Swami Keshvanand Institute of Technology, Management & Gramothan

Approved by AICTE, Ministry of HRD, Government of India
Recognized by UGC under Section 2(f) of the UGC Act, 1956
Affiliated to Rajasthan Technical University, Kota

Assignment Sheets Sample

Swami Keshvanand Institute of Technology, Management & Gramothan,
Ramnagaria, Jagatpura, Jaipur-302017, INDIA
Approved by AICTE, Ministry of HRD, Government of India
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## Assignment No.-1

Maximum Marks: 06   **Submission Date:**

Two Marks Questions (2M X 10=20)

1. Based on the principle of conservation of energy, write an energy balance equation for a motor. Discuss briefly about the four energy terms involved.

2. Clearly state Ampere's circuital law?

3. Write down the expression for reluctance. What is its unit?What is mean length and its importance?

4. Given two magnetic materials with permeability $\mu1$ and $\mu2$ with $\mu1 > \mu2$.
    Which of these two, you will choose to make a magnetic circuit and why?

5. Write the magnetic field energy stored W_{fld} in terms of (i) flux and reluctance; (ii) flux linkage and current; (iii) self inductance and current; (iv) flux linkage and inductance; (v) mmf and reluctance; (vi) mmf and flux; (vii) B and H; (viii) μ and B

6. Why not the operating point is selected in the saturation zone of the B-H characteristic?

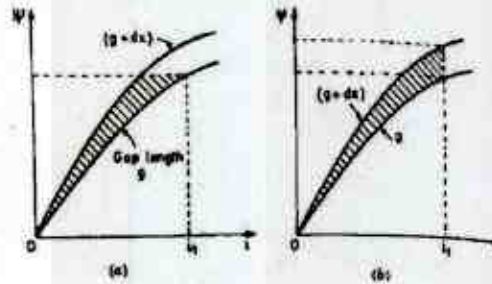7. Draw the equivalent electrical circuits representation of magnetic circuits for the Figs. below:
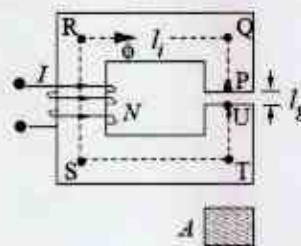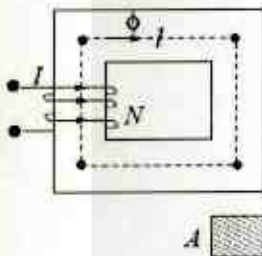
8. Explain the principle of transformer action. Derive an expression for the emf induced in a transformer winding. Show that emf per turn in primary is equal to emf per turn in the secondary.

9. Draw and explain the no-load phasor diagram of a 1-phase transformer. Discuss how primary leakage flux is accounted for in the phasor diagram.

10. Explain why transformer rating is expressed in kVA or VA? Describe the significance of all the items mentioned on the name-plate of a single-phase transformer.

Four Marks Questions (4M X 5=20)

11. Write expression for mechanical work done fe.dx from a physical consideration of Fig (a) and hence find an expression for the magnetic force fe.

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Repeat Qs 11 for Fig. (b).

12. For a linear magnetic circuit, derive the following relations for the stored magnetic energy W_{fld} and W_{fld}':
    Wfld= Wfld' = $(1/2) F\Phi$ = $(1/2) \Psi i$ = $(1/2)\Phi^2 S$ = $(1/2) (\Phi^2/\Delta)$ = $(1/2) (F^2/S)$ = $(1/2)Li^2$ = $(1/2) (\Psi^2/L)$ joules.
    Hence show that the magnetic stored energy density w_{fld} is given by $(1/2) B^2/\mu$ joules/m^3

13. The doubly-excited magnetic system has the following self and mutual inductances:
    Ls =Lr =3+cos2θ, M=2cosθ, where θ is the angle between the axis of stator and rotor coils. The coils, connected in series, carry a current of $i=2^{1/2}$ I cosωt. Determine the time-average torque as a function of angle θ.
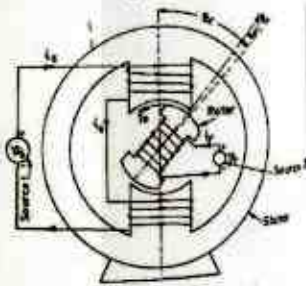
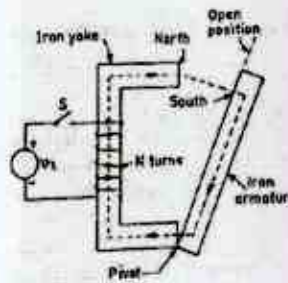

Fig. Doubly-excited magnetic system

Fig.2 Simple magnetic relay

14. For the simple magnetic relay of Fig 2, variation of flux linkage Ψ in terms of current I and displacement x from the open position is given by the relation $\Psi=ix^{1/2}$. Obtain an expression for the magnetic force.

15. In the magnetic circuit detailed in Figure below with all dimensions in mm, calculate the required current to be passed in the coil having 200 turns in order to establish a flux of 1.28 mWb in the air gap. Neglect fringing effect and leakage flux. The B-H curve of the material is given in Figure. Permeability of air may be taken as, $\mu0 = 4\pi \times 10-7$ H/m.
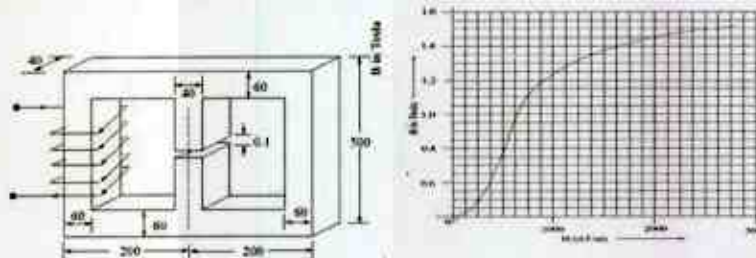
Eight Marks Questions (8M X4=32)

16. A 5 kVA, 200 V / 100 V, 50 Hz single phase transformer has the following parameters:
HV winding Resistance = 0.025
HV winding leakage reactance = 0.25
LV winding Resistance = 0.005
LV winding leakage reactance = 0.05
Resistance representing core loss in HV side = 400
Draw the equivalent circuit referred to (i) LV side and (ii) HV side and insert all the parameter values.

17. A 10 kVA, 1000 V / 200 V, 50 Hz, single phase transformer has HV and LV side winding resistances as 1.1 and 0.05 respectively. The leakage reactance of HV and LV sides are respectively 5.2 and 0.15 respectively. Calculate (i) the voltage to be applied to the HV side in order to circulate rated current with LV side shorted; (ii) Also calculate the power factor under this condition.

18. Draw the complete phasor diagrams of a single phase transformer when (i) the load in the secondary is purely resistive and (ii) secondary load power factor is leading.

19. (a) A 30KVA, 6000/230V, 50Hz single phase transformer has HV and LV winding resistances of 10.2 and 0.016 respectively. The equivalent leakage reactance as referred to HV side is 34. Find the voltage to be applied to the HV side in order to circulate the full load current with LV side short circuited. Also estimate the full load % regulation of the transformer at 0.8 lagging power factor.

(b) The following data were obtained from testing a 48 kVA, 4800/240V, 50 Hz transformer. At what kVA the transformer should be operated for maximum efficiency? Also calculate the value of maximum efficiency for 0.8 lagging power factor load.

| O.C test (from LV side): | 240 V | 2 A | 120 W |
| S.C test (from HV side): | 150 V | 10 A | 600W |

Assignment-II (Electrical Machine-II)
Part-A

1. Define slip of a 3-phase induction motor.
2. Compare induction motor with transformer?
3. We want to make a 60Hz AC motor with synchronous speed of 600 rpm. How many poles should the machine have?
4. Find the synchronous speed of a 6-pole 50 Hz AC motor in revolution per minute
5. At what speed (in rps) the magnetic field produced by the stator of an 8 pole 50Hz motor would rotate with respect to the earth-frame if the stator is not moving in the earth-frame?
6. A 12-pole 50 Hz AC motor (rotor) is rotating at the speed of 400 rpm. Find the slip in percentage.
7. If a 4 pole 50 Hz Ac machine is running at 5% slip, then what is the speed of the rotor in rpm?
8. How much EMF is induced in the rotor of an induction motor when it is operating at the synchronous speed?
9. How much current flows through the rotor winding of an induction motor when it is operating at the synchronous speed?
10. How much electromagnetic torque is produced in an induction motor when it is operating at the synchronous speed?

