MALVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

END–TERM EXAMINATION (50%), I & J (SLOT – 2), 2024 – 25

ENGINEERING DRAWING & SKETCHING (22CET – 112) on 3rd Dec 2024, 5:00 - 7:30 pm

NOTE: 1. Answer ALL questions. MARKS are indicated in the bracket. ALL the dimensions are in millimetres.
2. If any DATA is missing, assume the appropriate value & write your NAME, ID, Batch & SCALE.
3. Default: 1st PROJECTION & Projection means draw ALL salient features. Upload the PDF file to http://172.16.23.14

Part A:: AutoCAD (5:00 - 7:00 PM, 2 hours)

1. Projectors drawn from HT and VT of line AB are 80mm apart, and those drawn from its ends are 50mm apart. End A is 10mm above H.P., VT is 55mm above H.P. while its HT is 35mm in front of V.P. Draw projections, locate traces, and find TL of line & inclinations with H.P. and V.P. [6 M]

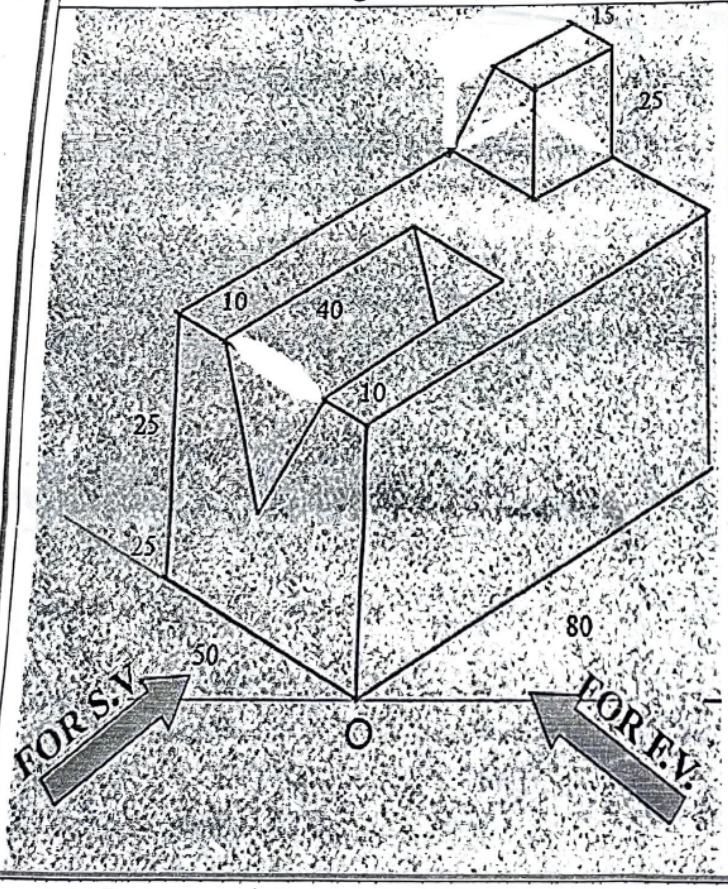
2. A $30^0 – 60^0$ set square of the longest side 100mm long is in V.P. Its surface 45^0 inclined to V.P. One end of the longest side is 10mm, and the other is 35mm above H.P. Draw its projections. [9 M]

3. A square pyramid with a 30mm base side & 50mm long axis rests on its apex on H.P., such that its one slant edge is vertical & a triangular face is perpendicular to V.P. Draw its projections. [8 M]

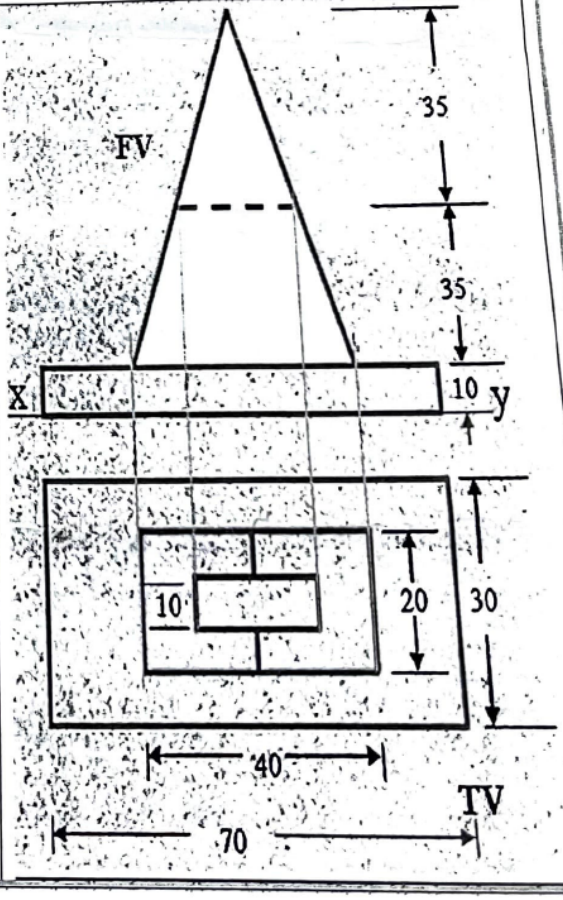
4. A hexagonal pyramid base 25mm side and axis 55mm long has one of its slant edges on the ground. A plane containing that corner and the axis is perpendicular to the H.P. and inclined at 45° to the V.P. Draw its projections when the apex is nearer to the V.P. than the base. [12 M]

Part B:: Sketching (7:00 - 7:30 PM, ½ hour)

5. Draw the orthographic view of F.V., S.V., & T.V. for the isometric figure below. [7 M]



6. Draw the isometric view from the orthographic figure as given below. [8 M]



ROUGH WORK (P.T.O)

Department of Mechanical Engineering

End-Term Examination

Session: Aug – Dec, 2024 (Odd Semester)

Course title: Introduction to Mechanical Systems
Course code: 22MET101
Programme/ Semester: B. Tech./ I

Max. Marks: 50
Time Duration: 150 minutes
Date: 04/12/2024

Note: 1. All the questions are compulsory. Marks are indicated against each question.
2. Use of scientific calculator and steam tables is permitted. Programmable/ graphical calculator is not allowed.
3. Draw neat labeled diagrams, sketches and graphs wherever required. All answers should be to the point.
4. Answer scripts with matching solution, partly or wholly, will be summarily rejected without prior information.
5. Attempt the questions in the given sequence. Answers of the numerical problems should be accompanied with S.I. units.

Section A (5 x 3 = 15 marks)

1. Apart from cooling the room air, list atleast two additional functions of an air-conditioner aimed at improving human comfort. **3**
2. Derive the numerical equivalent of 1 TR in S.I. units. If an air conditioner is rated at 1.5 TR, what is its cooling capacity in kW? **3**
3. Determine whether the working fluid is a sub-cooled liquid, saturated liquid, wet vapour, dry saturated, or superheated in the following cases (a) Steam at 175 °C and 5 bar (b) Steam at 8 bar and 22 °C **3**
4. Which thermodynamic cycle governs the operation of Spark Ignition Engines? Show the cycle on both pressure-volume and temperature-entropy diagrams. **3**
5. List atleast three machining operations performed on a drilling machine and show each with a simple diagram. **3**

Section B (7 x 5 = 35 marks)

6. Compression ratio and maximum temperature of an air standard diesel cycle is 18 and 2800 K respectively. If pressure and temperature at the start of compression stroke is 1 bar and 300 K respectively, determine the cut-off ratio and thermal efficiency of the cycle. Take γ=1.4 **5**
7. Why is it necessary to have a suitable cooling system for an uninterrupted operation of internal combustion engines? Draw a labeled schematic of a water cooled system and briefly explain its functioning. **5**
8. A rigid vessel of 0.0076 m^3 capacity contains 0.05 kg steam at 15 bar. Predict the steam temperature. If the vessel undergoes cooling, determine the temperature when steam becomes dry saturated. If cooling continues until pressure drops to 11 bar, determine the steam quality. **5**
9. Explain the operating principle of shielded metal arc welding. List atleast three merits as well as demerits of arc welding compared to oxy-acetylene gas welding. **5**
10. An ice-cream factory daily produces 5 metric tonnes of ice-cream at 0 °C. If the COP of the plant is 3.0, mechanical efficiency of the compressor motor is 90 % and the initial temperature of liquid hot cream is 38 °C, determine (i) Rate of heat removal from the hot cream (ii) Power requirement of the compressor motor. Take specific heat of liquid hot cream equal to 4186 J/kg-°C, and latent heat of freezing is 334.5 kJ/kg. **5**
11. List atleast five lathe operations. Briefly explain their application and show each with a simple diagram. **5**
12. Briefly explain the operating principle, list key components, and draw a neat diagram of a *Domestic Refrigerator*. **5**

MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR
Department of Humanities and Social Sciences
B. Tech. Sem I, End-Term Examination, Dec 2024
Sub Code: 22HST106, Sub: English Communication Skills

M.M: 50 **Time: 2.5 hours**

Q1. Answer the following questions in about 100-150 words: **(9)**

a. Trace the transformation happening in the field of education and bring out its impact on career options available today as laid out in the essay Freedom and Choice.

b. Describe in detail the core mission of Microsoft to empower people and organizations to achieve more as clearly indicated in the mail from Satya Nadella to his employees.

c. Narayan Murthy highlighted the role of parents in fostering a study-friendly environment at home through his letter to Akshata. How did Murthy parents create the congenial environment for the children at home?

Q2. Reading the following passage and answer the questions that follow in 4-5 lines: **(6)**

The recent plight of astronauts, Sunita Williams and Butch Wilmore, stranded aboard the International Space Station (ISS) after unexpected delays with Boeing's Starliner spacecraft, highlights the fragile line between human ambition and technological vulnerability. Originally scheduled for a brief mission, their stay in space was prolonged due to unresolved technical issues, a scenario that reveals the unpredictable challenges inherent in space exploration. Their extended stay serves as a vivid reminder of the unforeseen obstacles that often arise, even in the most carefully planned missions.

Space exploration stands as one of humanity's greatest scientific achievements, yet it continues to expose the limits of human endurance. The physical toll of long-term space travel is well-known—muscle atrophy and bone density loss from microgravity—but the psychological challenges are equally significant. Astronauts endure isolation and confinement, far from the comforts of Earth, which takes a mental and emotional toll. This combination of physical and psychological stress points to the complexity of human adaptation to the harsh environment of space. Even the most advanced technology cannot fully mitigate these challenges, revealing the intricate relationship between science and human limitations.

The technical difficulties that delayed the astronauts' return further emphasize the precariousness of space technology. Despite years of research and development, space missions are still susceptible to unforeseen failures. In this case, the Starliner's propulsion and structural issues forced a delay in the return journey. Such setbacks highlight the gap between humanity's lofty goals and the practical realities of space technology. Though advancements continue to be made, these obstacles reveal the vulnerability of even the most sophisticated systems in the harsh environment of space. In the context of exploration, these setbacks are inevitable.

