Department of Electronics and Communication Engineering, NIT Patna
Mid Semester Examination
Electronics Workshop (EC15103/ EC111103)
B.Tech. Semester –I

Max Marks: 30 **Time: 2:00 Hrs.**

Note: All questions carry equal marks. Any missing data may be assumed suitably.

1 (a) What is the difference Between Active and Passive Components? Give proper justification with examples.
(b) Write brief notes on Zener diode, FET and LDR.

2 (a) Calculate the output voltage V_0 and current through diodes D_1, D_2, and 0.33kΩ in Fig. 1.
(b) A LED is fabricated with GaAs material. Find the wave length of radiated light at room temperature if the energy gap at room temperature is 1.47eV.

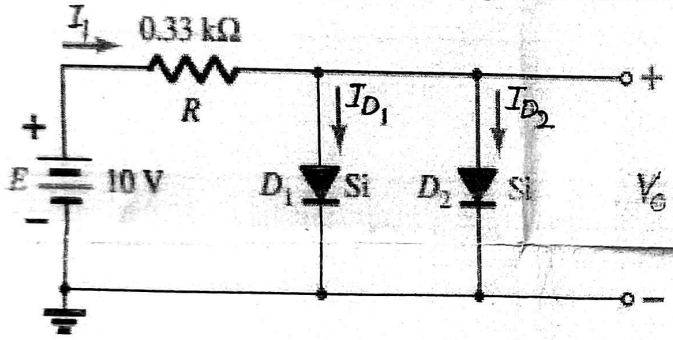


Fig. 1.

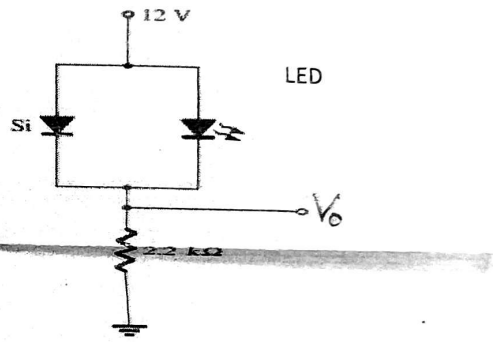


Fig. 2.

3 (a) Determine the voltage V_o of the network shown in Fig. 2, here, LED is made of GaAs material.
(b) What is the major difference between photo diodes and photo transistors? Give the justification with a proper diagram.

4 (a) Explain the working principle of a Bipolar Junction transistor for CB configuration.
(b) Write short notes on DC battery Pencil cell: 1.5 V, AAA, AA Type, +9V, rechargeable Cell, Mobile battery.

5 (a) Write down the relationship between the current gain coefficient of CB, CE and CC Bipolar Junction transistor.
(b) If the current gain coefficient of CE is 49, find out the value of the remaining two current gain.

Sayed Kaif Singh

National Institute of Technology, Patna

Department of Mechanical Engineering

Mid semester examination (July- Dec 2024)

Stream: B.Tech.-ME (**Section B**) & B.Tech.-MAE
Semester: 1st
Subject: Engineering Graphics
Subject codes: ME12101, ME111101
Time: 2 Hrs.
Full Marks: 30

Instructions: **Question 1 is compulsory. Attempt any two questions from the rest.**

---

1. **Fill in the blanks with appropriate words:** **10**

(i) ----- are used for drawing curves which cannot be drawn by a compass. (French curves)

(ii) Dimension of a cylinder should never be given as a -----.

(iii) The line connecting a view to a note is called a -----.

(iv) The two system of placing dimensions are ----- and -----.

(v) When the drawing is drawn of the same size as that of the object, the scale used is Actual.

(vi) Uses of the T-square, set-squares, scale, and protractor are combined in the drafter.