Part-B

11. The rotor of a 4-pole AC machine is excited with a 50 Hz supply which produces a rotating magnetic field that rotates in the clockwise direction with respect to the rotor (the stator is not excited). At the same time, the rotor is rotated in the clock wise (**same**) direction at the speed of 500 rpm by some external means. What would be the magnitude of the speed (mechanical) of the rotating magnetic field with respect to the earth (in rpm)?
12. Given that the number of stator turns per phase is 100 and the stator winding factor is 0.85. The number of rotor turns per phase is 85 and the rotor winding factor is 0.90. Both the stator and the rotor are connected in star configuration. If 100V (line to Neutral RMS) supply is connected to the stator, how much voltage will be generated in the rotor (line to Neutral RMS) (in Volt) when the rotor is held stationary?
13. The normal full load slip of a 500 h.p. 50-Hz, 3-phase induction motor is 1.9%. The rotor winding has a resistance of 0.25 Ω and a standstill reactance of 1.5 Ω per phase. Neglect stator impedances magnetizing current. Estimate the per phase full load current (in A)
14. A 3-phase induction motor with synchronous speed of 1000 rev per minute develops 5 mechanical h.p. at 935 rev per minute. What is the stator input (in kW) if the stator loss is 400 W?
15. A 6-pole, 50-Hz induction machine has net flux per pole is given to be 0.25 Wb. The winding factor of the rotor is 0.8. Number of turns per coil-group of the rotor = 10. Compute the RMS value of the EMF induced (in Volt) in each coil-group of the the rotor when the rotor is running at a 950 rpm.

Part-C

16. A 6-pole, 50 Hz, 3-phase induction motor running on full load develops a useful torque of 162Nm, and the EMF induced in the rotor has a frequency of 90 cycles per minute. The mechanical torque lost in friction is 13.5 Nm. Stator losses total 750 W. Estimate the brake horse-power (i.e. the useful mechanical power) in h.p. unit.
17. In above question estimate the copper loss in the rotor winding in Watt.
18. In above question estimate the input power in kW unit.
19. In above question estimate the efficiency in percentage.
20. A 3-phase, wound rotor induction motor has following parameters Rotor resistance = 0.02 Ω per phase Rotor reactance = j 0.1 Ω per phase Stator impedances, rotational losses and no-load current are negligible. The maximum torque occurs at slip = _____ %

Assignment-I (Electrical Machine-II)

Part-A

1. What do you understand by active portion and overhang in winding?
2. Name different types of AC windings.
3. Define pitch factor.
4. Define distributed factor.
5. Differentiate concentrated and distributed winding.
6. Name types of rotor used in induction motor.
7. Why skewing of rotor is done?
8. Give application of induction motors.
9. In case of a 6 pole AC machine if we write θelectrical $=k$ θmechanical, then k=?
10. A 4 pole AC generator is rotating at the speed of 1800 revolution per minute. What will be the frequency of generated EMF in Hz?

Part-B

11. A 6 pole AC generator has 120 slots on the rotor. If one side of a coil is placed in slot number 11, then in which slot the other side should be to have maximum value of EMF generated in the coil?
12. A 6-pole AC generator has 240 rotor slots. How much will be the phase difference between the induced EMFs in two coils placed in two consecutive slots (in degrees)?
13. The coil span for the stator winding of an alternator is 120o. Find the chording factor of the winding.
14. Calculate the distribution factor for a 36-slots, 4-pole, single layer 3-phase winding.
15. In an Indian hydel power plant, the turbine is rated to rotate at a speed around 500 revolutions per minute. How many poles should the alternator have?

Part-C

16. 2 pole, 3-phase,50 Hz,2300 V synchronous machine has 42 slots. Each slot has two conductors in double layer winding. The coil pitch is 17 slots. Each phase winding has 2 parallel paths. Calculate flux per pole required to generate a phase voltage of 2300/√3 volts.
17. A three phase 50 Hz star connected alternator with 2-layer winding is running at 600 RPM. It has 12 turns per coil, 4 slots per pole per phase and a coil pitch of 10 slots. If the flux per pole is 0.035 Wb, sinusoidally distributed. Find the phase and line EMF induced. Assume that total turns per phase is series connected.
18. Calculate the RMS value of the induced EMF per phase of a 10-pole, 3-phase, 50Hz alternator with 2 slots per pole per phase and 4 conductors per slot in two layers. The coil span is $150°$. The flux per pole has a fundamental component of 0.12Wb and a third harmonic component is 20% of fundamentals magnitude
19. Air-gap flux density of an 8-pole AC generator has a 3rd harmonic component. The amount of 3rd harmonic flux is $\phi3= 0.02$ wb per (3rd harmonic-) pole. The machine is rotating at 15 RPS. Compute the RMS value of induced 3rd harmonic voltage (in Volt) in a coil with N=10 turns. The two sides of any coil is placed 180°(electrical) apart with respect to the fundamental poles. (Use π=3.14 and √2=1.41).
20. A 50 Hz AC generator has 0.5 Wb flux per pole. Each rotor coil has 10 turns. Coils are full-pitched. How much will be the RMS value of the EMF generated per coil?

SWAMI KESHVANAND INSTITUTE OF TECHNOLOGY MANAGEMENT & GRAMOTHAN, JAIPUR

Subject: Digital Electronics (3CS3-04)

Branch: CSE

Session 2019 - 2020

Assignment-1

PART A (Very Short Answers)

Q.1 Find radix r of $(23)_r + (12)_r = (101)_r$.

Q.2 Find the value of X in $(11000)_2 + (143)_8 = (X)_{10}$.

Q.3 Represent $(473)_{10}$ in Excess-3 Code.

Q.4 Represent $(377)_{10}$ in 8-4-2-1 BCD, 2-4-2-1 BCD.

Q.5 Convert $(54.75)_{10}$ in hexadecimal number.

Q.6 Prove $a'b' + ab + a'b = a'+b$.

Q.7 Perform $(473)_{10} - (734)_{10}$ using BCD subtraction.

Q.8 Perform $(99)_{10} + (99)_{10}$ using BCD addition.

Q.9 Represent $(247)_{10}$ in 2-4-2-1 BCD.

Q.10 Find 9's complement of $(746)_{10}$.

PART B (Analytical)

Q.11 Reduce the function $F = A[B+C(AB + AC)]$ using Boolean postulates and realize using NAND gates.

Q.12 Using K – map, realize expression $F(A,B,C,D)= \sum m (1,4,8,12,13,15) + d(3,4)$.

Q.13 Convert the expression $Y= (A+B) (A+C) (B+C')$ into standard POS form.

Q.14 Implement 4x1 Multiplexer using 2x1 Multiplexer.

Q.15 Encode the binary word 1110 into 7-bit hamming code.

PART C (Descriptive)

Q.16 Minimize the expression $F = \sum m(1,2,3,7,8,9,10,11,14,15)$ using tabulation method.

Q.17 Explain why Gray code is also known as reflected code. Give the applications of gray code.

Q.18 Explain briefly Carry Look Ahead Adder.

Q.19 Describe the working of BCD Adder.

Branch: CSE   **Subject: OOP (3CS4-06)**

PART-A

1. What do you mean by inheritance in C++.write the syntax for derived class definition.
2. What are the various types of inheritance in C++? List all.
3. What do you mean by virtual base class?
4. Write a C++program to demonstrate the use of pure virtual function.
5. Explain virtual destructor.
6. What will be the output of following code snippet?

```
void Location(int &x, int y=4)
{
Y+=2;
X+=y;
}
void main()
{
    int px=10,py=2;
    Location(py);
    cout<<px<<" ," <<py<<endl;
    Location(px , py);

    cout<<px<<", "<< py<<endl;

}
```

7. What are the differences between template and macros
8. Define class template with syntax.
9. What are the exceptions in C++?
10. What is function overriding?

Part B

1. Write a C++program to swap two values using function template. (by using call by reference)

2. Write a template function that returns the average of all the elements of an array. The arguments to the function should be the array name and the size of the array (type int). In main(), exercise the function with arrays of type int, double and char.

3. Create a time class that includes integer member values for hours, minutes and seconds. Make a member function get_time() that gets a time value from the user, and a function put_time() that displays a time in 12:59:59 format. Add error checking to get_time() function to minimize user mistakes. This function should request hours, minutes and seconds separately, and should check that the range for hours should be in between 0 ad 23, and minutes and seconds between 0 and 59.

4. Create a class named "student" that contains roll_number,stu_name and course_name, father_name, DOB as data member and Input_student and display_student as member functions. Create a Derived class named "exam" from the class named "student" with publicly inherited mode. The derived class contains members as mark1,mark2,mark3 as marks of three subjects and input_marks and display_results as member functions. Create an array of object of the "exam" class and display the result of 10 students.

5. What is class template? Explain with suitable example.

Part-C

1. What do you mean by inheritance? What will happen if a class is inherited in private mode. Justify your answer with suitable example

2. Write a C++ program using file handling to perform the following operations

(A) A file named "data.txt" contains number from 0 to 100. Open the "data.txt" file in read mode.

(B) Read data from "data.txt" file.

(C) If the number is odd, open a new file named "odd.txt" and write the odd number into "odd.txt" file.

(D) If the number is even, open a new file named "even.txt" and write the even number into "even.txt" file.

(E) Display the data of all files.

3. Write a C++ program which will overload "= =" binary operator. The overload class should contain one parameterized constructor to initialize default value to the member variable, and a display function to display value of member variables.