However, these challenges also underscore the resilience of both humanity and science. While the astronauts faced adversity, their prolonged stay provided vital data that will shape future missions. Every failure leads to new insights, and these experiences push scientific progress forward, allowing for the refinement of technologies and strategies that will make future missions safer and more efficient. As difficult as the delays were, they serve as an essential part of the learning process, reminding us that while science may encounter setbacks, the drive to explore will always push humanity to rise above.

1. How do the technical setbacks faced by astronauts reveal the ongoing tension between human aspirations and scientific limitations? (1.5)

2. How can the challenges faced by astronauts during long-duration space missions inspire future innovations to improve the safety and sustainability of space exploration? (1.5)
3. Write a precis of the above passage and provide an appropriate title? (3)

(5)

Q3. Write the correct form of the verb given in the brackets:

There is a possibility that alien life existed in hot water on Mars. The latest evidence _____ (show) scientists the possibility of hot water flowing on Mars during its ancient times. This development could likely establish that despite arid conditions, the red planet may have been once capable of supporting life aeons ago. This latest piece of information_____ (come) from a 4.45 billion-year-old zircon grain within the Martian meteorite NWA7034 that _____ (discover) in the Sahara Desert in 2011. The NWA7034, a two-billion-year-old Martian meteorite, is the second oldest ever discovered and is _____ (know) as "Black Beauty" due to its shiny black appearance. The researchers _____ (find) that the zircon grain has fingerprints of fluids rich in water. (5)

Q4. Complete the following sentences:

1. If he doesn't hurry, he _____.
2. If I had more free time, I _____.
3. If she_____, she will improve her grades significantly.
4. If she hadn't forgotten her wallet, she_____.
5. If I_____anywhere in the world, I would visit Japan.

Q5. Fill in the blanks with the correct form of the verb given in the brackets. (4)

1. Each of the students ___ (is/are) responsible for completing the assignment on time.
2. The book, along with the notes, ___ (was/were) left on the table.
3. Either the teacher or the students ___ (need/needs) to prepare the presentation.
4. Neither of the dogs ___ (barks/bark) at strangers.

Q6. Find the error and correct the sentences: (5)

1. He has been working here since five years.
2. He said he would visit the museum tomorrow, but he didn't went.
3. He hasn't never been to Mumbai before.
4. My father give me some advice.
5. She don't like going to the park every Sunday.

Q7. Follow the given instructions to answer: (5)

1. What is a homophone of the word "piece"?
2. Identify the misspelled word from the following: definitely, accomodate, recommend, association.
3. Write the noun form of the word "decide."
4. Use the word "ensure" in a sentence.
5. One-word substitute for "One who does a thing for pleasure and not as a profession."

Q8. Write a job application letter applying for the position of Chemical/Mechanical/Civil Engineer in a Tech startup. Invent the necessary details and attach a Resume. (3+3)

Q9. Draft an email to the Course Coordinator requesting to switch your tutorial group due to a scheduling conflict. Invent necessary details. (5)

inspire future

MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR
Department of Humanities & Social Sciences
End-term Examination [B. Tech. Semester I, Sections: G, H, I & J] ***November 2024***

22HST101: Basic Economics

Duration: 2.5 hours
Max. Marks: 50

Section A

Section A contains 7 questions carrying 2 marks each. ***Attempt all questions*** *in about 30-40 words.*

1. On the *Forbes* list of the richest people in the world (as of 22 Nov 2024), Elon Musk ranks at the top with a net worth of $ 314.4 billion. Does this 'richest man in the world' face scarcity, or does scarcity only affect those with more limited incomes and lower net worth?
2. If the price of coffee rises from ₹45 to ₹55 per pack, and as a result the consumer's demand for tea increases from 600 to 800 packs. Find out the cross-price elasticity of demand of tea for coffee.
3. What is the difference between *Marginal Utility* and *Marginal Rate of Substitution*?
4. The following table gives the total output as a function of labour units used. Does it indicate a situation of increasing returns, diminishing returns or constant returns? Explain.

LABOR	0	1	2	3	4	5
TOTAL OUTPUT	0	5	9	12	14	15

5. How are average and marginal costs related in the short run? Show with the help of a diagram.
6. What do *Economies of Scope* mean? Give an example.
7. Define: i) Stagflation and ii) Hyperinflation.

Section B

Section B contains 7 questions carrying 6 marks each. ***Attempt any 6 questions*** *in about 100 words.*

8. Suppose a hypothetical household has ₹500 to spend per month on goods *X* and *Y*. If the price of *X* is ₹5 and the price of *Y* is ₹10 -
   a. Plot the household budget constraint.
   b. Assume that the household splits its income equally between *X* and *Y*. Show where the household ends up on the budget constraint.
   c. Suppose the household income doubles to ₹1,000. After the change, the household spends ₹200 on *Y* and ₹800 on *X*. Does this imply that good *X* is a normal or an inferior good? What does it imply for good *Y*?
9. Elucidates how the least cost factor combination of producing a given level of output is obtained using the concept of isoquant and isocost line. Use diagram.
10. Compare and contrast the market structures representing perfect competition, monopoly, monopolistic competition, and oligopoly. Discuss how each market structure affects pricing, output, and efficiency. Provide examples of industries for each of them.
11. Explain the concepts of Purchasing Power Parity (PPP), the Human Development Index (HDI), and the Happiness Index. How do these measures provide a more comprehensive understanding of a country's development compared to traditional economic indicator, GDP?
12. A brick company manufactures a standard stone block for the building industry. The production capacity for the year is 100,000 standard blocks. The selling price per block is $1.60, variable costs are $0.60 per brick and fixed costs are $60,000 per annum. Calculate the break-even level of output and the total revenue if the company breaks even.
13. Explain why the long-run average cost (LAC) curve is typically U-shaped.
14. Explain the meaning and tools of fiscal and monetary policies. How do these policies influence economic stability and growth?

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Text -1

Infosys Founder Narayan Murthy's Letter to his daughter Akshata

Akshata,

Becoming a father transformed me in ways that I could never have thought possible. I could never go back to being the person I used to be before. Your arrival in my life brought unimaginable joy and a larger responsibility. I was no more just a husband, a son, or a promising employee of a fast-growing company. I was a father, who had to measure up to the expectations his daughter would have of him at every stage of her life.

Your birth raised the benchmark of my life, in every aspect. My interactions at the workplace became more thoughtful and measured; the quality of my transactions with the outside world more considerate, dignified, and mature. I felt a need to deal with every human being more sensitively and courteously. After all, some day you would grow up and understand the world around you, and I didn't want you ever to think that I had done anything even remotely wrong.

My mind often goes back to the initial days after your birth. Your mother and I were young then and struggling to find our feet in our careers. Two months after your birth in Hubli, we brought you to Mumbai, but discovered quickly enough, that it was a difficult task to nurture a child and manage careers side by side. So, we decided that you would spend the initial years of your life with your grandparents in Hubli. Naturally, it was a hard decision to make, one which took me quite a bit of time to come to terms with. Every weekend, I would take the plane to Belgaum and then hire a car to Hubli. It was very expensive, but I couldn't do without seeing you.

What never ceased to amaze me was how you created your own little happy world at Hubli, surrounded by your grandparents and a set of adoring aunts and relatives, oblivious of our absence from your life…

I am often asked about the qualities that I have imparted to my children. I tell them that it is your mother who shouldered this great responsibility and I am ever so grateful to her for bringing you up to be the fine individuals you are. She communicated values more by action than by talking about them. She taught Rohan and you the importance of simplicity and austerity. There was this one instance, in Bangalore, when you were selected for a school drama for which you were required to wear a special dress. It was in the mid-eighties, Infosys had just begun its

operations, and we did not have any money to spend on non-basic goods. Your mother explained to you that we would not be able to buy the dress and that you would have to drop out of the performance. Much later, you told me that you had not been able to understand or appreciate that incident. We realize it must have been a bit drastic for a child to forgo an important event in school, but, we know you learnt something important from that- the importance of austerity.

Life has changed for us since then and there is enough money. But, you know, our lifestyle continues to be simple. I remember discussing with your mother the issue of sending you kids to school by car once we were a little comfortable with money, but your mother insisted that Rohan and you go to school with your classmates in the regular autorickshaw. You made great friends with the 'rickshaw uncle' and had fun with the other kids in the auto. The simplest things in life are often the happiest and they are for free.

You would often ask me why there was no television at our home when the rest of your friends discussed stuff they watched on TV. Your mother decided early on that there would be no TV in Our home so that there would be time for things like studying, reading, discussions, and meeting friends. She insisted that it was important to create an environment conducive to learning at home. Therefore, every night we dedicated the time between 8 pm and 10 pm to pursuits that brought the family together in a productive environment. While Rohan and you did your schoolwork, your mother and I read books on History, Literature, Physics, Mathematics, and Engineering, or did any office work.

It is quite a well-known fact that when a daughter gets married, a father has mixed feelings about it. He hates the fact that there is somebody else in his daughter's life with whom she shares her affections–a Smart, confident, younger man who gets the attention that was earlier his alone. I, too, was a little sad and jealous when you told us you had found your life partner. But when I met Rishi and found him to be all that you had described him to be-brilliant, handsome, and, most importantly, honest-I understood why you let your heart be stolen. It was then that I reconciled to sharing your affections with him. A few months ago, you made me a proud grandparent. If holding you in my arms for the first time gave me indescribable joy, seeing Krishnaa, your lovely daughter, for the first time at your home in Santa Monica, was a different experience altogether. I wondered, whether from now on, I would have to behave like a wise, grand old man! But, then I realized the bonus to growing older and becoming a grandparent. I would have the joy of pampering a child silly! Besides, you know what they say about grandparents and grandchildren having a common

enemy-the parent! I am convinced, Krishnaa and I will eventually exchange notes and crib about you and be completely on the same page when it comes to criticizing you!

As you pursue your goals and live a contended life, remember that there is only one planet for us to live in and that planet is now becoming endangered. Remember that it is your responsibility to pass on this planet to Krishnaa in a better condition than you got it from us.

Take care, my child!

Lovingly, Appa

Text -2

From: SatyaNadella
To: AllEmployees
Date: Feb.4,2014
Subject: RE: Satya Nadella – Microsoft's New CEO

Today is a very humbling day for me. It reminds me of my very first day at Microsoft, 22 years ago. Like you, I had a choice about where to come to work. I came here because I believed Microsoft was the best company in the world. I saw then how clearly we empower people to do magical things with our creations and ultimately make the world a better place. I knew there was no better company to join if I wanted to make a difference. This is the very same inspiration that continues to drive me today.

It is an incredible honor for me to lead and serve this great company of ours. Steve and Bill have taken it from an idea to one of the greatest and most universally admired companies in the world. I've been fortunate to work closely with both Bill and Steve in my different roles at Microsoft, and as I step in as CEO, I've asked Bill to devote additional time to the company, focused on technology and products. I'm also looking forward to working with John Thompson as our new Chairman of the Board.

