that it became known as Fishbourne Roman Palace and a museum was erected to preserve some of the remains. This is administered by the Sussex Archaeological Society.

In its day, the completed palace would have comprised four large wings with colonnaded fronts. The north and east wings consisted of suites of private rooms built around courtyards, with a monumental entrance in the middle of the east wing. In the north-east corner, there was an assembly hall. The west wing contained state rooms, a large ceremonial reception room, and a gallery. The south wing contained the owner's private apartments. The palace included as many as 50 mosaic floors, under-floor central heating, and a bathhouse. In size, Fishbourne Palace would have been approximately equivalent to some of the great Roman palaces of Italy, and was by far the largest known Roman residence north of the European Alps, at about 500 feet (150m) square. A team of volunteers and professional archaeologists are involved in an ongoing archaeological excavation on the site of nearby, possibly military, buildings.

The first buildings to be erected on the site were constructed in the early part of the conquest in 43 AD. Later, two timber buildings were constructed, one with clay and mortar floors and plaster walls, which appears to have been a house of some comfort. These buildings were demolished in the 60s AD and replaced by a substantial stone house, which included colonnades, and a bath suite. It has been suggested that the palace itself, incorporating the previous house in its south-east corner, was constructed around 73–75 AD. However, Dr. Miles Russell, of Bournemouth University, reinterpreted the ground plan and the collection of objects found and has suggested that, given the extremely close parallels with the imperial palace of Domitian in Rome, its construction may more plausibly date to after 92 AD. With regard to who lived in Fishbourne Palace, there are a number of theories; for example, one proposed by Professor Cunliffe is that in its early phase, the palace was the residence of Tiberius Claudius Cogidubnus, a local chieftain who supported the Romans and who may have been installed as king of a number of territories following the first stage of the conquest. Cogidubnus is known from a reference to his loyalty in *Agricola*, a work by the Roman writer Tacitus, and from an inscription commemorating a temple dedicated to the gods Neptune and Minerva found in the nearby city of Chichester. Another theory is that it was built for Sallustius Lucullus, a Roman governor of Britain of the late 1st century, who may have been the son of the British prince Adminius. Two inscriptions recording the presence of Lucullus have been found in Chichester, and the redating by Miles Russell of the palace was designed for Lucullus, then it may have only been in use for a few years, as the Roman historian Suetonius records that Lucullus was executed by the Emperor Domitian in or shortly after 93 AD.

1. **Identify True/ False/ Not Given from the passage: -** 5×2= 10
- I. Fishbourne Palace was the first structure to be built on its site.
 - II. Fishbourne Palace was renovated more than once
 - III. Fishbourne Palace was large in comparison with Roman palaces in Italy.
 - IV. Research is continuing in the area close to Fishbourne Palace.
 - V. Researchers agree on the identity of the person for whom Fishbourne Palace was constructed.

2. **Choose ONE WORD AND/OR A NUMBER from the passage for each answer Fishbourne Palace** 5×1= 5

Construction

- The first buildings on the site contained food for the i)
- The palace building surrounded ii)
- In the 2nd and 3rd centuries colour was added to the iii) of the palace.

Discovery

- The first part of the palace to be found was part of a iv).....

Possible inhabitants

- Congidubnus -he is named in several writings
- Sallustius Lucullu-he may have lived there until approximately v) AD
- Verica -a British king

3. **Write down the summary of the passage.** 05

4. (A) **Fill in the blanks with appropriate verbs:** 5×1= 5

- i) After I (finish) ---- the work, I went to bed
- ii) If I had a lot of money, I (help) ---- the poor.
- iii) You are used to (work) --- ten hours a day.
- iv) Jerry (to be) --- at the orphanage since he was four.
- v) While (take) ---- dinner, he received the phone.