4. Explain the procedure to catch multiple exceptions thrown by a single try block with example.

Branch: CSE   Subject: DBMS (4CS4-05)

Part A:

1. What are the disadvantages of file system.
2. What are different database constraints?
3. What is the difference between internal & external schema ?
4. What are the characteristics of data in the database?
5. What are the views ? How are they useful?
6. What is the difference between Union & Set Intersection Operation.
7. Explain Data Abstraction in DBMS.
8. What is SQL? Explain DDL, DML, DCL with examples
9. Define Entity, attributes, entity set, Schema and Instance.
10. List Codd rules for RDBMS

Part B:

1. Who Is DBA ? What are the different responsibilities of DBA?

2. Compare JDBC and ODBC

3. Describe Structure Of DBMS.

4. Explain Triggers in detail with a suitable example.

5. Compare Embedded Sql vs. Dynamic Sql.

Part C:

1. Describe different Applications Of Database Management Systems.

2. Explain File System vs. Database Management Systems.

3. What is ER model? Draw an ER Diagram model cities, counties and states in the US. For states, we wish to record the name, population, and state capital (which would be a city). For counties, we wish to record the name, the population, and the

state in which it is located. For cities, we wish to record the name, the population, the state in which it is located and the county/counties in which it is located. Names of states are unique. Names of counties are only unique within a state (e.g. 26 states have counties called "Washington"), and cities are likewise unique only within a state (e.g., there is a city called "Lafayette" in Lousiana as well as Indiana). Some counties and cities have the same name, even within a state (example: San Francisco). Almost all cities are located within a single county, but some (e.g., New York City) extend over several counties.

4. Write Relational Algebra, Relational Calculus and SQL Queries for Following:

Titles: **Publisher:**

1	Data Structure	Ajeet	DS	1	4	217
2	Computer Studies	Shivam	FND	2	2	75
3	Adv. Pascal	Vivek	PROG	1	4	350
4	DBASE dummies	Shivani	DBMS	3	5	130
5	Mastering C++	Manav	PROG	4	3	295
6	Guide Network	Robin	NET	5	3	200
7	Mastering Access	Divjot	DBMS	4	2	135
8	DOS Guide	Ankit	OS	6	3	175
9	Basic for Beginners	Ankita	PROG	4	3	40
10	Windows Guide	Malvika	OS	4	1	225

Pub_id	Publisher_name
1	McGraw
2	Galgotia
3	PustakM
4	BPB
5	ZPress
6	PHI

A. Select all the PROG type published by BPB from Library
B. Display a list of all books with Price more then 130 and sorted by Qty
C. Display a report. Listing Book No. current value and misplacement charges for each book in the above table. Calculate the misplacement charges for all books Price*1.25
D. Count the number of books published by PHI
E. Count the no of books in each Type.

Assignment-1
PART A (Very Short Answers)

1. What is the connection between **M** and **HL** pair of 8085?
2. Mention the flags of 8085.
3. What are the serial port pins of 8085?
4. What is SP register of 8085?
5. Differentiate between **SUB B** and **CMP B**.
6. What lines are multiplexed in 8085 and why?
7. Mention the hardware interrupts of 8085 in order of priority.
8. What is the significance of $\overline{INTA}$ Signal?
9. Mention the ISR addresses of hardware interrupts of 8085.
10. How is Opcode Fetch machine cycle different from Memory Read machine cycle?

PART B (Analytical)

11. Figure shows the memory circuit of an 8085 microprocessor
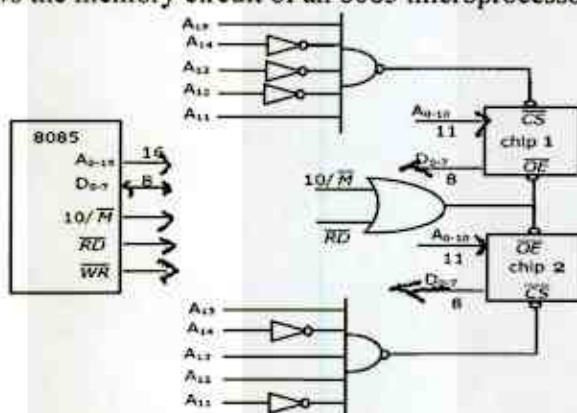
    i.   What is the total size of memory in circuit?
    ii. Name the beginning and ending addresses of the memory chip **2**.
    iii. Are memory chips in the circuit RAM or ROM?
    iv. How will you replace two NAND gates in the circuit with one 3 to 8 decoder, without changing the memory size or the memory addresses?
12. Explain the execution of instruction **SBI 21H**. The contents of A=59H and carry (borrow) flag=01H.
13. Explain the timing diagram of Memory Write machine cycle.
14. Which interrupts will be masked after the execution of following instruction:

    MVI A, 10H

    SIM
15. Determine the execution time of instruction SHLD 4000H if the frequency at crystal pins is 10MHz.

PART C (Descriptive)

16. Explain the addressing modes of 8085 in detail with examples.
17. WAP to transfer a block of 10 data elements from memory location 5000H to memory location 6000H.
18. Explain the data transfer during the execution of CALL and RET instruction with examples.
19. WAP which counts the number of 1's in the contents of memory location 9000H and store the result in memory location 9001H.

Part A:
1. What is operator grammar?
2. Define compiler.
3. Define translator.
4. Define interpreter.
5. State names of different type of errors in compilers.
6. Define non-terminals and terminals.
7. Define DFA and NFA.
8. Define ambiguous grammar.
9. Give definitions of string and language.
10. State the formula for removing left factoring.

Part B:
1. Calculate first and follow for following grammar,
   S->Aa
   A->BD
   B->b/ε
   D->d/ε
2. Consider following grammar and eliminate left recursion,
   E->E+E/E*E/a
3. Consider following grammar and eliminate left recursion,
   S->(L)/a
   L->L,s/s
4. Define bootstrapping and input buffering with example.
5. Explain leftmost derivation and rightmost derivation with example.

Part C:
1. Find whether the following grammars are LL(1) or not?
   a) S->aSbS/bSaS/ε
   b) S->AB
      A->a/ε
      B->b/ε
2. Draw and discuss phases of compiler.
3. Solve the input i+i using LR(0) parser for the grammar,
   E->T/E+T
   T->i/(E)
4. Solve the input id+id*id using operator precedence parser,
   T->T+T/T*T/id

Branch: CSE   **Subject: CGM (5CS4-04)**

Part – A

1. Write down application areas of computer graphics.
2. Define random scan system.
3. Define Raster scan system.
4. Draw conceptual diagram of DVST.
5. Write down drawbacks of DVST.
6. Write down computer graphics standards and software's.
7. Aliasing and Anti-aliasing.
8. Scaling vs rotation.
9. Transformation matrix for reflection and translation.
10. Homogenous coordinates.

Part – B

1. Explain mid-point line algorithm.
2. Explain mid-point circle algorithm.
3. Explain mid-point ellipse algorithm.
4. Write down the steps for Cohen-Sutherland line clipping algorithm.
5. Write down the steps for Cyrus Beck line clipping algorithm.

Part – C

1. Consider the line from (5,5) to (13,9). Use Bresenham's line algorithm to draw this line.
2. Draw a line using DDA from points (0,0) to (6,6).
3. Draw line from (1,1) to (8,7) using Bresenham's line algorithm.
4. Consider a point (4,3) is rotated counterclockwise by an angle of 45°. find the rotation matrix and resultant point.

Branch: CSE   Subject: CLC (6CS4-06)

PART-A

1. What is Cloud Computing?

2. What are the characteristics Cloud Computing?

3. What are the enabling technologies for cloud computing?

4. Write service models for cloud computing

5. Write deployment models for cloud computing.

6. What do you mean by Ubiquitous cloud?

7. What is the difference between elasticity and scalability?

8 What is "EUCALYPTUS" in cloud computing? Why is it used?

9. What is virtualization in cloud?

10. List the all programming languages used in cloud.

PART-B

1. What is migration in cloud? Explain all the steps for migration.

2. Explain Internet of Things in Brief.

3. Write and explain Ethical Issues of Cloud Computing.

4. What is MapReduce? Explain Word Count Problem with the help of MapReduce.

5. Write a short note on benefits of virtualization.

PART-C

1. Describe NIST Cloud Reference Model.

2. What is Google App Engine? Explain in detail.

3. Explain Hadoop in detail.

4. Describe architectural design of compute and storage of Cloud.

Assignment- 1

B.Tech./ Semester – 3rd/6th   **Branch: CSE**

Subject: Information Security System   **Subject Code : 6CS4-03**

SET A

Q1. Use Caesar's Cipher to decipher the Message " HQFUBSWHG WHAW".

Q2 Caesar Cipher is an example of Mono-alphabetic cipher or polyalphabetic cipher and why?

Q3. Which type of attacks are possible in DES Algorithm?

Q4. Which type of services are provided by digital signature mechanism?

Q5 list the phases of virus.

Q6 Difference between virus and worms.

Q7. How many rounds AES-192 does perform and expanded key size?

Q8 how we can encrypt the message with rabin cryptosystem?

Q9. Difference between http and https?

Q10 What do you mean by message authentication ?

SET B

Q1 Compare RSA and DSS digital signature

Q12. Differentiate block cipher and stream cipher with proper examples.

Q13. Why is SHA more secure than MD5?

Q14. Explain possible approaches to attacking the RSA algorithm

Q15 describe the idea of merkle-demgard scheme.