While we have seen great success, we are hungry to do more. Our industry does not respect tradition — it only respects innovation. This is a critical time for the industry and for Microsoft. Make no mistake, we are headed for greater places — as technology evolves and we evolve with and ahead of it. Our job is to ensure that Microsoft thrives in a mobile and cloud-first world.

As we start a new phase of our journey together, I wanted to share some background on myself and what inspires and motivates me.

Who am I?

I am 46. I've been married for 22 years and we have 3 kids. And like anyone else, a lot of what I do and how I think has been shaped by my family and my overall life experiences. Many who know me say I am also defined by my curiosity and thirst for learning. I buy more books than I can finish. I sign up for more online courses than I can complete. I fundamentally believe that if you are not learning new things, you stop doing great and useful things. So family, curiosity and hunger for knowledge all define me.

Why am I here?

I am here for the same reason I think most people join Microsoft — to change the world through technology that empowers people to do amazing things. I know it can sound hyperbolic — and yet it's true. We have done it, we're doing it today, and we are the team that will do it again.

I believe over the next decade computing will become even more ubiquitous and intelligence will become ambient. The coevolution of software and new hardware form factors will intermediate and digitize — many of the things we do and experience in business, life and our world. This will be made possible by an ever-growing network of connected devices, incredible computing capacity from the cloud, insights from big data, and intelligence from machine learning. This is a software-powered world.

It will better connect us to our friends and families and help us see, express, and share our world in ways never before possible. It will enable businesses to engage customers in more meaningful ways.I am here because we have unparalleled capability to make an impact.

Why are we here?

In our early history, our mission was about the PC on every desk and home, a goal we have mostly achieved in the developed world. Today we're focused on a broader range of devices. While the deal is not yet complete, we will welcome to our family Nokia devices and services and the new mobile capabilities they bring us.

As we look forward, we must zero in on what Microsoft can uniquely contribute to the world. The opportunity ahead will require us to reimagine a lot of what we have done in the past for a mobile and cloud-first world, and do new things.

We are the only ones who can harness the power of software and deliver it through devices and services that truly empower every individual and every organization.

We are the only company with history and continued focus in building platforms and ecosystems that create broad opportunity.

Qi Lu captured it well in a recent meeting when he said that Microsoft uniquely empowers people to "do more." This doesn't mean that we need to do more things, but that the work we do empowers the world to do more of what they care about — get stuff done, have fun, communicate and accomplish great things. This is the core of who we are, and driving this core value in all that we do — be it the cloud or device experiences — is why we are here.

What do we do next?

To paraphrase a quote from Oscar Wilde — we need to believe in the impossible and remove the improbable.

This starts with clarity of purpose and sense of mission that will lead us to imagine the impossible and deliver it. We need to prioritize innovation that is centered on our core value of empowering users and organizations to "do more." We have picked a set of high-value activities as part of our One Microsoft strategy. And with every service and device launch going forward we need to bring more innovation to bear around these scenarios.

Next, every one of us needs to do our best work, lead and help drive cultural change. We sometimes underestimate what we each can do to make things happen and overestimate what others need to do to move us forward. We must change this.

Finally, I truly believe that each of us must find meaning in our work. The best work happens when you know that it's not just work, but something that will improve other people's lives. This is the opportunity that drives each of us at this company.

Many companies aspire to change the world. But very few have all the elements required: talent, resources, and perseverance. Microsoft has proven that it has all three in abundance. And as the new CEO, I can't ask for a better foundation.

Let's build on this foundation together.

Satya

Text -3

FREEDOM AND CHOICE

N.Krishnaswamy,
LalithaKrishnaswamy
Revathy Krishnaswamy

Approach to the Text:

- Discuss the career options available in the present times.
- Do you think today's youngsters prefer establishing their own business rather than work under someone? Discuss

About the Author:

N. Krinshnaswamy, former professor, CIEFL, Hyderabad, is an experiencedteacher educator. He is the author of The Politics of Indians' English (OUP),Modern English Grammar (Macmillan) and several other books and articles.Lalitha Krishnaswamy is a teacher- administrator and has written books for teaching English at the school level.Revathy Krishnaswamy teaches English at the San Jose State Unioversity, San Jose, California, USA. She is the author of Effeminism: The Economyof Colonial Desire (Michigan University Press); her articles have appeared in important international journals.

Freedom and Choice explores various career opportunities for youngsters in the present times. The essay also throws light on the fact that the parents are accepting and encouraging their daughters to select a career of their choice.

What is freedom? Freedom is the right to choose; the right to create for oneself the alternatives of choice. Without the possibility of choice and the exercise of choice, we are not human beings but only inanimate objects.

Fortunately, we are now living in a world full of choice; even in selection of ice-cream or soaps, there is so much choice that we find it difficult to choose and some people feel that we actually suffer from what may be called choice fatigue!

Thanks to the tremendous growth and diversification in all spheres of life, the educational spectrum is crowded with a variety of courses in every conceivable field; most of the courses offered are practical and job-oriented and, as a result, there is an array of career options available. Students are becoming smarter and they are learning to take intelligent decisions based on what is right for them. A good way to choose one's career path is to match one's strengths and aptitudes to the opportunities and threats in the job market of tomorrow. There are career guidance cells and centres in most of the colleges and universities from where one can get detailed information on career options; even newspapers and magazines publish Career Quest columns regularly.

There was a time where teaching and nursing were the only careers earmarked for women but now it is possible to pursue a career in almost any field. Today, a career in computers is the 'in' thing; you can become a programmer, a systems analyst, a CAD (Computer Aided Designs) specialist, or a desktop publisher. Now most universities and colleges offer MCA programmes; NIIT, Aptech, Pentafour (to name a just a few) offer counselling and guidance in addition to a number of computer education programmes. Like literacy, computeracy, computer literate, software, hardware, micro, macro, super and many other computer-related expressions are becoming part of English usage.

Also gaining in popularity are courses in mass communication, advertising and journalism, electronic journalism, video editing, and many more. These options are available in addition to the conventional courses in medicine, engineering and commerce; competing with the IITs and Regional Engineering Colleges, new IIITs

and International/ Indian Business Schools are being established. Fashion, until recently unexplored, has become a popular profession. NIFT (National Institute of Fashion Technology) and NID (National Institute of Design) offer a wide range of courses in fashion designing, apparel pattern making and industrial design. The related field is of graphic arts and interior decoration that concentrates on designing and developing graphics, colour schemes,furnishing, etc., often computer- aided, for a variety of advertising and business needs- artwork, pictures, illustrations, layouts, book covers, logos, etc. The School of Interior Design, Centre for Environmental Planning and Technology in Ahmedabad, and some other institutions offer courses on this subject. For a creative mind with an artistic bent and a good knowledge of designing and typography, the sky is the limit.

For enterprising entrepreneurs, beauty parlours, Interior decoration units, furniture designing shops, catering and fast food joints, pottery and ceramics industry, travel agencies and the like offer ample opportunities. With Indian business becoming more market-oriented and consumer-friendly, there is a great demand for sales and service, marketing and finance. If you are interested in management and media management, a number of job-oriented courses are available; there are even new expressions like hospitality industry, healthcare, media managers, travel management, Veejaying, etc. to refer to new and emerging areas.

For a country where even about ten years ago a girl had hardly any educational and career options to choose from, India has come a long way. The younger generation today is very enterprising and the youth are willing to experiment and take risks. Parents, too are learning to accept that daughters have right to their ideas, dreams, thoughts and decisions; the stereotype of the father as the all-knowing strict disciplinarian and bread-winner, and the mother as the submissive housekeeper is fast changing; relationships are being redefined.

Don't you think you are lucky to be born in this transitional society?

Glossary:

earmarked - set aside/ specified

Pentafour - it is a pioneer in software and digital media

veejaying - to work as a video jockey (someone who presents a television programme)

come a long way - progressed

Comprehension

I. Answer the following questions in a sentence or two:

1. What is freedom?
2. What kind of world are we living in now?
3. What do you understand by the expression, 'choice fatigue'?
4. Who is an entrepreneur? What are the options available for an enterprising entrepreneur?
5. List some of the options available in the field of management.
6. What are the career options available in the field of computers?
7. What are the other courses that are gaining popularity in addition to the conventional courses?
8. What do the following stand for?
   a.IIT b. IIIT c. NIIT d. IBM e. MCA f. MBA
9. What is computer literacy?
10. What is meant by a 'transitional society'?

II.Answer the following questions in about a page each:

1. Why does the author say that we are living in the world full of choice?
2. What are the career options available for women at present in comparison to those in the past?
3. How do career options of today differ from the past?
4. What are the options available for enterprising entrepreneurs today? Give examples.

5. How have the stereotypical images of a job seeking youngster, father and mother in a family changed?

III. Answer the following questions in about two pages each:

1. Trace the transformation happening in the field of education and bring out its impact on career options available today.

2. What is your opinion about being a woman in modern society? Do you think you can also contribute to the making of New and strong India? Specify the ways in which you can contribute.

3. Computerization has revolutionized career opportunities. Discuss.

Suggested Reading:

- Ascent – The Times of India
- Employment News

Malaviya National Institute of Technology, Jaipur
B.Tech, Mathematics-II
Mid-Term examination even semester 2023-24
22MAT102

Maximum Marks: 30 *Time: 90 minutes* *Date: 26 February, 2024*

Each question carries equal marks.

1. *Solve* $(D^2+5D-6)y = \sin x \sin 4x$, $D = \frac{d}{dx}$.

2. *Write the Charpit's Auxilary equations and solve the following PDEs:*
   (a) $p(1+q) = qz$
   (b) $p^2+q^2 = x+y$

3. *Consider* $\Phi(u,v) = 0$, *where* u, v *are known functions of* x, y, z *and* Φ *is an arbitrary function. Find the partial differential equation by eliminating the arbitrary function* Φ.

4. *Obtain a series solution of the differential equation* $(1-x^2)y'' - 4xy' + 2y = 0$ *around the origin using the power series method. Find at least three non-zero terms in each linearly independent series solution.*

5. *Solve* $(D^2+2DD'+3D'^2)z = e^{x-2y}$, $D = \frac{\partial}{\partial x}$, $D' = \frac{\partial}{\partial y}$.