- (B) **Change the sentences as directed** 5×1= 5

- i) His behaviour surprised me. (Passive)
- ii) Despite being rich, he leads a poor life. (Compound)
- iii) Work hard and you will succeed. (Simple)
- iv) He said to me, "let me come in" (indirect)
- v) My mother said, "May God bless you." (indirect)

PART-B

(Answer all the questions)

5. Suppose you are a reporter of a national daily. Write a report for the newspaper on recent price hike. Now write a report on it. 10
6. Discuss Anita Desai's treatment of child psychology in her short story "Games at Twilight". 10
7. Global warming is one of the biggest threats humans face in the 21st Century and sea levels are continuing to rise at alarming rates. 10
What problems are associated with this and what are some possible solutions?

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Department of Electrical & Electronic Engineering

Final Examination, 2023

Course No: **EEE 303**

Time: **03 (Three) hours**

2nd year 1st Semester

Course Title: : **Energy Conversion I**

Full Marks: 60

N.B. : (i) Answer any three question from each PART

(ii) Use separate answer scripts for each PART

(iii) Marks allotted are indicated in the margin

(iv) Special Instruction (if any)-----N/A-----

PART-A

(Answer any **three** questions)

1. (a) Draw the vector diagram transformer when it's loaded as non-inductively, inductively & capacitively. Ignore magnetic leakage. 04
- (b) From elementary theory of ideal transformer explain that only one flux exist on transformer core. 04
- (c) The maximum flux density in the core of a 250/3000-volts, 50-Hz single-phase transformer is 1.2 Wb/m^2 . If the e.m.f. per turn is 8 volt, determine (i) primary and secondary turns (ii) area of the core. 02
2. (a) How can we increase the starting torque of 3 phase induction motor? 02
- (b) **200/400V** single phase transformer has following test data: 06
OC test: 200V, 0.7A, 70W on LV side
SC test: 15V, 10A, 85W on HV side
When delivering **5kw** at pf **0.8** lagging primary voltage being **200V** find (i) Secondary terminal voltage (ii) voltage regulation (iii) efficiency
- (c) Define self-induction, mutual induction, eddy current, hysteresis loss. 02
3. (a) Why 3phase induction motor is started in star connection & run in delta? 03
- (b) Explain the production of rotating magnetic of 3 phase induction motor while supplying power to only two phase of that motor. 05
- (c) A 3-phase, 400/200-V, Y-Y connected wound-rotor induction motor has 0.06Ω rotor resistance and 0.3Ω standstill reactance per phase. Find the additional resistance required in the rotor circuit to make the starting torque equal to the maximum torque of the motor. 02
4. (a) Classify single phase induction depending on their construction & method of running. 02
- (b) The power input to the rotor of a 400 V, 50 Hz, 6-pole, 3-phase induction motor is 20 kW. The slip is 3%. Calculate (i) the frequency of rotor currents (ii) rotor speed (iii) rotor copper losses and (iv) rotor resistance per phase if rotor current is 60 A. 05
- (c) Draw the circuit diagram of forward & reverse running single phase induction motor. 03

PART-B

(Answer any **three** questions)

5. (a) Explain the double field revolving theory. 03
- (b) Explain the capacitive start & induction run of single phase induction motor. 04
- (c) Establish the starting torque equation of three phase induction motor. 03
6. (a) Why does transformer rating in KVA? 02
- (b) The efficiency of a 1000-kVA, 110/220 V, 50-Hz, single-phase transformer, is 98.5 % at half full-load at 0.8 p.f. leading and 98.8 % at full-load unity p.f. Determine (i) iron loss(ii) full-load copper loss and (iii) maximum efficiency at unity p.f. 05
- (c) Step by step draw the exact equivalent circuit of transformer referred to primary side. 03
7. (a) Prove that at maximum efficiency **core loss = copper loss**. 03
- (b) The power input to the rotor of 440 V, 50 Hz, 6-pole, 3-phase, induction motor is 80kW. The rotor electromotive force is observed to make 100 complete alterations per minute. Calculate (i) the slip, (ii) the rotor speed, (iii) rotor copper losses per phase. 04
- (c) Step by step write down the power stages of induction motor. 03
8. (a) Prove that capacity of V-V bank transformer is 57.77% of Δ - Δ bank transformer. 03
- (b) A 500-kVA, 3-phase, 50-Hz transformer has a voltage ratio (line voltages) of 33/11-kV and is delta/star connected. The resistances per phase are : high voltage 35 Ω , low voltage 0.876 Ω and the iron loss is 3050 W. Calculate the value of efficiency at full-load and one-half of full load respectively (a) at unity p.f. and (b) 0.8 p.f. 05
- (c) Write the name & draw most common connection of three phase transformer. 02