(vii) To draw or measure angles, ----- is used. (protractor)

(viii) When measurements are required in three units, ----- scale is used. (Diagonal)

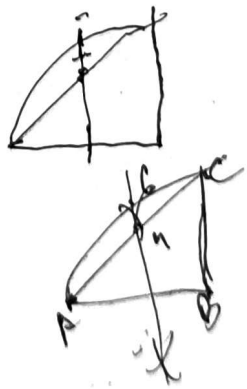
(ix) The ratio of the length of the drawing of the object to the actual length of the object is called ---. R.F

2. Divide an 80 mm long straight line into seven equal parts. **10**

3. Draw a regular pentagon of 40 mm sides, using general method. **10**

4. Construct a regular heptagon of 40 mm sides using inscribe circle method. **10**

******* *End of the question paper* *******



NATIONAL INSTITUTE OF TECHNOLOGY PATNA
MID SEMESTER EXAMINATION, JULY-DECEMBER 2024

Program: UG & DD **Semester:** 1st **Department:** HSS

Course Code: HS12101 (B), HS111101, HS16101 (B), HS19101

Branch: ME & M&AE and EE & CE&T.

Course Name: Communicative English

Full Marks: 22.5 **Duration of Examination:** 2 Hours

Instructions:

- Answer all questions.
- Marks for each section has been allotted separately.

Section A

Short Answer Questions (6 Marks).

1. Describe the process of communication and its key elements. Give examples. **(2 marks)**
2. Explain the concept of non-verbal communication and its significance. Give examples **(2 marks)**
3. Discuss the role of active listening in effective communication. **(2 marks)**

Section B

Long Answer Questions (6 Marks).

4. Analyze the barriers to effective communication and give examples. **(3 marks)**
5. Describe the different types of listening modes and their applications. **(3 marks)**

Section C

Read the following dialogue and answer the questions that follow **(4 marks)**

Ravi: Hey, did you hear about the new project we're working on?

Neha: No, I haven't. What's it about?

Ravi: It's a collaboration with our sister company in the UK. We're developing a new software application for their clients.

Neha: That sounds exciting! When do we start working on it?

Ravi: We have a meeting scheduled next week to discuss the project details and timelines. The client wants us to deliver the first phase by the end of this quarter.

Neha: Wow, that's a tight deadline. Do we have enough resources to handle this project along with our existing workload?

Ravi: I've already spoken to the HR manager about hiring a few more developers. We're also planning to outsource some of the testing work to our QA team in India.

Neha: I see. Well, let's hope everything goes smoothly. Keep me posted on the project updates, okay?

Ravi: Sure, no problem. I'll share the meeting notes with you after the discussion next week.

Neha: Great, thanks! I'm looking forward to working on this project.

Questions:

a) What is the new project about? (1 mark)
b) What is the deadline for the first phase of the project? (1 mark)
c) How is the company planning to handle the additional workload? (1 mark)
d) What will Ravi do after the meeting next week? (1 mark)

Section D

Read the Passage and answer the questions that follow **(6.5 Marks)**

In the bustling city of New York, the Avengers were gearing up for their next big mission. However, there was a problem: they were having a communication crisis! Iron Man, Captain America, and Thor were all in the same room, but instead of discussing their strategy, they were arguing about who was the best superhero.

Iron Man boasted, "I have the coolest gadgets and the best suit! No one can match my technology!"

Captain America replied, "But it's not just about technology! It's about leadership and doing what's right. I stand for justice and honor!"

Thor, swinging his mighty hammer, chimed in, "You both have your strengths, but can you summon lightning? I can! That makes me the most powerful!"

As the argument heated up, Black Widow entered the room and raised her hands. "Friends, this isn't helping! We need to focus on the mission, not who's the best superhero. We have a villain to stop, and we can't do it if we're fighting among ourselves."

Realizing the truth in Black Widow's words, the Avengers paused. They began to communicate more effectively, sharing their strengths and ideas instead of competing. Iron Man suggested using his tech to track the villain, Captain America proposed a tactical plan, and Thor offered to create a distraction with his lightning.