6. *Find the general solution of the equation* $x^3y''' + 5x^2y'' + 5xy' + y = x^2 + \ln x, \quad x > 0$

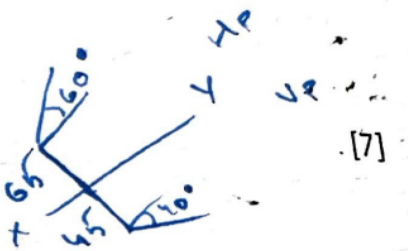
6. **Draw free hand sketches showing top view, front view and side view of the figure shown below. Front view shall be drawn in the direction the arrow. Use first angle projection.** **8**

Tech Mid Term Exam 2024 22CET112 Engg Drg & Sketching MM 30 **27/02/2024 Sec A; Time 1.5 Hrs**

Answer ALL questions; & MARKS indicated in the bracket. Upload the PDF file to **http://172.16.23.14**

1 Draw top and front views of point A in the following positions in the **sketch** file.

I (a) Point is 20 mm in front of VP and 45 mm above HP
II (b) Point is 30 mm behind VP and 20 mm above HP
III (c) Point is 30 mm below HP and 10 mm behind VP
IV (d) Point is 20 mm below HP and 20 mm in front of VP
(e) Point lies in HP and 50 mm in front of VP
(f) Point lies in VP and 25 mm above HP
(g) Point lies in both the reference planes

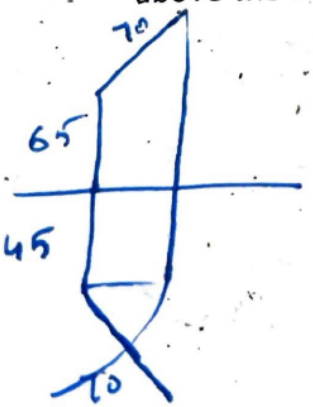


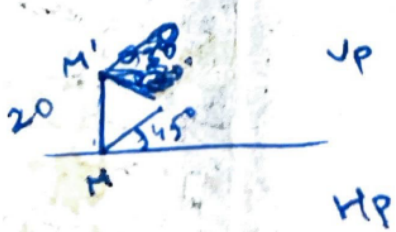
[7]

Draw solutions to the following questions in **AutoCAD** 50

2 A line PQ 70 mm long is inclined at 40 degrees to HP and 60 degrees to VP. The end P is 65 mm behind the VP and 45 mm below HP. Draw the projections and indicate the positions of both traces. [11]

3 A-Line PQ 100 mm long is inclined at 30° to HP and 45° to the VP. Its mid-point is in the VP and 20 mm above the HP. Draw its projections if its end P is in the third quadrant and Q in the first quadrant. [12]



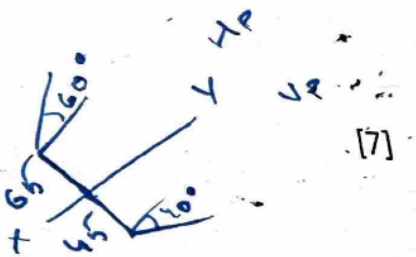


Tech Mid Term Exam 2024 22CET112 Engg Drg & Sketching MM 30 **27/02/2024 Sec A**; Time 1.5 Hrs.

Answer ALL questions; & MARKS indicated in the bracket. Upload the PDF file to **http://172.16.23.14**

1 Draw top and front views of point A in the following positions in the **sketch** file.

(a) Point is 20 mm in front of VP and 45 mm above HP
(b) Point is 30 mm behind VP and 20 mm above HP
(c) Point is 30 mm below HP and 10 mm behind VP
(d) Point is 20 mm below HP and 20 mm in front of VP
(e) Point lies in HP and 50 mm in front of VP
(f) Point lies in VF and 25 mm above HP
(g) Point lies in both the reference planes



[7]

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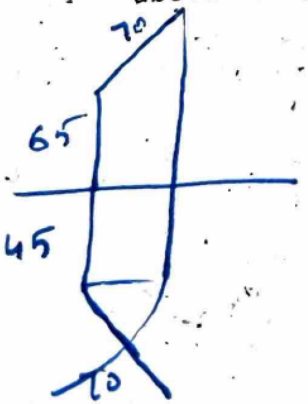
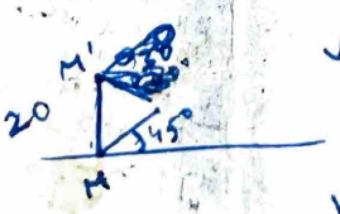
3 A-Line PQ 100 mm long is inclined at 30^0 to HP and 45^0 to the VP. Its mid-point is in the VP and 20 mm above the HP. Draw its projections if its end P is in the third quadrant and Q in the first quadrant. [12]





Malaviya National Institute of Technology Jaipur

II Semester B.Tech. (Sections A, B and Back) End-term Examination 2023-24

22CET112: Engineering Drawing and Sketching

Time Allowed: 2½ hours 10th May 2024; 8-10:30 AM **Max. Marks: 50**

NOTE: Questions 1 to 4 are to be solved on AutoCAD. Make a pdf of these to be printed on a single A4 sheet. Upload PDF file to **http://172.16.23.14**. Questions 5 and 6 are to be solved by hand sketch on the separate paper (use a proper scale) which will be provided ONLY AFTER PDF file has been uploaded. Expected time to solve Q. 5 & 6 is 20-30 minutes. **Your name, ID no, and batch must appear on lower right-hand corner of both the sheets.** ***Sign both the A4 printout & separate paper before leaving.***

AUTO - CAD! 8 - 10 AM

1. A line AB, 60 mm long, has its end A 15 mm behind VP and 10 mm below HP. It is inclined at 45° to the HP and 30° to the VP. Draw its projections when (i) the line lies in third quadrant, (ii) the end B lies in the first quadrant. 8

2. A hexagonal plane of side 30 mm is resting on the HP on one of its corners and the plane is inclined at 40° to the HP. Draw projections of the plane when the line joining this corner with the opposite corner is inclined at 25° to the VP. 8

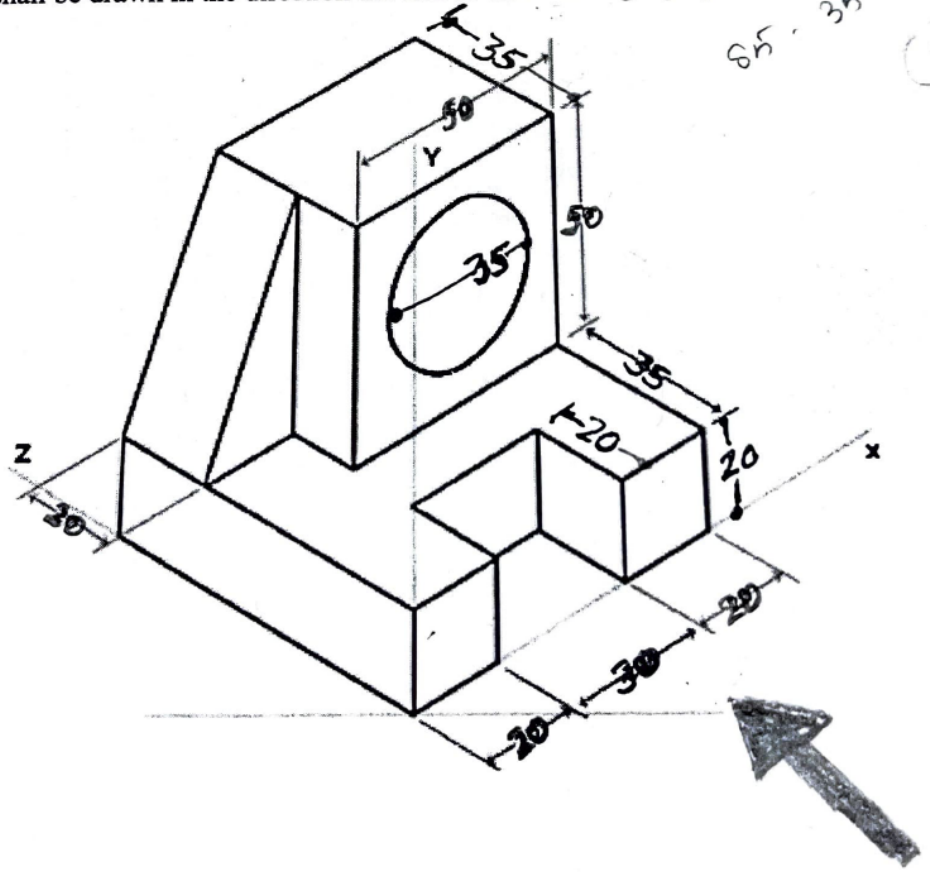
3. A pentagonal pyramid of side 30 mm and height 70 mm rests on one of its base edges on the ground with its axis inclined at 30° to the HP and that base edge is also inclined at 45° to the VP. Draw top and front views. 10

4. Draw the projections of a cone, base 45 mm diameter and axis 50 mm long, when it is resting on the ground on a point on its base circle with the axis making an angle of 30^0 with the H.P. and 45^0 with the V.P. 10

SKETCHING: 10 - 10:30 AM

5. A pyramid of 85 mm height with hexagonal base of 35 mm side stands on the ground with one of the base edges parallel to the VP. It's top 20 mm part is cut off. Draw a sketch showing isometric view of the frustum of the solid. 6

6. Draw free hand sketches showing top view, front view and side view of the figure shown below. Front view shall be drawn in the direction the arrow. Use first angle projection. 8



MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR
Department of Humanities and Social Sciences
B. Tech. Sem II, End-Term Examination, May 2024
Sub Code: 22HST106, Sub: English Communication Skills

M.M: 50 **Time: 2.5 hours**

Q1. Answer the following questions in about 100-150 words: **(9)**

a. **How have the stereotypical images of a job seeking youngster, father and mother in a family changed as per the text Freedom and Choice?**
b. **Elaborate the features of a 'software-powered world' as described by Satya Nadella in his mail to employees of Microsoft.**
c. **Describe the parenting tips that IT baron Mr. Narayan Murthy's moving letter to Akshata details.**

Q2. Reading the following passage and answer the questions that follow in 4-5 lines:

The education landscape is undergoing a significant transformation fuelled by the ever-evolving field of Artificial Intelligence (AI). While traditional classroom settings with human teachers will undoubtedly remain, AI is rapidly emerging as a powerful tool to supplement and personalize the learning experience. This integration of AI presents both exciting possibilities and potential challenges for the future of education.

One of the most promising applications of AI in education is personalized learning. AI systems can analyse vast amounts of student data, including academic performance, learning styles, and individual strengths and weaknesses. Using this information, AI-powered platforms can tailor learning materials and activities to each student's specific needs. Imagine a virtual tutor who adjusts the difficulty level of exercises in real-time based on the student's comprehension, or curates educational resources that align with their preferred learning style (visual, auditory, kinaesthetic). This personalized approach has the potential to significantly improve learning outcomes, ensuring students are neither bored nor overwhelmed by the curriculum.

Another key benefit of AI is its ability to automate repetitive tasks. Grading multiple-choice exams, providing basic feedback on assignments, or offering drill-and-practice exercises in subjects like math and grammar are all tasks that AI can handle efficiently. This frees up valuable time for human teachers to focus on more complex aspects of education, such as fostering critical thinking skills, facilitating discussions, and providing personalized guidance for students facing learning difficulties. Teachers can become facilitators and mentors, leaving the rote tasks to AI, ultimately leading to a more productive and impactful teaching experience.

However, the rise of AI in education also raises concerns. One major concern is the potential for over-reliance on technology. While AI can be a powerful tool, it can never fully replace the human element in education. The ability to inspire, motivate, and nurture a love of learning are all qualities that a passionate human teacher can bring to the classroom. Additionally, overdependence on AI-generated content could limit student exposure to diverse perspectives and critical thinking exercises crucial for well-rounded development.