SET C

Q16 if prime field GF(19); that is, $p = 19$. sender selects primitive roots a = 10 and private key is 10 and then calculate public key and if h(M)=14 and random number r=5 then calculate digital signature.

Q17.Explain Elliptic Curve Cryptosystem with example.

Q18. During an ongoing class, Ram wants to send a message " **thepepsiisintherefrigerator** " to Shyam in such a way that no one except Shyam can understand. Before going to the class Ram and Shyam agreed upon a secret **"HUMOR"** which is called as "Key" and Vigenere Cipher.So Ram writes a message on a piece of paper and sends it to Shyam via some of their classmates.Now, Shyam recovers the original message from ciphertext If Shyam sends a ciphertext **"XJSI TS BMFYXFUU"** to Ram, What message is recieved by Shyam and Ram.

Q19. Explain how SSL/TLS works?

Swami Keshvanand Institute of Technology, Management & Gramothan, Jaipur

Department of Electronics and Communication Engineering
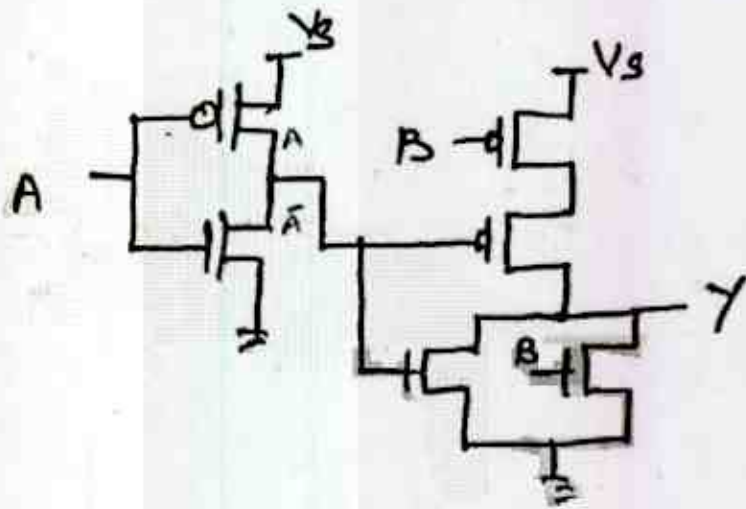
Course Name: *Digital System Design*   Course Code: *3EC4-04*

Assignment No.: 02   Maximum Mark: 06

Q.No	Questions
	Part – A: Short answer questions (25 Words)
1	Draw the circuit diagram of two Dynamic Memory Cell.
2	Define Fan-Out, Fan-In, Power dissipation and Noise Margin of logic system.
3	Write and explain the two-modeling style in VHDL.
4	Write VHDL code for $Y=\overline{AB}$ in structural model.
5	What is major advantage of TOTEM-POLE output arrangement?
6	Design one-bit Magnitude Comparator.
7	State the advantage of Finite State Machine.
8	Give the comparison between PAL (Programmable Array Logic) and PLA (Programmable Logic Array).
9	What is Race around condition? How it is avoided.
10	Design Serial Adder.
	Part – B: Analysis/ Application/ Problem Solving Questions
11.	Design a 4-bit synchronous down counter using T Flip- Flop.
12	Draw and explain CMOS NAND and NOR gates.

13	Draw the output waveform of a four-bit serial in parallel out shift register for six clock pulses. Assume the Data Input is = 10111011...
14	Implement Y= A+BC in ECL logic and explain its working.
15	Write VHDL code for 4-bit ripple carry adder using Dataflow Modeling.

Part C: Descriptive/ Design Question

| 16	(a) Draw and explain the circuit diagram of TTL NAND gate. (b) In a two input TTL circuit, the 7400 NAND gate has Vcc = +5V and a 5 KΩ load connected to its output. Find the output voltage (i) when both the inputs are at +5V and (ii) when both the inputs are at 0V.
17	(a) Find the output Y in terms of A and B as shown in figure: - (b) Compare the characteristics of TTL, RTL, ECL and CMOS.
18	The state diagram of the FSM is given below, design its logic. Show its State table, state assignment table and final implemented logic.
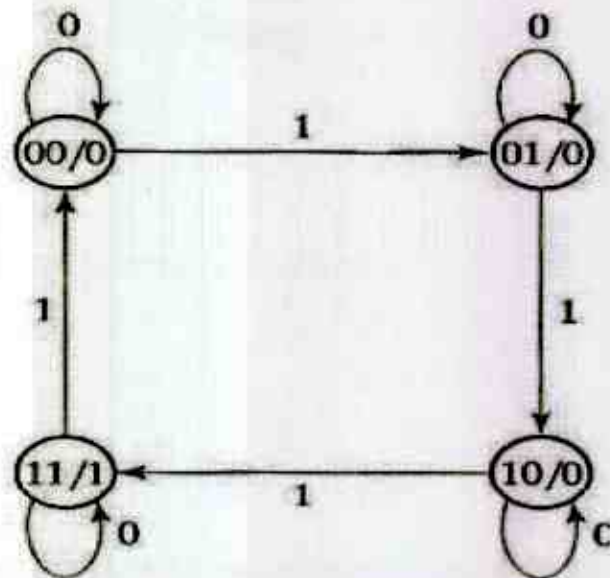
| 19 | How FPGA are used for logic implementation. Show the OR and AND space for a 2-variable input. Also show the connection in FPGA for implement $Y = \bar{A}\,\bar{B}$ in it. |

PART A

1. The network shown in figure is initially under steady-state condition with the switch in position 1. The switch is moved from position 1 to position 2 at t = 0. Calculate the current i(0+) through R1 after switching.Define various driving point functions for two port networks.
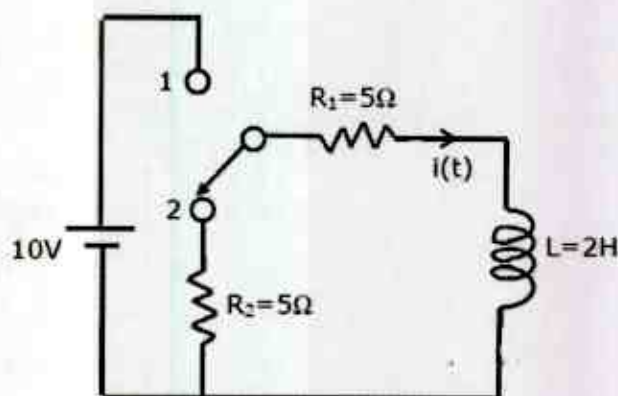
2. Find Laplace transform of the following function:

   $F(t)=t+1$ $0 \leq t \leq 2$

   $=3$ $t>2$

3. In figure, the switch was closed for a long time before opening at t = 0. the voltage Vx at t = 0+ is
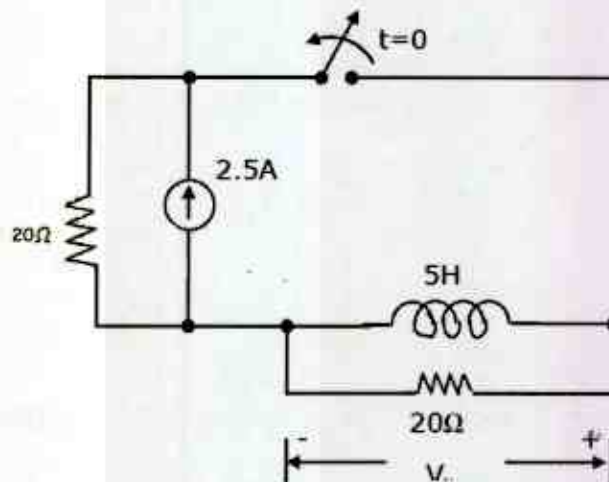
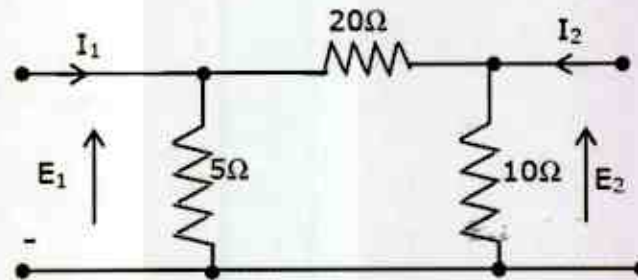4. Compute the quality factor of an RLC series circuit, with R=2Ω, L=50mH, and C=1 μF.

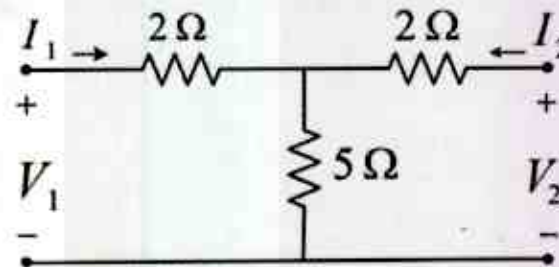5. With the usual notations, a two port resistive network satisfies the conditions

   $A=D=\frac{3}{2}$ $B=\frac{4}{3}$ C. Find the Z_{11} of the network.