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Final Examination, 2023
Course No: MATH 303
Time: 03 (Three) hours

2nd year 1st Semester
Course Title: Coordinate Geometry and Linear Algebra
Full Marks: 60

N.B. : (i) Answer any three questions from each PART
(iii) Marks allotted are indicated in the margin

(ii) Use separate answer scripts for each PART
(iv) Special Instruction (if any)-----N/A-----

PART-A

(Answer any **three** questions)

1. (a) Define equal matrix, trace of a matrix and invertible matrix. 03
- (b) Find all the values of k for which the linear system- 04
- $$\begin{aligned}x + 2y + 3z &= 1 \\x + y + kz &= 2 \\x + ky + z &= 1\end{aligned}$$
- has (i) Unique solution (ii) No solution (iii) Infinite solution
- (c) Solve the following system of linear equation using Gaussian Elimination method: 03
- $$\begin{aligned}2x + 2y + 2z &= 0 \\-2x + 5y + 2z &= 1 \\8x + y + 4z &= -1\end{aligned}$$
2. (a) Check whether the vector $V = \{(a,b,c) \text{ where } b=a+c\}$ of R^3 is a subspace or not. 02
- (b) Check if function f is a subspace of $F(\infty, -\infty)$ for which $f(0)=1$. 02
- (c) Suppose that, $v_1 = (2, 1, 0, 3)$, $v_2 = (3, -1, 5, 2)$ and $v_3 = (-1, 0, 2, 1)$. Check if the vector $(2, 3, -7, 3)$ is in $\text{span}\{v_1, v_2, v_3\}$? 04
- (d) If a subspace of R^3 is given by the plane $3x - 2y + 5z = 0$ then find a basis and state its dimension. 02
3. (a) Find the characteristic equation, the Eigen values and bases for the Eigen space of the matrix_ 06
- $$A = \begin{bmatrix} 0 & 0 & -2 \\ 1 & 2 & 1 \\ 1 & 0 & 3 \end{bmatrix}$$
- (b) Show that the vectors $p_1 = 1 - 3x + 2x^2$, $p_2 = 1 + x + 4x^2$, $p_3 = 1 - 7x$ do not form a basis for p_2 . 04
4. (a) Reduce the conicoid $16x^2 + 4y^2 + 4z^2 + 4yz - 8zx + 8xy + 4x + 4y - 16z - 24 = 0$ to symmetric form. 05
- (b) Find the condition that the plane $lx + my + nz = p$ touches the conicoid $ax^2 + by^2 + cz^2 = 1$ 05

PART-B

(Answer any **three** questions)