Another concern is the issue of equity and access. Not all students have equal access to technology or reliable internet connections. This could exacerbate existing educational disparities and create a "digital divide" where students from underprivileged backgrounds are left behind. Furthermore, the development and implementation of AI systems require significant financial resources, which may pose a challenge for some schools. As AI continues to evolve, navigating its role in education effectively will be paramount. A balanced approach is crucial, where AI acts as a valuable tool to enhance, not replace, the human teacher. Ensuring equitable access to technology and fostering the development of AI systems that promote critical thinking and diverse learning experiences will be essential for maximizing the positive impact of AI in education.

1. Mention any two benefits of AI for students as mentioned above. **(2)**
2. As AI continues to evolve, how can educators ensure balance between AI and human interaction in the classroom? **(2)**
3. Write a precis of the above passage. **(3)**

Q3. Write the correct forms of the verbs given in the brackets: (5)

Recently, the Supreme Court _____ (warn) that animal-human conflicts pose a danger to the very existence of forests and wildlife, stressing the need for a balance that _____ (take) care of the rights of both stakeholders. "There _____ (have) to be a balance between the rights of the stakeholders. We cannot take a lopsided view. Forests and wildlife will not exist if conflict between animals and humans _____ (not resolve)," Justice B.R. Gavai observed. The court's observations came while _____ (hear) a case concerning the demarcation of the boundaries of Assam's Pobitora wildlife sanctuary, which hosts one of the largest rhino populations in the country.

Q4. Complete the following conditional sentences: (5)

a. If he had applied for the scholarship, he _____
b. If you don't brush your teeth, you _____
c. He _____ if he doesn't pay attention,
d. If I had remembered his birthday, I _____
e. I could work as a translator in China if I _____ ___Mandarin fluently,

Q5. Fill in the blanks with appropriate forms of verbs given in the brackets: (4)

a. Sixty percent of the students in the class----------(speak/speaks) three languages.
b. The house with large windows _____ (was/were) sold today.
c. Neither the students nor the Principal _____ (has/have) been informed about the incident.
d. Those trousers _____ (is/are) made of pure wool.

Q6. Find the error and correct the sentences: (5)

a. She has a curly hair.
b. They arrived at the airport in Monday morning.
c. He made the boy to do the whole work.
d. She asked to borrow my pen, but I didn't have none.
e. Suresh told to me about it.

Q7. Follow the given instructions to answer: (5)

a. A homonym for "lead"
b. Noun form of verb "prove"
c. One-word substitute for "A sudden and severe shortage of food, typically affecting a large number of people"
d. Use the word 'conspicuous' in a sentence of your own
e. Find the misspelt word: definitely, occasion, neccessary, separate

Q8. Write a job application letter applying for the position of a Software Engineer in Oracle. Invent necessary details and attach a Resume. (6)

Q9. You have a deadline approaching for a group project but two members of your team are ill. Write an email to the Course Coordinator to ask for an extension on the project and clarifying the situation. Invent necessary details. (4)

Malaviya National Institute of Technology Jaipur

Department of Physics

B.Tech II Semester Mid Term Examination 2023-24

Course: Modern Physics **Course Code:** 22PHT102

Date: February 27, 2024 **Duration:** 1 hour 30 minutes **Max. Marks:** 30

Answer all the questions

1. (a) State and explain the significance of de Broglie's hypothesis. (1+2)
   (b) Distinguish between phase velocity and group velocity. (1)
2. Write one dimensional time dependent Schrodinger's wave equation and from there derive the time independent Schrodinger's wave equation in one dimension. (1+4)
3. (a) Draw the wavefunctions and probabilty functions of ground state, first and second excited states, for a particle in 1-D infine potential box of width 'a'. (3)
   (b) For the case n = 3, find the probability that the particle will be located in the region $\frac{a}{3} < x < \frac{2a}{3}$. (2)
4. (a) Calculate the volume of the reciprocal lattice of the face centered cubic lattice. (3)
   (b) A beam of X-rays of wavelength 0.071 nm is diffracted by (110) plane of rock salt (FCC) with the glancing angle of 21° for the second-order diffraction. Find the lattice constant. (3)
5. (a) Find the relaxation time of conduction electrons in a metal of resistivity $1.54 \times 10^{-8}\ \Omega\ m$, if the metal has 5.8×10^{28} conduction electrons/m^3. (2)
   (b) What is Fermi energy and Fermi surface? Derive the expression of electronic density of states (DOS) for a metal in 3-D. (2+3)
6. Write down Fermi-Dirac distribution function for the electrons (Fermions) and plot its characteristic variation with energy for temperatures T = 0 K, and T ≠ 0 K. (1+2)

(Boltzmann constant: 1.38×10^{-23} J K^{-1}; mass of electron 9.1×10^{-31} kg; h=6.62×10^{-34} Js)

MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

Department of Mechanical Engineering

First Year B.Tech (Batch: A,B,C,D,E,F) **Even Semester: 2023-24**

Mid Term Exam **Max Marks: 30**

SUBJECT: Introduction to Mechanical Systems (22MET-101) **Date : 28/02/2024**

Note: 1. All the questions are compulsory. Marks are indicated against each questions.
2. Use of Scientific calculator is permitted. Programmable/graphical calculator is not allowed.
3. Draw neat labelled diagrams, sketches and graphs whenever required. All answers should be to the point.
4. Answer script with matching solution, partly or wholly, will be summarily rejected without prior information.
5. Attempt the questions in the given sequence. Answer of the numerical problems should be accompanied with S.I units.

Section A (3 x 2= 6 Marks)

Que 1. List any four machining operations done on milling machine with neat diagram? **(2)**

Que 2. Explain following mechanical properties of materials a) Strength b) Ductility c) Elasticity d) Hardness **(2)**

Que 3. Give the general classification of 3D printing and list basic steps of 3D printing? **(2)**

Section B (6 x 4 = 24 Marks)

Que 4. Describe in brief brazing and soldering processes and their applications? **(4)**

Que 5. What are the main characteristics which a good moulding sand should posses? **(4)**

Que 6. What are the purposes of the following lathe parts?
a) Tailstock b) Spindle c) Leadscrew d) Compound rest **(4)**

Que 7. Describe the functions of following tools used in foundry with neat diagram
a) Strike - off bar b) Slick c) Rammer d) Vent rod **(4)**

Que 8. Explain the working of 2-stroke petrol engine with neat sketch. In what respect it differ from 4- stroke petrol engine? **(4)**

Que 9. An air engine works on the following cycle: Air is taken in at atmospheric pressure of 1 bar and at temperature of 16°C and is compressed adiabatically, the pressure at the end of the stroke being 35 bar. Heat is taken in at constant pressure the expansion afterwards takes place adiabatically , the ratio of expansion being 5. The air exhausted at the end of the stroke, the heat is assumed to be rejected at constant volume. Find the ideal thermal efficiency. **(4)**

MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

Electronic Devices & Circuits (22ECT104)

Mid-Term Examination, 29th February 2024

Time Allowed – 1:30 hrs **MM-30**

Note: This question paper consists of 5 questions and 1 page. All questions are compulsory.

1. Draw the energy-band diagram and potential diagram of a p-n junction diode in equilibrium, forward & reverse-bias cases with proper marking of all the energy and potential levels. **(6)**

2. Explain the choice ***with appropriate reasons***: **(2+2+2)**
   a) Slope of the output characteristics of CB configuration is..... the slope of output characteristics of CE configuration. [greater than / equal to / lesser than]
   b) I_{CBO} is ..... I_{CEO}. [greater than / equal to / lesser than]
   c) After crossing a biased p-n junction, charge carriers in each side move due to..... [diffusion / drift / thermal energy]

3. Determine the operating point for the circuit in Figure 1. **(4)**

4. With a BJT having h_{fe} = 140 and h_{oe} = 0.1 mS, determine followings:
   a) Operating point, Z_i, Z_o, A_V and A_i in Figure 2. **(5)**
   b) Z_i, Z_o, A_{VNL}, A_V and A_i in Figure 3. **(5)**

5. Design an amplifier with emitter-bias network (without bypass capacitor) having Z_i of 35 KΩ, Z_o of 3 KΩ and A_v of -10. The BJT used has following h-parameter matrix: **(4)**

$$\begin{bmatrix} 625 & 0 \\ 125 & 0 \end{bmatrix}$$

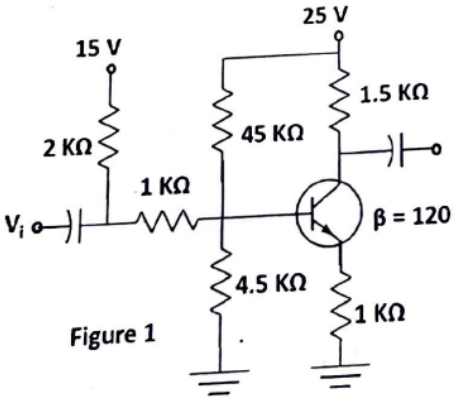


Figure 1

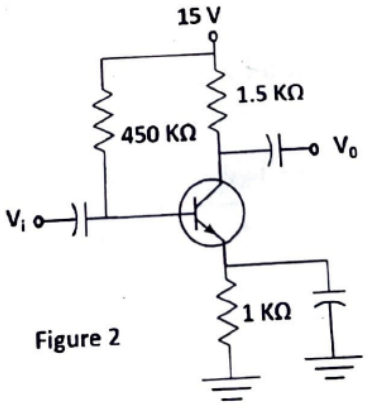


Figure 2

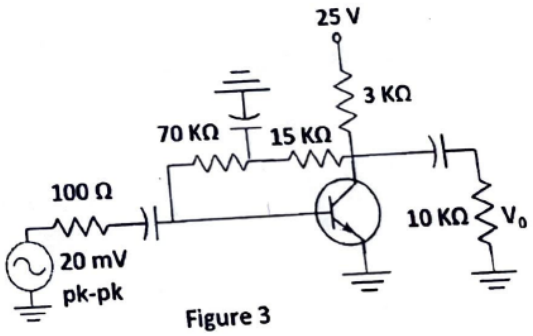


Figure 3

Malaviya National Institute of Technology, Jaipur
B.Tech, Mathematics-II
End-Term examination even semester 2023-24
22MAT102

Maximum Marks: 50 Time: 2.5 hours Date: 1 May, 2024

Each question carries equal marks.

1. Form the partial differential equation by eliminating the arbitrary function from $f(x^2+y^2, z-xy)=0$

2. Using method of variation of parameter, obtain the solution of following differential equation

$$\frac{d^2y}{dx^2} - y = \frac{2}{1+e^{2x}}.$$

3. By method of reduction of order, find the general solution of $x^2\frac{d^2y}{dx^2} + x\frac{dy}{dx} - y = x^2+1$, $y(1)=2$, $y'(1)=-3$; given that $y_1 = x$ is a solution of corresponding homogenous differential equation $x^2\frac{d^2y}{dx^2} + x\frac{dy}{dx} - y = 0$.