6. A two port network has parameters $A=D=0.98$ and $B=j60\ \Omega$. Find the ratio $\frac{V_2}{V_1}$ if $I_2 = 0$

7. The admittance parameter Y12 in the 2-port network in Figure is

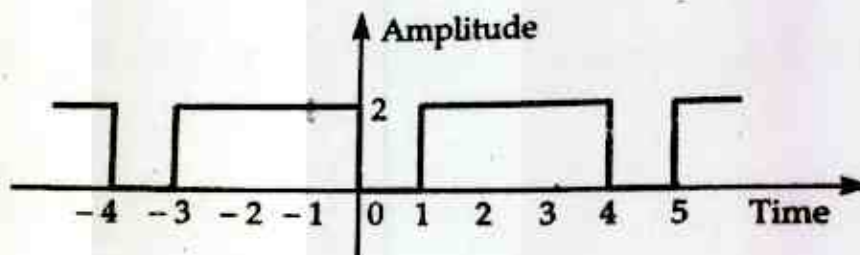8. Find the parameter B for the given two-port network

9. Explain significance of poles and zeros of network functions.

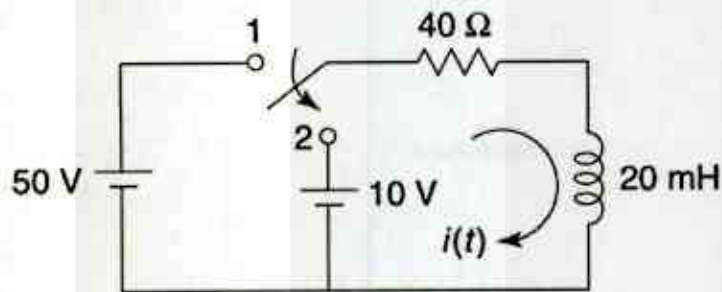10. What are the necessary conditions for driving point functions.

PART B

1. 1 Obtain the Fourier transform for the waveform shown in figure.

2. The network of figure is under steady state with switch at the position 1. At t=0, switch is moved to position 2. Find i (t).

3. Find the driving point impedance of the network shown in fig. Find the poles and zeros of the network and locate them in the s plane.
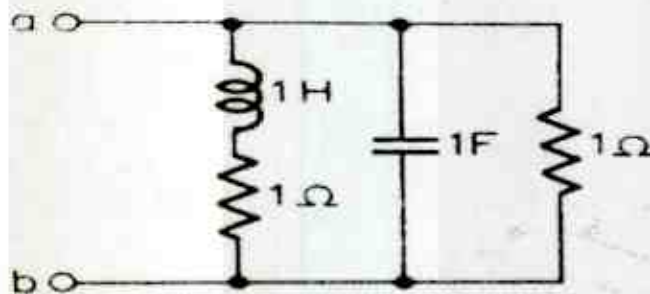
4. In the circuit shown in the figure, find the h parameter.
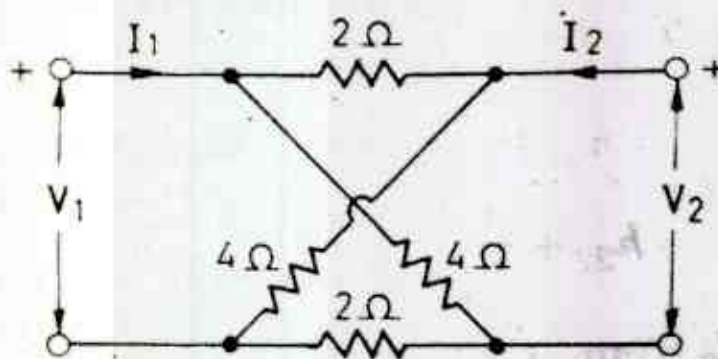
5. Derive Z parameter in terms of hybrid parameter.

PART C

1. Determine Z parameter and Y parameter of the following circuit shown in fig.
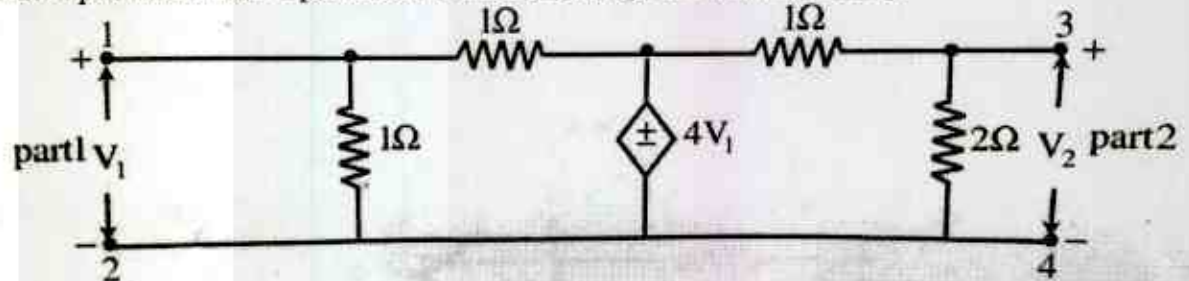
2. Find the impulse response of the voltage across the capacitor in the network in fig. Also determine response v_c (t) for step input using Laplace transform.

a.
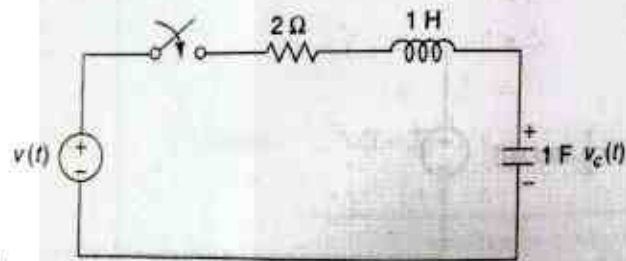
3. Find Vc(t) for the circuit shown in figure.(I(0)=0) using Fourier transform.
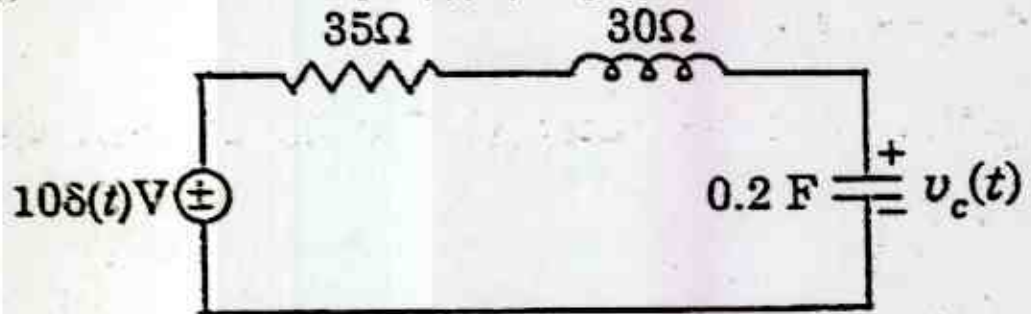
4. Determine the current i(t) in a series RLC circuit consisting of R=5Ω, L=1H and C=1/4
   .W hen the source voltage is given as:

   (a) Ramp voltage 12r(t-2)

   (b) Step voltage 3u(t-3).Assume that the circuit is initially relaxed.

Part A

1. Define slew rate.
2. What are the values of gain, input impedance and output impedance for an ideal op-amp?
3. Draw circuit diagram of DAC with R-2R resistors.
4. What is switched capacitor?
5. Draw the circuit of summing amplifier using Op-Amp.
6. What is the need of differential amplifier?
7. What is the gain of a non-inverting op-amp amplifier?
8. Draw the circuit of counter type ADC.
9. Define CMRR (common mode rejection ratio) in Op-Amp.
10. Draw the circuit of single slope ADC.

Part B

11. How does an op-amp can be used as a Schmitt trigger, draw required circuit diagram, input and output waves?
12. Design a first order low pass filter with a high cut off frequency of 2 KHz and whose passband gain is 2. (Assume C= 0.01µF.)
13. Explain working of D/A converter with binary weighted resistors with suitable circuit diagram.
14. How integrator and diffrentiator can be constructed using op-amp, derive expression for their respective output voltages.
15. Describe op-amp block diagram and draw its electrical equivalent circuit.

Part C

16. Draw the circuit diagram for successive approximation type analog to digital convertor. Explain its working. Also show how it will convert a 10.1V analog input voltage into its equivalent decimal number.

17. Design a wide band pass filter with f_L=500 Hz, f_H = 2 KHz , pass band gain=5 for both section of filter. Also determine value of Q for filter.

18. Derive expression for voltage gain, input resistance & output resistance for SIBO (Single input balanced output) Differential amplifier.

19. (i) The input signal to an Op-Amp is 0.03 sin 1.5×10^5t. What can be the maximum gain of Op-Amp with slew rate of 0.4V/µsec.
    (ii) Design a scaling adder circuit using an Op-Amp to give the output V_O= - $(3V_1+4V_2+5V_3)$

Assignment-1

Part A

1. Show Bandgap order of GaAs, GaP and SiC in increasing order.
2. Write two difference between Degenerate and non-degenerate semiconductors.
3. What is mass action law?
4. Why is silicon preferred over germanium in the manufacturing of semiconductor devices?
5. State continuity equation and write its expression.
6. Differentiate drift current and diffusion current.
7. Discuss the effect of temperature on conductivity of a semiconductor.
8. What is Einstein relationship.
9. What is the effect of heavy doping on the Fermi level in Degenerate Semiconductors.
10. Differentiate between Direct and Indirect bandgap semiconductors.