Through open communication and teamwork, the Avengers successfully combined their skills and defeated the villain, saving the day once again. They learned that effective communication is not just about talking but also about listening and working together towards a common goal.

a) What was the main problem the Avengers faced in the passage? **(1.5 marks)**
b) Who intervened to help resolve the argument, and what did they say? **(1 mark)**
c) What did the Avengers learn about communication by the end of the passage? **(2 marks)**
d) Why is effective communication important for teamwork? **(2 marks)**

NATIONAL INSTITUTE OF TECHNOLOGY PATNA

Department of Mechanical Engineering

Mid Semester Examination, July-December 2024

B. Tech: Semester-I

Course Name: Workshop Practice-I **Course Code: ME12102/111102**

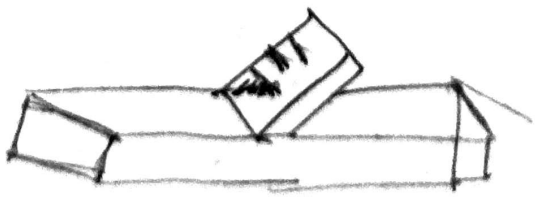
Maximum Time: 02 Hours, Date: 25th Sept. 2024 **Max. Marks: 30**

Instructions:

1. Attempts All Questions.

2. The Marks, CO (Course Outcome) and BL (Bloom's Level) related to question are mentioned on the right-hand side margin.

		Marks	CO	BL
1(a).	What is importance of measuring tools and define four-fold box wood rule with figure?	5	3	2
1(b).	Explain steel rule and inch tape with suitable figure.	4	3	1
2(a).	What do you mean by marking tools and explain try square with suitable figure?	5	3	1
2(b).	Describe scriber and marking gauge with suitable figure.	6	2	2
3(a).	What is cutting tools and explain rip saw and chisel?	4	2	2
3(b).	Explain jack plane with suitable figure.	6	3	2



Jay Kant Singh
October 3

NATIONAL INSTITUTE OF TECHNOLOGY PATNA

DEPARTMENT OF MATHEMATICS

MID-SEMESTER EXAMINATION - OCTOBER 2024

COURSE: ENGINEERING MATHEMATICS – I — CODE: MA111101

TIME: 2 hour — MAXIMUM MARKS: $6 \times 5 = 30$

Answer all questions

1. Use elementary operation to obtain the inverse of the matrix

$$A = \begin{pmatrix} 3 & 1 & 1 \\ 2 & 4 & 2 \\ -1 & -1 & 1 \end{pmatrix}.$$

2. Determine the values of k for which the linear system of equations

$$\begin{aligned} x_1 + x_2 + x_3 &= 1 \\ x_1 + 2x_2 + 4x_3 &= k \\ x_1 + 4x_2 + 10x_3 &= k^2. \end{aligned}$$

has (i) a unique solution; (ii) infinitely many solutions and (iii) no solution.

3. Consider the set $S = \left\{ \begin{pmatrix} a & b \\ b & d \end{pmatrix} \middle| a, b, d \in \mathbb{R} \right\}$. Find the basis and dimension of the set S.

4. Determine whether the set $W = \{(a_1, a_2, a_3) \in \mathbb{R}^3 : a_1 - 4a_2 - a_3 = 0\}$ is a subspace of $\mathbb{R}^3$ under the operations of addition and scalar multiplication defined on $\mathbb{R}^3$. Justify your answers. If W is a subspace, then determine the basis and dimension of W.

5. Test that the vectors $u_1 = (2, -3, 1)$, $u_2 = (1, 4, -2)$, $u_3 = (-8, 12, -4)$, $u_4 = (1, 37, -17)$, and $u_5 = (-3, -5, 8)$ generates $\mathbb{R}^3$. Find the subset of the set $\{u_1, u_2, u_3, u_4, u_5\}$ that is a basis for $\mathbb{R}^3$.

6. Prove that $T : P_2(R) \to P_3(R)$ is a linear transformation, where T is defined by

$$T(f(x)) = 2f'(x) + \int_0^x 3f(t)dt.$$

Also find the rank and nullity of the linear transformation.

******** ✠ ********