5. (a) Find the angle between two diagonals of a cube with graph. 03
- (b) Find the acute angle between the lines whose direction cosines are given by the relations 05
 $l + m + n = 0$ and $l^2 + m^2 - n^2 = 0$.
- (c) If a line makes angle α, β, γ with the axes, show that $\sin^2\alpha + \sin^2\beta + \sin^2\gamma = 2$. 02
6. (a) Find the equation of the plane through the points $(1, 2, -2), (3, -2, 6)$ and perpendicular to 05
the plane $2x - y - z + 7 = 0$.
- (b) Find the equation of the planes $x - 4y + z = 0$ and $3x + 4y + z = 2$ and at a unit 05
distance from the origin.
7. (a) Define vector space. If S and T be two subspaces of a vector space $V(F)$, then prove that 2+3=5
 $S \cap T$ is also a subspace of $V(F)$.
- (b) If $V(F)$ be a vector space, then show that 2.5×2= 5
- i) $\forall k \in F$ and $\underline{0} \in V, k\underline{0} = \underline{0}$
- ii) $\forall k \in F$ and $\underline{u} \in V, k(-\underline{u}) = (-k)\underline{u} = -k\underline{u}$
8. (a) Find the co-ordinates of the centre and radius of the circle 05
 $x + 2y + 2z = 15, \quad x^2 + y^2 + z^2 - 2y - 4z = 11$
- (b) Find the equation of the two spheres which pass through the circle 05
 $x^2 + y^2 + z^2 - 4x - y + 3z + 12 = 0, 2x + 3y - 7z - 10 = 0$
and touch the plane $x - 2y + 2z = 1$.

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Sylhet Engineering College, Sylhet
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Department of Electrical & Electronic Engineering

Final Examination, 2023

Course No: HUM 303

Time: 03 (Three) hours

2nd year 1st Semester

Course Title: Financial & Managerial Accounting

Full Marks: 60

N.B. : (i) Answer any two question from each PART

(ii) Use separate answer scripts for each PART

(iii) Marks allotted are indicated in the margin

(iv) Special Instruction (if any)-----N/A-----

PART-A

(Answer any **two** questions)

1. (a) What is accounting? Differentiate between financial accounting and managerial accounting. 03
- (b) Briefly explain the term GAAP. What uses of financial accounting information are made by (i) investors and (ii) creditors? 04
- (c) Gibson opens his own consultancy firm on Aug 1, 2024. During the first month of operations, the following transactions occurred. Prepare a transaction analysis on the basis of the using the accounting equation. 08
- Aug. 01- Gibson invested \$15,000 in cash in the law practice.
Aug. 03- Provided legal services to clients for cash \$1,500.
Aug. 06- Purchase office equipment on account \$2,000.
Aug. 08- Performed consultancy services for client on account \$2,000.
Aug. 12- Borrowed \$700 cash from a bank on a note payable.
Aug. 15- Paid monthly expenses: salaries and wages \$500, utilities \$300, and miscellaneous \$100.
Aug. 20- Gibson withdraws \$1500 cash for personal use.
Aug. 25- Paid \$1000 rent for July office space.
2. (a) "The terms debit and credit mean increase and decrease, respectively." Do you agree? Explain. 2.5
- (b) Define journals and identify its contribution on recording process. 2.5
- (c) Selected transaction for Joe Root, an interior decorator, in the first month of business are as follows 4+6
- Jan. 2 Root invested \$11,000 cash in the business.
3 Purchased office equipment for \$5,000 cash for use in business
9 Purchased supplies on account for \$600.
11 Billed customers \$2,100 for service provided.
16 Paid \$350 cash for advertising.
20 Received \$700 cash from customer billed on January 11.
23 Paid creditor \$300 cash on balance billed on January 9.
28 Withdraw \$1,000 cash for personal use by owner.

Requirements

- i. Prepare journal entries for the transaction listed above.
- ii. Give posting the account in the bracket to ledger entries (cash, Supplies, equipment, accounts receivable, accounts payable)

3. (a) "Depreciation is a valuation process that results in the reporting of the fair value of the asset." Do you agree? Explain. 03
- (b) Maria Alvarez, a beginning accounting student, believes debit balances are favorable and credit balances are unfavorable. Is Maria correct? Discuss. 04
- (c) Prepare a trail balance from the following entries on July 31 2024 for Silikon Int. 08
 Cash-\$26,000, Accounts receivable-\$15,000, Equipment-\$40,000, Cottage-\$50,000, Capital-\$85,000, Drawing-\$5000, Service Revenue-\$11,200, Salaries Expense-\$2,500, Unearned Revenue-\$2,500, Accounts Payable-\$6,000, Mortgage Payable-\$35,000, Utilities Expense-\$200, Prepaid Insurance-\$1,500, Insurance Premium-\$500, Supplies-\$1,500, Salaries Payable-\$1,500, Advertisement-\$500, Notes Payable-\$1,500.