4. Find the Laplace transformation of the function $\int_0^t \frac{\sin u}{u} du$.

5. Find the Laplace inverse of $F(s) = \frac{1}{s(s^2+9)} + \frac{e^{-s}}{s^2+9}$.

6. Find the solution of the initial value problem

$$y'' + 2y' + 5y = \delta(t-2),\ y(0)=0,\ y'(0)=0.$$

7. Let $f(t), g(t)$ be piecewise continuous functions on $[0,\infty)$ and be of exponential orders. Then prove that $L[(f*g)(t)] = L[(f(t)]L[g(t)] = F(s)G(s)$

8. Represent the following function by a Fourier sine series:

$$f(t) = \begin{cases} t, & 0 < t \le \frac{\pi}{2} \\ \frac{\pi}{2}, & \frac{\pi}{2} < t \le \pi \end{cases}.$$

9. Express $f(t) = \begin{cases} 1, & \text{for } 0 \le x \le \pi, \\ 0, & \text{for } x > \pi \end{cases}$, as a Fourier sine integral and hence evaluate

$$\int_0^\infty \frac{1-\cos(\pi\lambda)}{\lambda}\sin(x\lambda)d\lambda$$

10. Find the Fourier cosine and Fourier sine transforms of

$$f(t) = \begin{cases} t, & 0 \le t \le l \\ 0, & t > l \end{cases}$$

MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

Department of Mechanical Engineering

First Year B.Tech (A,B,C,D,E,F) **Even Semester: 2023-24**

End Term Exam **Max Marks: 50**

SUBJECT: Introduction to Mechanical Systems(22MET-101) **Date :06-05-2024**

Note: 1. All the questions are compulsory. Marks are indicated against each questions.
2. Use of Scientific calculator is permitted. Programmable/graphical calculator is not allowed.
3. Draw neat labelled diagrams, sketches and graphs whenever required. All answers should be to the point.
4. Answer script with matching solution, partly or wholly, will be summarily rejected without prior information.
5. Attempt the questions in the given sequence. Answer of the numerical problems should be accompanied with S.I units.

Que 1. Suggest a suitable gear drive for the following cases of driver and driven shafts (i) Shafts are intersecting (ii) shafts are non-coplanar and non-intersecting (iii) shafts at an angle (iv) shafts are parallel (v) Gear of infinite radius (5)

Que 2. A diesel engine has a compression ratio of 15 and heat addition at constant pressure takes place at 6% of stroke. Find the air standard efficiency of the engine. Draw the P-V and T-S diagram of diesel cycle also. (5)

Que 3. Explain the principle of arc welding and its applications. List the equipments and tools used with their functions in arc welding with diagram. (5)

Que 4. A carnot refrigerator requires 1.25 KW per ton of referigeration to maintain a region at low temperature of -40°C. Determine (i) COP Carnot refrigerator (ii) Higher temperature of the cycle and (iii) Heat delivered and COP when this device is used as heat pump. Draw the block diagram of heat pump, heat engine and refrigerator. (5)

Que 5. Two pulleys, one 450 mm dia. and other 200 mm dia are on parallel shafts 2 m apart are connected by a crossed belt. Find the length of belt required. What power can be transmitted by a belt when the larger pulley rotates at 200 rpm and maximum permissible tension in the belt is 1KN? Given the coefficient of friction between the belt and pulley is 0.25. (5)

or

In a flat belt drive prove that $T1/T2 = e^{\mu\theta}$,Where T_1 is tension in tight side ,T_2 is tension in slack side, μ is coefficient of friction, θ is angle of lap in radian. (5)

Que 6. Explain the function of five hand tools used in foundry with neat sketch? (5)

Que 7. What is Air Conditioning .What do you mean by ton of refrigeration. Briefly explain the operating principle, list key components, and draw a neat diagram of window air conditioner. (5)

Que 8. A storage tank closed at both ends contains steam at a pressure of 8 bar and temperature of 200°C. It has an internal volume of 0.652 m^3. If the pressure in the storage tank falls to 3 bar due to heat loss from the steam pipe, find the mass of steam in the pipe and then quality and temperature of the steam at the final state. (5)

Que 9. Describe the operation of the two stroke in I C Engine in which only air is taken during the suction stroke. How it is different from petrol engine. (5)

Que 10. Draw a neat diagram of centre lathe indicating various key component. List any five lathe operations. (5)

MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

Department of Physics, End-term Examinations 2024, Even Semester

B. Tech: Modern Physics **Course Code: (22PHT102)** **Time: 2.5 Hours** **Max Marks: 50**

Date: 3rd May 2024

Note: Answer all the questions.

Q1. **(a)** Derive the wave equation for electromagnetic waves in free space. Prove that magnetic field vector $\vec{B}$ is perpendicular to both the propagation vector $\vec{k}$ and electric field vector $\vec{E}$. [6]

(b) Write the Maxwell's equations in integral form. Using Faraday's law, determine $\vec{B}$, if $\vec{E} = xy^2 e^{-t}\hat{z}$, and $\vec{B} = 0$ at $t = 0$. [4]

Q2. **(a)** Derive an expression for the Poynting theorem and explain the physical significance of all of its terms. [6]

(b) Derive the continuity equation in electrodynamics and discuss its physical significance. [4]

Q3. **(a)** A parallelepiped sample of copper (resistivity $\rho = 1.6 \times 10^{-8}\,\Omega m$, length $L = 10\,cm$, width $W = 8\,cm$, height $H = 6\,cm$) is placed in a uniform magnetic field ($B_0(\hat{z})$) of 0.1 Tesla with its edges parallel to the axes. If an external emf ($V_0 = 10\,V$) is applied on the opposite faces along x-direction, then calculate the Hall voltage (V_H) developed in the sample (along $\hat{y}$) for the following orientations. ($R_H = -0.8 \times 10^{-10} m^3 A^{-1} s^{-1}$) [6]

(i) $L\,(\hat{x}), W\,(\hat{y}), H\,(\hat{z})$; (ii) $W\,(\hat{x}), L\,(\hat{y}), H\,(\hat{z})$.

(b) Explain the direct and indirect bandgap semiconductors with the help of E-k diagrams. [4]

Q4. **(a)** State the Bloch theorem and explain the origin of band gap in solids with suitable equations and diagrams. [6]

(b) There are 2.5×10^{28} free electrons per cubic meter of sodium. Calculate the Fermi energy and Fermi velocity. [4]

Q5. **(a)** What is the lowest allowed energy and corresponding wave function for a particle in a 3D box with equal edge lengths? Calculate the degree of degeneracy for the first four energy states. [6]

(b) A particle of mass m, which is confined to move in one dimension between 0 and L, is described by the wave function $\psi(x) = Ax(L - x)$. Normalize the wave function and find out the location of the maximum probability of finding the particle. Derive an expression for the average value of the position of the particle. [4]

(Boltzmann constant: $1.38 \times 10^{-23}\,J\,K^{-1}$; mass of electron 9.1×10^{-31} kg ; h=6.62×10^{-34} Js)

MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

Electronic Devices & Circuits (22ECT104)

End-Term Examination, 07th May 2024

Time Allowed – 2:30 hrs **MM-50**

Note: This question paper consists of 7 questions and 1 page. All questions are compulsory.

1.

a) What are the advantages of negative feedback? Explain the concept of gain desensitivity with negative feedback. **(4)**

b) Explain the concept of oscillator operation. Draw the circuit diagrams of RC-phase shift and Wien-bridge oscillator circuits and state the expression of output frequency for each circuit. **(4)**

c) Compare the pinch-off states of Depletion and Enhancement type MOSFETs. State the current expressions in various operating regions of Depletion and Enhancement type MOSFETs. **(4)**

d) Describe three modes of operation of a MOS *Capacitor*. Define the threshold voltage of a MOSFET. **(4)**

e) **(4)**

I. Channel in the enhancement MOSFET is formed under.....mode. (Accumulation/Depletion/Inversion)

II. BJT functions as an amplifier in.....region. (Cutoff/Active/Saturation)

III. MOSFET operates as an amplifier in.....region. (Cutoff/Linear/Saturation)

IV. .....is relatively more stable thermally. (BJT/MOSFET)

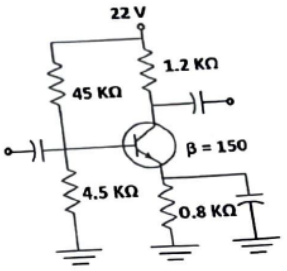


Figure 1

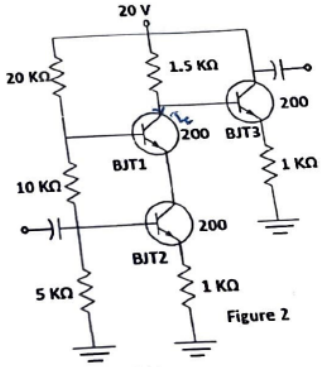


Figure 2

2. An amplifier with $A_v = 250$; $Z_i = 200$ kΩ; $Z_o = 2$ kΩ; $f_L = 5$ kHz; $f_H = 50$ kHz, is connected in a voltage-series feedback configuration with feedback factor of 0.1. Determine the modified A_v, Z_i, Z_o and bandwidth. **(4)**

3. Determine the Q-point, Z_i, Z_o and A_v for the circuit in Figure 1. **(5)**

4. Determine I_E and V_{CE} for each BJT for the circuit in Figure 2. **(5)**

5. Determine the overall voltage and current gains for the BJT network of Figure 3. **(5)**

6. Determine the Q-point, Z_i, Z_o and A_v for the circuit in Figure 4. **(5)**

7. Calculate the following for circuit in Figure 5: **(6)**
I) V_D-V_C; II) Voltage gain; III) Suggest a method to reduce the gain by 20% without changing Q-points of BJT and MOSFET in this circuit.