Part B

11. V_i is applied to the circuit with ideal diodes, as shown in the figure. Draw the output(V_o) waveform of the circuit.
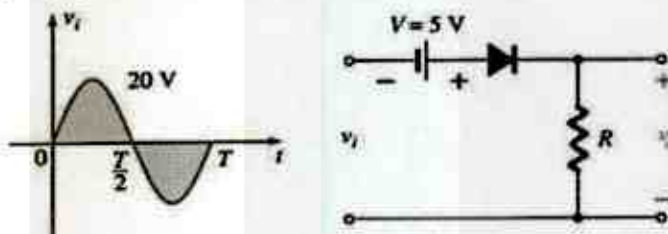
12. Find the density of impurity atom that must be added to an intrinsic silicon crystal in order to convert it to
    a) P type silicon of resistivity 100 ohm-cm.
    b) N type silicon of resistivity 10 ohm-cm.
    Calculate also the concentration of minority carriers in each case. Given $\mu_e = 1350$ cm²/v-sec, $_h= 450$ cm²/v-sec, $n_i= 1.5 \times 10^{10} cm^{-3}$

13. Find the V_L, V_R I_Z and P_Z for the given network if
    (a) $R_L = 1.2$ KΩ   (b) $R_L = 3$ KΩ
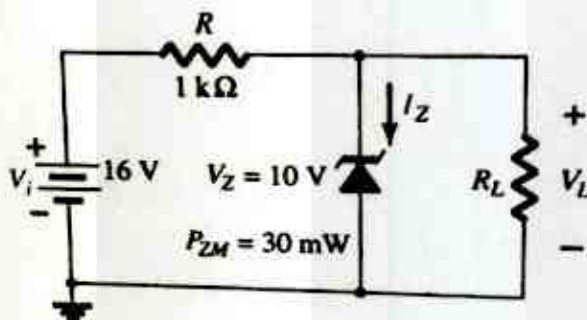
14. What is Hall effect? Describe with the suitable diagram.

15. The electron concentration in a sample of uniformly doped n – type silicon at 300^0K varies linearly from10^{17}/cm3 at$x = 0$ to 6×10^{16}/ cm3 at$x = 2\mu m$. Assume a situation that electrons are supplied to keep this concentration gradient constant with time. If electronic charge is 1.6 $\times 10^{19}$ coulomb and the diffusion constant $D_n = 35$ cm^2/S. Find the current density in the silicon, if no electric field is present.

Part C

16. Explain Schottky Diode draw its V-I characteristics. How it is suitable at high frequency operation over a basic PN junction diode?
17. Explain Generation and recombination of charge carriers in semiconductor.
18. a.Explain E-K diagram.
    b.Describe group and phase velocity.
19. Write short note on-
    a. Thermistor   b. Sensistor

B.Tech I&II Semester

Engineering Chemistry
1FY2-03/2FY2-03

Assignment sheet –II

UNIT – 2 (FUELS)

EASY

SET-A

Q.1 What is knocking in an IC engine? How it is related to the structure of constituent hydrocarbons.

Q.2 Define and classify fuels.

Q.3 What do you mean by Calorific value? Define G.C.V and N.C.V.

Q.4 Draw neat & labeled diagram of Bergius method

Q.5 Define octane no. and cetane no. Give examples of anti-knocking agents.

Q.6 Write important characteristics of good metallurgical coke.

Q.7 Give fractional distillation of petroleum.

SET-B

Q.8 The percentage composition by weight of a sample of coal was found to be as under

C = 85%, H = 5%, O = 3%, S = 1.5%, N = 2.1% and ash = REST

Calculate the gross and net calorific values using Dulong's formula.

Q.9 The ultimate analysis of anthracite coal sample gives:

C=84.5%,   N=0.5%,   H=6%,   O=8%   S=1%. Calculate high & low calorific value

using Dulong's formula.

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असतो मा सद्गमय

DIFFICULT

Q.9 The percentage composition by weight of a sample of coal was found to be as under

C = 81%, H = 5%, O = 8.5%, S = 1%, N = 1% and ash = 3.5%.

Calculate the minimum amount of air required for complete combustion of 1 kg of coal.

Q 10 A gaseous fuel has following composition by volume.

H_2 = 20%, CH_4 = 5%, CO = 20%, CO_2 = 5%, N_2 = 45%. If 50% excess of air is used, find the weight of air actually supplied per m^3 of this gas.

Q.11 Explain Proximate analysis for determination of moisture content, volatile matter, ash content and fixed carbon of coal sample.

Q.12 Explain Ultimate analysis of carbon,hydrogen, nitrogen and sulphur present in coal sample.

SET-C

MODERATE

Q.13 What is carbonization? Explain manufacturing of coke by Otto-Hoffmann's method

with the help of neat & labeled diagram. Also account for recovery of by products.

Q.14 Explain determination of calorific value of solid fuels using Bomb Calorimeter with the help of neat and labelled diagram.

Q.15 What is synthetic petrol? Explain the manufacturing of petrol by Fischer- Tropsch process.

Q.16 What are important gaseous fuels? Give advantages of gaseous fuels over other fuel Describe manufacture of coal gas.

Q.17 What is cracking? Explain moving bed catalytic cracking method with the help of neat & labeled diagram.

Submitted by

Dr Poonam Ojha

Subject: Engineering. Mathematics-I [Course Code:1FY2-01]

Assignment: 1.1

Sem/Sec: .... Branch:.........Session: 20__/__   M. M: __

Date of issue:............   Date of submission:.............

SECTION –A (*Short answer questions*)

1. Find $\lim\limits_{\substack{x \to 1 \\ y \to 2}} \dfrac{2x}{x^2 + y^2 + 1}$

2. Check the limit of $f(x, y) = \dfrac{2xy}{x^2 + y^2}$ at $(0, 0)$.

3. Check the continuity of $f(x, y) = \begin{cases} xy, & xy \neq 0 \\ 1, & xy = 0 \end{cases}$ at $(0, 1)$.

4. Verify $\dfrac{\partial^2 u}{\partial x \partial y} = \dfrac{\partial^2 u}{\partial y \partial x}$ for $u = x^y$

5. If $u = x^3 y - xy^3$ show that $\left[\dfrac{1}{u_x} + \dfrac{1}{u_y}\right]_{\substack{x=1 \\ y=2}} = -\dfrac{13}{22}$

6. Find the tangent plane to the surface $f(x, y, z) = x^2 + y^2 + z - 9 = 0$ at the point $(1, 2, 4)$.

7. Find the Normal line to the surface $f(x, y, z) = x^2 + 2y^2 + 3z^2 - 12 = 0$ at the point $(1, 2, -1)$.

SECTION –B (*Analytical/ problem solving questions*)

8. Verify the Euler's theorem for $u = \dfrac{x(x^3 - y^3)}{x^3 + y^3}$.

9. Verify the Euler's theorem for $u = ax^2 + 2hxy + by^2$.

10. If Resisters of R_1, R_2 and R_3 ohms are connected in parallel to make an R-ohm resistor, find the value of $\dfrac{\partial R}{\partial R_2}$ when $R_1 = 30$, $R_2 = 45$ and $R_3 = 90$ ohms.

11. The altitude of a right circular cone is 15 cm and is increasing at 0.2 cm/sec. The radius of the base is 10 cm and is decreasing at 0.3 cm/sec. How fast is the volume changing?

Subject: Engineering. Mathematics-I [Course Code:1FY2-01]

Assignment: 1.1

Sem/Sec: .... Branch:.........Session: 20__/__   M. M: __

Date of issue:.............   Date of submission:.............

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12   In order that the function $u = 2xy - 3x^2y$ remains constant, what should be the rate of change of

      y (w.r.t. t) given that x increases at the rate of 2 cm/sec at the instant when x = 3 cm and y = 1 cm

13   If $u = f(y - z, z - x, x - y)$, prove that $\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} + \frac{\partial u}{\partial z} = 0$

SECTION –C (*Descriptive/Analytical questions*)

14   If $z = \tan^{-1}\left(\frac{y}{x}\right)$ then prove $\frac{\partial^2 z}{\partial x^2} + \frac{\partial^2 z}{\partial y^2} = 0$.

15   If $u = \left(1 - 2xy + y^2\right)^{-\frac{1}{2}}$ then prove $\frac{\partial}{\partial x}\left\{\left(1 - x^2\right)\frac{\partial u}{\partial x}\right\} + \frac{\partial}{\partial y}\left\{y^2\frac{\partial u}{\partial y}\right\} = 0$.

16   If $z = \tan(y + ax) + (y - ax)^{3/2}$ then prove $\frac{\partial^2 z}{\partial x^2} - a^2\frac{\partial^2 z}{\partial y^2} = 0$.