PART-B

(Answer any **two** questions)

4. Nixxon Holiday Resort opened for business on June 1 with eight air conditioned units. 10+5
 Its trial balance on august 31 is as follows

Particulars	Debit \$	Credit \$
Cash at bank	50000	
cash	19600	
Supplies	3300	
Prepaid insurance	6000	
Land	25000	
Cottage	125000	
Furniture	26000	
Accounts Payable		6500
Unearned Rent Revenue		7400
Mortgage Payable		80000
P. Harder Drawing	5000	
P. Harder, Capital		100000
Rent Revenue		80000
Repair Expenses	3600	
Salaries Expenses	1000	
	9400	
	273900	273900

In addition to those listed on the trial balance, the chart of accounts for Nixxon Holiday Resort also contains the following accounts

- i. Insurance expires at the rate of \$ 400 per month.
- ii. A count on August 31 shows \$ 600 of supplies on hand.
- iii. Annual depreciation is \$ 60000 on cottage and \$ 24 on furniture.
- iv. Unearned rent revenue of \$ 4100 was earned prior to august 31.
- v. Salaries of \$ 400 were unpaid at August 31.
- vi. Rentals of \$ 1000 were due from tenants at August 31.
- vii. The mortgage interest rate is 9% per year 9 (The mortgage was taken out on august 1).

Requirements:

- (a) Prepare an income statement and owner's equity statement for the 3 months ending August 31.
- (b) Prepare balance sheet as at August 31.

- ✓
5. (a) Differentiate between money market and capital market. 02
- (b) Define NPV and Payback period. Why IRR is important for capital budgeting. 04
- (c) From the cash flow of 'X' corporation given below, fulfill the following requirement. 4+3+2
- i. Calculate NPV assuming interest on 10%, and 15% respectively.
 - ii. Calculate discounted payback period for 'X' corporation on interest rate of 10%.
 - iii. Calculate IRR of 'X' Corporation.

Year	Cash flow
0	-3000
1	1300
2	1000
3	800
4	500

6. (a) Define NPV, PBP and IRR. 03

The Bear Motel opened for business on May 1, 2012. Its trial balance before adjustment on May 31 is as follows. 6+6

Ac. No.	Particulars	Debit	Credit
101	Cash	\$ 3,500	
126	Supplies	2,400	
130	Prepaid Insurance	2,080	
140	Land	12,000	
141	141 Buildings	60,000	
149	Equipment	15,000	
201	Accounts Payable		\$ 4,800
208	Unearned Rent Revenue		3,300
275	Mortgage Payable		40,000
301	Owner's Capital		10,300
429	Rent Revenue		610
610	Advertising Expense	600	
726	Salaries and Wages Expense	3,300	
732	Utilities Expense	900	
		\$99,780	\$99,780

Other data:

1. Prepaid insurance is a 1-year policy starting May 1, 2012.
2. A count of supplies shows \$750 of unused supplies on May 31.
3. Annual depreciation is \$3,000 on the buildings and \$1,500 on equipment.
4. The mortgage interest rate is 12%. (The mortgage was taken out on May 1.)
5. Two-thirds of the unearned rent revenue has been earned.
6. Salaries of \$750 are accrued and unpaid at May 31.

Requirements:

- i. Journalize the adjusting entries for May 31.
- ii. Prepare adjusted trial Balance on May 31.