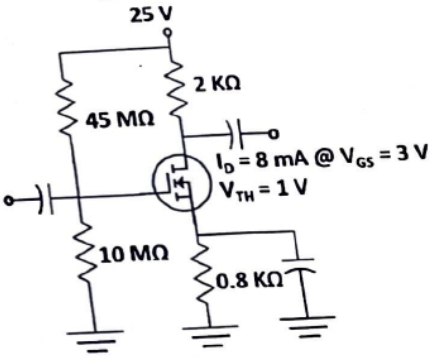


Figure 4

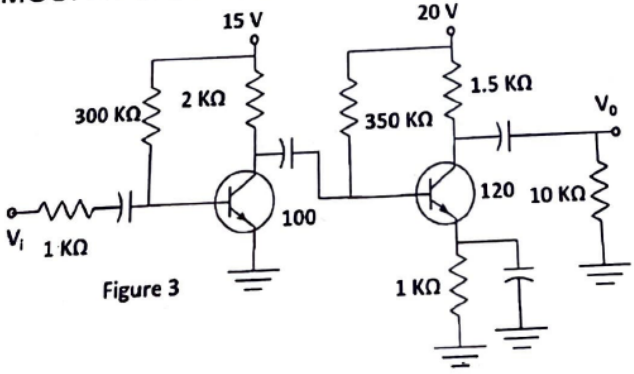


Figure 3

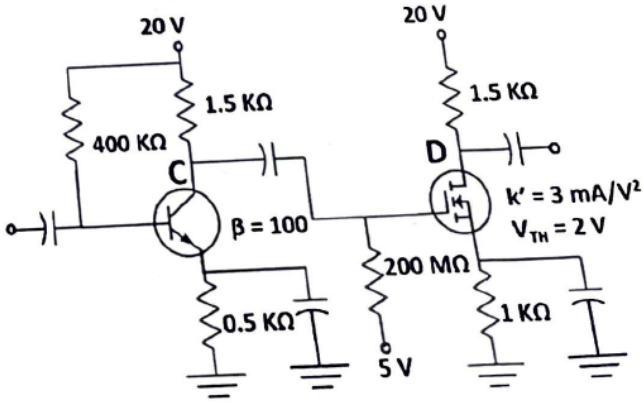


Figure 5

Malaviya National Institute of Technology Jaipur
Department of Electronics and Communication Engineering
II Semester B.Tech.(ECE) Mid Term Exam

22ECT104 Signals and Systems

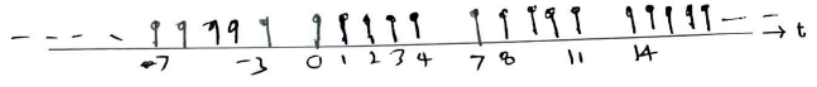
VLTC-206, 207, 208
Max marks: 50

May 8, 2024
1:20 to 3:50 PM

Instructions:
1. Interpret any bad data (if any)
2. Attempt any **five questions**

Student ID:

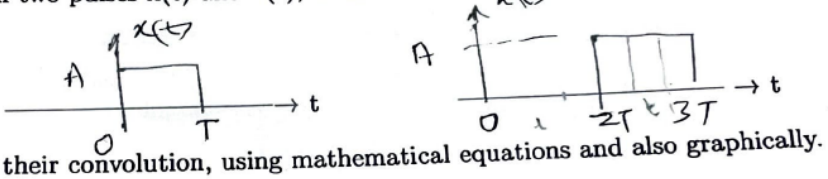
1. (a) Given the following discrete time periodic signal $x[n]$



(CO1,2)

Evaluate its DTFS equation. **(5)**

(b) Given two pulses x(t) and h(t), as shown below



Find their convolution, using mathematical equations and also graphically. **(5)**

2. (a) Find the frequency components of the following periodic signal

$y(t) = \sum_{-\infty}^{+\infty} A\ rect\left(\frac{t-nT_s}{T}\right)$ where $T_s > T$

(CO1,2)
(5)

(b) Evaluate and sketch the Fourier Transform of the integral of h(t), as shown in Q.1(b) above

(CO2)
(5)

3. (a) Write the analysis and synthesis equations of Disrete-Time Fourier Series (DTFS). How do we evaluate the Disrete-Time Fourier Transform (DTFT) from the DTFS equations.

(CO2)
(5)

(b) Write a short note on comparison of the Fourier and Laplace transforms. Evaluate the Laplace transform of the following signal

$$x(t) = 3e^{2t}u(-t) - 2e^{-t}u(t)$$

4. (a) What is the role of Region of Convergence (RoC) in z-tranforms? Explain all the different types of possible convergence regions. (CO2) (5)

(b) Why are the communication systems preferred to be Linear Time-Invariant (LTI)? Write the properties of such LTI systems. (CO2) (5)

5. (a) What is the need to compute Fast Fourier Transform (FFT)? Discuss it in terms of the reduced computational complexity.
Draw the butterfly diagram of an 8-point FFT. (CO2) (5)

(b) Find the inverse fourier tranform of the following signals
(i) $\delta(f)$
(ii) $u(f)$
(iii) $rect(f)$
(iv) $sinc(f/W)$, W is a constant
(v) convolution of (i) and (ii) (CO2) (5)

$u(f)$ $f(t) = \frac{1}{2\pi}\int_0^{\infty} e^{+j\omega t}\,d\omega$ $\left[e^{j\omega t}\right]_0^{\infty}$ $\frac{1}{jt}$ $\frac{1}{2\pi}$

$u(t) = \frac{1}{j\omega}$ $-\frac{1}{jt}\div 2\pi$

Best wishes

2023UEC119

MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR
Department of Humanities & Social Sciences

End-term Examination [B. Tech. Semester II, Sections: A, B, C, D, E & F] ***May 2024***

22HST101: Basic Economics

Duration: 2.5 hours Max. Marks: 50

Section A

This section contains twelve questions carrying two marks each.
Attempt any TEN questions. **[10 x 2 marks = 20 marks]**

1. Why should policymakers think about incentives?
2. Popeye's income declines, and he buys more spinach. Is spinach an inferior or a normal good? What happens to Popeye's demand curve for spinach?
3. How does a surplus or shortage occur in a market? Illustrate with the help of demand and supply curves.
4. Seema has decided always to spend one-third of her income on clothing. What is her income elasticity in terms of clothing demand?
5. Can Indifference curves intersect each other? Give reason.
6. Anu's budget line relating good X and good Y has an intercept of 50 units of good X and 20 units of good Y. If the price of good X is Rs.12, what is Anu's Income and the price of good Y?
7. A firm's short-run production function is given by $Q=10L-0.5L^2$ where Q is the quantity of output and L is the quantity of labour. Determine the average product of labour (AP_L) when $L=8$.
8. Define the Marginal Rate of Technical Substitution (MRTS).
9. Suppose you and your roommate started a burger delivery service on campus. List some of your fixed and variable costs.
10. What are the characteristics of a competitive market? Which of the following drinks do you think is best described by these characteristics?
    a) tap water b) bottled water c) cola
11. What is Purchasing Power Parity (PPP)? How does PPP help in comparing living standards and prices between different countries?
12. Why is it desirable for a country to have a large GDP? Give an example of something that would raise GDP and yet be undesirable.

Section B

This section contains seven questions carrying five marks each.

Attempt any SIX questions. **[6 x 5 marks = 30 marks]**

13. Imagine that you are a policymaker trying to decide whether to reduce the rate of inflation. To make an intelligent decision, what would you need to know about inflation, unemployment, and the tradeoff between them?
14. What are the conditions of the consumer's equilibrium under the indifference curve analysis? Illustrate.
15. Explain the Law of Variable Proportion. Define the stage of rational production decision in the short run.
16. Compare and contrast the market structures of monopoly, monopolistic competition, and oligopoly. Highlight the differences in terms of market power, barriers to entry, product differentiation, pricing behaviour, and efficiency.
17. Shubhangi's Juice shop has the following cost schedules:

Quantity	Total Variable cost	Total Cost
0	0	30
1	10	40
2	25	55
3	45	75
4	70	100
5	100	130
6	135	165

   a) Calculate total fixed cost (TFC), average variable cost (AVC), average fixed cost (AFC), average total cost (ATC), and marginal cost (MC) for each quantity.
   b) How are the marginal cost and average total cost curves for a typical firm related?
18. A small manufacturing company produces perfume bottles. The company's total cost (TC) function is given by $TC=1000+20Q$, where Q is the number of perfume bottles produced. The market price (P) is Rs 50, and the total revenue (TR) function is $TR=50Q$. Calculate: **a)** Average Revenue (AR); **b)** Marginal Revenue; **c)** determine the break-even level of output **d)** analyse the firm's profit situation.
19. Define economies of scale and diseconomies of scale. Explain why they might arise.

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MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

Department of Humanities & Social Sciences

Mid-term Examination [B. Tech. Semester II, Sections: A, B, C, D & E] ***February 2024***

22HST101: Basic Economics

Duration: 1.5 hours Max. Marks: 30

Section A

Attempt any five questions in about 50 words each. **[5 x 2 marks = 10 marks]**

1. Define microeconomics and macroeconomics.
2. Explain the concept of trade-off and opportunity cost using an example.
3. What are the two main causes of market failure? Explain with the help of an example for each.
4. What are the factors that affect demand? State the law of demand?
5. List any four factors affecting the price elasticity of demand.
6. What is the law of diminishing marginal utility?

Section B

Attempt any five questions in about 150 words each. **[5 x 4 marks = 20 marks]**

7. Explain the circular flow of income using a four-sector model.
8. Draw and explain a Production Possibility Frontier (PPF) for an economy that produces only two goods, X and Y. What happens to this frontier in case of the following events:
   a) Technological advancement in the industry producing good X
   b) Destruction of resources due to an earthquake
9. Classify each of the following statements as positive or normative. Give reason.
   a) Society faces a short-run trade-off between inflation and unemployment.
   b) The government should reduce subsidies on fossil fuels to promote cleaner energy alternatives.
   c) A higher industrial productivity can be achieved if the government prioritizes infrastructural development.
   d) The growth in real GDP during 2022-23 is estimated at 7.2 percent.
10. Consider the market for pizza. For each event listed below, draw a diagram to show the effect on the equilibrium price and quantity of pizza. Indicate whether demand or supply increases or decreases. Also, identify which of the determinants of demand or supply are affected.
    a) New and efficient ovens are launched.
    b) A growing number of people are becoming vegan.
    c) There is an outbreak of Lumpy Skin disease, which primarily affects cattle.
    d) The price of the burger reduces
11. Suppose the demand curve for a product is given by $Q_x = 50 - 2P_x + P_y$, where Q_x is quantity demanded of good X, P_x is price of good X, and P_y is price of a related good.
    Given $P_x = ₹10$ and $P_y = ₹20$,
    a) Find the price elasticity of demand. Based on this value, suggest whether the good X is a necessary good or a luxury good.
    b) Find the cross-price elasticity of demand. Comment on the nature of the relationship between good X and good Y.
12. (i) Distinguish between cardinal and ordinal concepts of utility.
    (ii) Define Total Utility (TU) and Marginal Utility (MU). With the help of a diagram, explain their inter-relationship.

decline

Text -1

Infosys Founder Narayan Murthy's Letter to his daughter Akshata

Akshata,

Becoming a father transformed me in ways that I could never have thought possible. I could never go back to being the person I used to be before. Your arrival in my life brought unimaginable joy and a larger responsibility. I was no more just a husband, a son, or a promising employee of a fast-growing company. I was a father, who had to measure up to the expectations his daughter would have of him at every stage of her life.

Your birth raised the benchmark of my life, in every aspect. My interactions at the workplace became more thoughtful and measured; the quality of my transactions with the outside world more considerate, dignified, and mature. I felt a need to deal with every human being more sensitively and courteously. After all, some day you would grow up and understand the world around you, and I didn't want you ever to think that I had done anything even remotely wrong.

My mind often goes back to the initial days after your birth. Your mother and I were young then and struggling to find our feet in our careers. Two months after your birth in Hubli, we brought you to Mumbai, but discovered quickly enough, that it was a difficult task to nurture a child and manage careers side by side. So, we decided that you would spend the initial years of your life with your grandparents in Hubli. Naturally, it was a hard decision to make, one which took me quite a bit of time to come to terms with. Every weekend, I would take the plane to Belgaum and then hire a car to Hubli. It was very expensive, but I couldn't do without seeing you.