17   A rectangular box, open at the top, is to have a volume of 32 cm³. Use Lagrange's method to find the

      dimension of the box having least material for its construction

18   Find the maximum value if $u = \sin x \sin y \sin(x + y)$

19   Discuss the maxima and minima of the function $x^3 + 3xy^2 - 15x^2 - 15y^2 + 72x$

Subject: Engineering. Mathematics-I [Course Code:1FY2-01]

Assignment: 3

Sem/Sec: .... Branch:..........Session: 20__/__   M. M: __

Date of issue:............   Date of submission:..............

Section A(Short answer questions)

Q.1   Write the relation between Beta and Gamma function.

Q.2   Find the value of $\int_0^\infty e^{-cx} x^{n-1} dx$

Q.3   Evaluate $\int_0^{\pi/2} \sqrt{\tan\theta}\, d\theta$

Q.4   Evaluate $\int_0^\infty 4x^4 e^{-x^4} dx$

Q.5   Evaluate B(1/2,1/2)

Section B (Analytic / Problem solving questions)

Q.6   Show that the surface of solid obtained by revolving the arc of the curve $y = \sin x$ from $x = 0$ to $x = \pi$ about X axis is $2\pi\{\sqrt{2} + \log(1 + \sqrt{2})$.

Q.7   The part of the parabola $y^2 = 4ax$ cut off by the Latus-rectum revolves about the tangent at the vertex, find the volume of the reel thus generated

Q.8   Evaluate $\int_0^\infty \dfrac{x^2(1+x^4)}{(1+x)^{10}} dx$

Q.9   Prove $\int_0^\infty e^{-x^2} dx = \dfrac{\sqrt{\pi}}{2}$

Q.10   Evaluate $\int_0^{\pi/2} \sec^{1/2} x \sin^{8/3} x\, dx$

Section C(Descriptive / Analytical questions)

Q.11   The part of the parabola $y^2 = 4ax$ cut off by the Latus-rectum revolves about the tangent at the vertex, find the surface of the reel thus generated

Q.12   Find surface and volume of solid obtained by revolving the ellipse $\dfrac{x^2}{a^2} + \dfrac{y^2}{b^2} = 1$ about the x-axis and y-axis when a>b

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Subject: Engineering. Mathematics-1 [Course Code:1FY2-01]

Assignment: 3

Sem/Sec: .... Branch:.........Session: 20__/__   M. M: __

Date of issue:.............   Date of submission:..............

Q.13   Find the volume of the spindle shaped solid generated by revolving the Astroid about X-axis

$$x^{\frac{2}{3}} + y^{\frac{2}{3}} = a^{\frac{2}{3}}$$

Q.14   Find the area of the surface formed by the revolution of the ellipse $x^2 + 4y^2 = 16$ about its major axis .

Q.15   Find the area of the surface formed by the revolution of the cardioid $r = a (1 + \cos\theta)$ about initial line

Q.16   Find the surface of the solid generated by the revolution of the astroid $x = a\cos^3 t,\ y = a\sin^3 t$ about the X-axis.

Q.17   The portion enclosed between the two parabolas $y^2 = 4ax$ and $x^2 = 4by$ revolves about the X-axis. Find the volume generated.

Q.18   Find the volume of the solid generated by the revolution of the cissoid $y^2(2a - x) = x^3$ about its asymptote.

Q.19   Express $\int\limits_0^1 x^m (1 - x^n)^p dx$ in terms of beta function. Hence evaluate $\int\limits_0^1 x^5 (1 - x^3)^{10} dx$

Q.20   Evaluate $\int\limits_0^\infty \dfrac{dy}{1 + y^4}$

Q.21   Show that $B(m,n) = a^m b^n \int\limits_0^\infty \dfrac{x^{m-1}}{(ax+b)^{m+n}} dx = \dfrac{\overline{|m}\,\overline{|n}}{\overline{|(m+n)}}$

Q.22   Prove that $\int\limits_0^{\pi/2} \cos^m \theta \sin^n \theta\, d\theta = \dfrac{\left|\dfrac{m+1}{2}\right.\left|\dfrac{n+1}{2}\right.}{2\left|\dfrac{m+n+2}{2}\right.}$

Q.23   Prove $\int_0^2 (8 - x^3)^{-1/3} dx = \dfrac{2\pi}{3\sqrt{3}}$

Q.24   prove $\Gamma\left(\frac{1}{2}\right) = \sqrt{\pi}$

Q.25   Show that if $c > 1$ $\int_0^\infty \dfrac{x^c}{c^x} dx = \dfrac{\Gamma(c+1)}{(\log c)^{c+1}}$

Q.26   Evaluate $\int_0^\infty x^p e^{-ax^q} dx$, where p, q and a are positive constants.

Department of Physics
B.Tech. I Sem 2020-21
Subject: Engineering Physics
Assignment-4
Topics: Coherence and Optical Fibers, Lasers, Material Science and Semiconductor Physics,
Introduction to Electromagnetism ((Last date of submission: 09 Nov. 2019)

PART-A

Q.1 Answer the following questions in short.   [10]

(a) What are coherent sources? How are they obtained in practice?

(b) Give any two differences between step index and graded index fiber.

(c) Write the applications of optical fiber.

(d) Distinguish between Spontaneous and Stimulated emission of radiation.

(e) Explain the essential requirement for producing laser action.

(f) How do pumping and population inversion are achieved in a semiconductor laser?

(g) Define Fermi energy in semiconductors at T=0K using Fermi-Dirac distribution function.

(h) Write the definition of Hall Effect with formula for Hall coefficient?

(i) Define displacement current.

(j) Explain physical significance of curl.

PART-B   [35]

Q.2 If the coherence length of a laser source is 100cm and the wavelength used in it is 6328Å; calculate the bandwidth and frequency spread.

Q.3 Calculate the numerical aperture, acceptance angle and the critical angle of a fiber having core refractive index=1.50 and cladding refractive index=1.45.

Q.4 LASER action occurs by stimulated emission from an excited state to a state of energy 30.5eV. If the wavelength of LASER light emitted is 690nm. What is the energy of the excited state?

Q.5 A laser beam can be focused on an area equal to the square of its wavelength, for a He-Ne Laser. If the laser radiates energy at the rate of 1 mW, find out the intensity of focused beam.

Q.6 A copper strip 4.0 cm wide and 0.5 mm thick carries a current of 100 A. If placed in a magnetic field of induction 2 weber/m^2 acting at right angles to the strip, a hall potential difference 29.7×10^{-6} volt appears across its edge. Find (i) hall electric field (ii) the number of charge carrier in unit volume of the strip.

Q.7 In a solid considers an energy level lying 0.1 eV below Fermi level. What is the probability of this level not being occupied by an electron at room temperature?

Q. 8 Consider a vector field $A = x^2i + y^2j + z^2k$

(i) Is the field is solenoidal?

(ii) Is the field is irrotational?

PART-C   [35]

Q.9 Explain temporal and spatial coherence in detail. Show that visibility is a measure of coherence.

Q.10 Explain construction and working of He-Ne gas laser with necessary diagram. What is role of He-atoms in this laser?

Q.11 Explain how the atomic energy levels split into bands when a number of atoms are brought close together to form a crystal? Explain the classification of solids in to semiconductors, conductors and insulators.

Q.12 What are Maxwell's equation? Derive Maxwell's equation in an isotropic medium and in free space.

Q.13 Derive Poynting theorem and explain its physical significance.

SWAMI KESHVANAND INSTITUTE OF TECHNOLOGY M & G, JAIPUR

CIVIL ENGINEERING DEPARTMENT

ASSIGNMENT-1   BUILDING MATERIAL AND CONSTRUCTION

Part A

Ques-1 Define the following terms:-

1) Efflorescence of Brick
2) Types of Geological Classification of Stones
3) Any Two Examples of Igneous Rocks
4) Any Two Examples of Sedimentary Rocks
5) Composition of Clay Bricks

Ques-2 Write any two difference between clay brick and silica lime brick.

Part B

Ques-1 Describe the geological classification of rocks with their suitable example.

Ques-2 Explain the manufacturing process of clay bricks.

Part C

Ques-1 Comparison between sedimentary rock and metamorphic rock. Explain their properties with suitable example.

Ques-2 Explain in detail the test perform for checking the properties of stone.

Ques-3 Explain in detail the test perform for checking the properties of clay bricks.

ASSIGNMENT-2   **CONCRETE TECHNOLOGY**

Part A

Ques-1   What do you mean by Grade of Concrete?

Ques-2   What is the role of water to cement ratio?

Ques-3   Differentiate between w/c & w/cm ratio?

Ques-4   Define the following term?

    a) Workability   b) Air content

    c) Flow ability   d) Viscosity

Ques-5   Differentiate the following terms:

    a) Segregation and Bleeding

    b) Creep and Shrinkage

Part B

Ques-1 Discuss the various factors affecting workability property of fresh concrete?

Ques-2 What do you mean by water content in concrete mix? How the quality of water affects the properties of concrete?

Ques-3 What is permeability? Discuss the factors influence permeability?

Ques-4 What is NDT? Why these tests have importance in field?

Ques-5 What is aggregate-cement interface and how its affect the properties of concrete?