What never ceased to amaze me was how you created your own little happy world at Hubli, surrounded by your grandparents and a set of adoring aunts and relatives, oblivious of our absence from your life…

I am often asked about the qualities that I have imparted to my children. I tell them that it is your mother who shouldered this great responsibility and I am ever so grateful to her for bringing you up to be the fine individuals you are. She communicated values more by action than by talking about them. She taugh

Rohan and you the importance of simplicity and austerity. There was this one instance, in Bangalore, when you were selected for a school drama for which you were required to wear a special dress. It was in the mid-eighties, Infosys had just begun its operations, and we did not have any money to spend on non-basic goods. Your mother explained to you that we would not be able to buy the dress and that you would have to drop out of the performance. Much later, you told me that you had not been able to understand or appreciate that incident. We realize it must have been a bit drastic for a child to forgo an important event in school, but, we know you learnt something important from that- the importance of austerity.

Life has changed for us since then and there is enough money. But, you know, our lifestyle continues to be simple. I remember discussing with your mother the issue of sending you kids to school by car once we were a little comfortable with money, but your mother insisted that Rohan and you go to school with your classmates in the regular autorickshaw. You made great friends with the 'rickshaw uncle' and had fun with the other kids in the auto. The simplest things in life are often the happiest and they are for free.

You would often ask me why there was no television at our home when the rest of your friends discussed stuff they watched on TV. Your mother decided early on that there would be no TV in Our home so that there would be time for things like studying, reading, discussions, and meeting friends. She insisted that it was important to create an environment conducive to learning at home. Therefore, every night we dedicated the time between 8 pm and 10 pm to pursuits that brought the family together in a productive environment. While Rohan and you did your schoolwork, your mother and I read books on History, Literature, Physics, Mathematics, and Engineering, or did any office work.

It is quite a well-known fact that when a daughter gets married, a father has mixed feelings about it. He hates the fact that there is somebody else in his daughter's life with whom she shares her affections–a Smart, confident, younger man who gets the attention that was earlier his alone. I, too, was a little sad and jealous when you told us you had found your life partner. But when I met Rishi and found him to be all that you had described him to be-brilliant, handsome, and, most importantly, honest-I understood why you let your heart be stolen. It was then that I reconciled to sharing your affections with him. A few months ago, you made me a proud grandparent. If holding you in my arms for the first time gave me indescribable joy, seeing Krishnaa, your lovely daughter, for the first time at your home in Santa Monica, was a different experience altogether. I wondered, whether from now on, I

MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR
Department of Humanities and Social Sciences
B. Tech. Sem II, Mid-Term Examination, February2024
Sub Code: 22HST106, Sub: English Communication Skills

M.M:30 **Time: 1 Hr.30 min.**

Q1. Answer the following questions in about 100-150 words: **(6)**

a. Elaborate the formative influences on Satya Nadella as detailed by him in his mail to employees of Microsoft.
b. How did Murthy parents create a conducive environment for learning at home?
c. Discuss how Microsoft empowers people to "do more".

Q2. Read the following passage and answer the questions that follow: **(5)**

The Indian Railways faced criticism for stampedes during the holiday rush, one of which killed one person and injured two others in Surat. Similarly, the cancellation of a special train to Bihar scheduled for the upcoming Chhath Puja festival in Punjab saw passengers vandalizing the train, as their anticipated journey was abruptly terminated. Meanwhile, videos posted by several news outlets as well as travellers from Mumbai's Lokmanya Tilak Terminus and Delhi's Anand Vihar station depicted massive crowds scurrying to board the train. A video posted by Press Trust of India captured the commotion, showing people thronging the station even before the train's arrival. The incidents prompted renewed conversation about India's overpopulation problem again.

Overpopulation, as traditionally defined, implies an unsustainable increase in the number of people relative to available resources. However, this viewpoint tends to neglect the fact that the challenge is not merely about numbers but about the distribution and utilization of resources, which exacerbates the consequences of population growth. In India, as in many parts of the world, the unequal distribution of wealth and resources intensifies social and economic disparities. Many have argued that the focus should shift from limiting population growth to the root cause – unequal access to resources.

The term 'overpopulation,' has permeated numerous discussions regarding the Global South's delayed development, including India. Soon after Independence, it became the reason for mass hysteria due to the release of a book called "The Population Bomb" in 1968, which attempted to predict the future, by a biologist Paul Ehrlich. Ehrlich's narrative laden with concerns about overpopulation not only seized the attention of Global North due to the prevailing anxieties around scarcity in a post WWII era, it also became a compelling pretext for their intervention – through welfare plans – into scapegoating the Third World countries – who were trying to revive both their depleted populations and economies after years of colonialism and war. Thus, the rising population alongside heavy industries in the Global South became a convenient target for deflecting blame, distracting attention from the prolonged industrialization pursuits of the very nations leveling these accusations– of overpopulation and pollution.

a. What are the problems causing issues with train stations in India? (1)

b. Why did the term 'overpopulation' become a reason for mass hysteria? (1)
c. Write a precis of the above passage. (3)

Q3. Write a paragraph on any one of the following topics (200-250 words): (5)

a. Fighting Fake News in Media
b. Mental Health and Academic Pressure
c. The Future of AI

Q4. Follow the given instructions: (5)

a. Write two words with the prefix 'Im-'
b. Find the root and write the meaning of the underlined word in the following sentence: The workers have decided to speak against the <u>maltreatment</u> they have been facing at their workplace.
c. Noun form of the word: Transform
d. Verb form of the word: Excellent
e. Suggest one synonym and antonym for 'Incredible'

Q5. Write the correct forms of the verbs given in the brackets: (5)

The expansion of renewable energy sources is reducing reliance on fossil fuels and _____ (mitigate) the impact of climate change. If governments increase investments in renewable energy infrastructure, they _____ (can) accelerate the transition to a low-carbon economy. Many countries have set ambitious targets for renewable energy deployment, which _____ (spur) innovation and job creation in the renewable energy sector. However, challenges remain in _____ (integrate) renewable energy into existing power grids, and concerted efforts _____ (need) to overcome these obstacles.

Q6. Fill in the blanks using the correct conditional forms: (4)

a. If the weather improves tomorrow, _____
b. When I finish my degree next year, _____
c. I would travel the world if _____
d. Had I known about the concert earlier, _____

Malaviya National Institute of Technology Jaipur
Department of Electronics and Communication Engineering
II Semester B.Tech.(ECE) Mid Term Exam

22ECT104 Signals and Systems

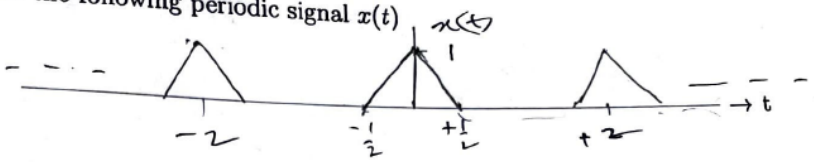
VLTC-207, 208
Max marks: 30

March 1, 2024
8:15 to 09:45 AM

Instructions:
1. Interpret any bad data (if any)
2. Attempt all the **three questions**

Student ID:

1. (a) Given the following periodic signal $x(t)$

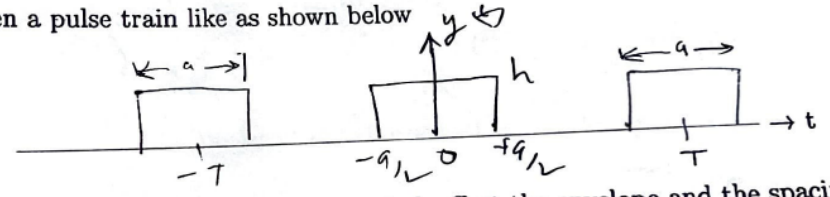


(CO1,2)

i. What is the period T in seconds
ii. What is the frequency f in Hz
iii. What is the frequency ω in rad/sec
iv. What is the first harmonic f_0 - the fundamental frequency - in Hertz
v. What is the third harmonic in Hz

(5)

(b) Given a pulse train like as shown below



i. How does increasing the magnitude h affect the envelope and the spacing and amplitudes of the harmonics

ii. How does decreasing the pulse width a affect the envelope and the spacing and amplitudes of the harmonics

iii. How does increasing the period T affect the envelope and the spacing and amplitudes of the harmonics

(CO1)
(5)

2. (a) i. Sketch the Fourier Transform $F[x(t)(cos(2\pi 1000t) + cos(2\pi 2000t))]$

ii. Sketch the magnitude of the Fourier Transform $F[x(t)p(t)]$ where p(t) is a pulse train of fundamental frequency $f_0 = 1$ KHz

(CO1,2)
(5)

(b) The synthesis equation of Disrete-Time Forier Series (DTFS) pair is given by (1)

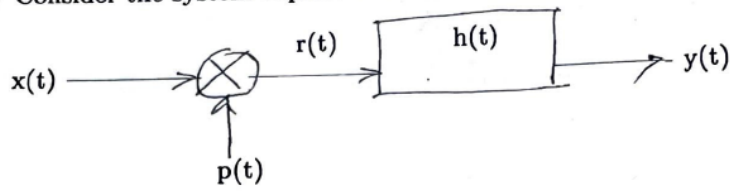
$$x[n] = \sum_{k=<N>} a_k e^{jk\omega n}$$

How do we evaluate the coefficients a_k in the above equation?

Now, consider a discrete-time LTI system with impulse response $h[n] = 2^n u[4-n]$.

(i) Is this system causal? Justify your answer.
(ii) Is this system stable? Justify your answer. (CO2)
(5)

3. (a) Consider the system depicted below,



where

$$r(t) = x(t)p(t) \quad (2)$$

$$x(t) = \frac{sin(4\pi t)}{\pi t} \quad (3)$$

$$p(t) = 2cos(2\pi t) \quad (4)$$

and the impulse response h(t) is given by

$$h(t) = 1 + 3sin(4\pi t) + 2cos(8\pi t) \quad (5)$$

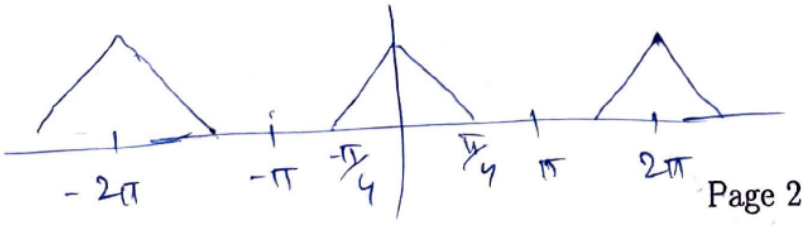
(i) Provide a labeled sketch of $R(j\omega)$, the Fourier transform of r(t).
(ii) Determine y(t).
(CO2)
(5)

(b) Consider a signal x[n] with Fourier Trasform $X(e^{j\omega})$ shown below

and let $w[n] = p[n]x[n]$ where

$p[n] = cos\pi n - cos(\pi\frac{n}{2})$

Sketch $W(e^{j\omega})$, the Fourier Transform of $w[n]$ (CO2)
(5)



Best wishes