Part C

Ques-1 Describe the standard tests on fresh and hardened concrete as per IS code?

Ques-2 Listed different types of NDT with their application and uses?

Ques-3 Design M30 concrete by using OPC cement as per the specification given in IS 10262:2019?

Ques-4 Design M55 concrete by using PPC cement as per the specification given in IS 10262:2019?

ASSIGNMENT No. 2

Subject- Structure Analysis-II

**Branch -Civil**   **Semester VI**

Q.1 Short answer

(A) Three hinge arch is a determinate structure. Why?

(B) Explain Unsymmetrical bending.

(C) What is tension coefficient.

Q.2 Detailed Answers

(A)A three hinged parabolic arch has a span of 24m and a central rise of 4m. It carries a concentrated load of 50 kN at 18m from left support and a udl of 30 kN/m over the left half portion. Determine the moment at section 8m from left support.
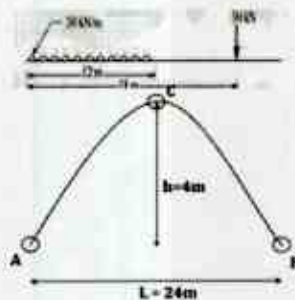
(B) Determine the principal moment of inertia for an unequal angle section 100 X 60 X 8 mm as shown in figure.
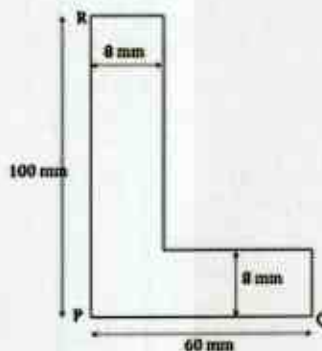
(C) A beam of rectangular section 100mm wide and 150mm deep is subjected to a bending moment of 15 kN-m. The trace of the plane of loading is inclined at 60o to the YY axis of the section. Locate the neutral axis of the section and calculate the maximum bending stress induced in the section.

Q.3 Descriptive Answers

(A) A parabolic two hinge arch has a span of 32m and rise of 8m. A UDL of 1KN/m cover 8m horizontal length of the left side. If $I = IoSec\theta$ where θ is the inclination of arch at the section to the horizontal and Io is the MOI of the section at the crown. Find out the horizontal thrust and bending moment at 8 m from left hinge. Also find out normal thrust and radial shear at this section.

(B) A pair of shear leg has a length of each leg as 5 m . And the distance between their feet is 4 m. The line joining the of the legs is 7m from the foot of the guy rope. If the length of the guy rope is 10m, find the thrust in each leg and pull in the guy rope when a load of 100KN is suspended from the head.

Swami Keshvanand Institute of Technology, Management & Gramothan, Ramnagaria, Jagatpura, Jaipur-302017

Analysis of Assignment -1

Branch : ECE
Subject Code:5EC4-02

Semester/session: V/2019-20
Subject:Electromagnetic wave

Max Marks:6

Q.No	Questions	CO	BL
1	Write characteristics features of EM waves.	1	L1
2	Compute div F and curl F for F=x4y i- z4-8xj+ 4y3k.	1	L1
3	What are the applications of EM waves?	1	L1
4	Explain the concept of transit time in transmission line.	1	L2
5	Derive an expression for reflection coefficient and VSWR when line is: (a) short circuited (b) open circuited (c) perfectly matched	1	L3
6	Derive the expression for input impedance of quarter wave line.	1	L3
7	A telephone line has R=30Ω/km, L=100mH/km, G=0 and C= 20 µF/km. At f=1 kHz obtain (a) The characteristic impedance of the line (b) The propagation constant	1	L3
8	What are the conditions for transmission line to be loss less? Find propagation constant, phase velocity and characteristics impedance for loss less transmission line.	1	L1
9	What are the conditions for transmission line to be low loss line? Find propagation constant, and characteristics impedance for low loss transmission line.	1	L1
10	State the mathematical expression for the impedance transfer from the load to source in a transmission line. Explain its physical significance.	1	L2
11.	Explain the physical significance of gradient, divergence and curl.	2	L1
12	Write Maxwells's equation in differential and integral form. Explain their physical significance	2	L1
13	What is VSWR of transmission line? Explain its significance.	1	L1

Analysis of Assignment -1

Branch : ECE   Semester/session: V/2019-20   Max Marks:6
Subject Code:5EC4-02   Subject:Electromagnetic wave

14	A 50 ohm line feeds an inductive load ZL= (35 + j35) Ω. Design a double stub tuner to match this load to the line (make use of smith chart)	1	L6
15	A load of ZL/Z0 = (0.2 + j0.3) is located at the end of a transmission line. At a distance of 0.11 λ from the load, an adjustable stub is placed. Another 0.175λ distance from the first stub, a second stub is placed. Using a smith chart, determine the lengths of the two stubs.	1	L3
16	Derive the expression for the power transfer on transmission line from the load line.	1	L3
17	Derive the voltage and current equations for transmission line. Deduce the expression for characteristic impedance and propagation constant.	1	L3
18	Derive the boundary conditions for electric and magnetic field using Maxwell's equations at the interface of (i) Two dielectric medium (ii) One is dielectric and another is conducting medium (iii) One is conductor and other is free space medium	2	L3
19	Derive Maxwell's equations of EM wave from basic laws of electrostatic and magnetostatic. Also explain the concept of displacement current.	2	L3
20	What is the need of impedance matching at load point of transmission line? Explain single and double stub method for the impedance matching.	1	L1

BL – Bloom's Taxonomy Levels
(1- Remembering, 2- Understanding, 3 – Applying, 4 – Analyzing, 5 – Evaluating, 6 - Creating)
CO – Course Outcomes

B.Tech/Semester: III/ V   Branch: ECE

Subject: MTT   Subject Code: : 5EC4-05

PART A (Short Answer Questions)

Q.1   Draw Electric and Magnetic Field Distribution of microstrip line.

Q.2   Draw the field lines for-
   1. TE_{10} mode
   2. TE_{20} mode

Q.3   Explain the excitation of modes in circular waveguide

Q.4   What is Rectangular Waveguides.

Q.5   What is the relation between ABCD matrix and Impedance Matrix.

Q.6   What are Dominant and Degenerate modes for Rectangular Waveguide.

Q.7   Why TEM mode does not exist in hollow waveguide.

Q8. Explain the excitation of modes in Rectangular waveguide.

Q.9. What are Strip lines . Draw its electric and magnetic field Distribution.

Q10. What are two types of power losses in Rectangular Waveguide.

PART B   (Problem Solving Questions)

Q1-   A Rectangular waveguide is filled by dielectric material of $er=9$ and has inside dimension of 7×3.5 cm^2. It operates in the dominant TE_{10} mode Determine:-

   a-   Cut off Frequency

   b-   Phase velocity in guide at frequency 2GHz.

   c-   Guide wavelength at same frequency

Q2.   An air filled waveguide with crossection 2×1cm transports energy in TE10 mode at the rate of 0.5Hp. The frequency is 30Ghz what is the peak value of electric field occurring in the waveguide?

Q3.   A circular waveguide has a cutoff frequency of 9GHz in dominant mode

a) Find the inside diameter of the guide if it is air filled.

b) Determine the inside diameter of the guide if the guide is dielectric filled. The relative dielectric constant $\varepsilon_r = 4$.

Q4. Derive field equations for TM modes in Circular waveguides.

Q5. Derive the expression on:-

a) Phase Velocity   b)Group Velocity

PART C   (Descriptive/Design Questions)

Q.1 Design the Scattering matrix representation

a) Directional coupler

Q.2 Explain the different between E-plane tee and H-plane tee . Draw S-matrix and diagram for E plane and H-Plane.

Q.3 Design Magic tee for 4× 4 S-Matrix. Describe the use of magic tee as an isolator.

Q.4 Derive field equations for TE modes in Rectangular Waveguides.

Assignment 1 (Common to All Sections of VI Sem.)

Short Answers (All questions carry One mark each.)

Q.1 Define Ton of Refrigeration (TR). Convert 1TR into kW.

Q.2 What is the use of Flash Chamber in a vapour compression cycle?

Q.3 What is compounding in vapour compression cycle?

Q.4 Describe the liquid vapour heat exchanger in a vapour compression cycle with the help of neat sketch.

Q.5 Describe the expansion device used in gas cycle.

Q.6 Why isentropic expansion is used in gas refrigeration cycle instead of throttling?

Q.7 Draw T-s and P-v diagram for the Brayton cycle and write its COP in term of pressure ratio (γP).

Q.8 What are the considerations for aircraft refrigeration system?

Q.9 Draw a schematic diagram of two stage compression with water intercooler, liquid sub-cooler and liquid flash chamber.

Q.10 Which system is adopted to achieve -50°C temperature? Draw its schematic diagram.

Analysis/Application (All questions carry Two marks each.)

Q.11 A refrigerator's storage is supplied with 3600 kJ of a substance at a temperature of 27°C. A substance has to be cooled at -23°C. The cooling is about 10 hours. The specific heat of substance is 2 kJ/kg.K above freezing point and the latent heat of freezing is 230 kJ/kg. What is the power required to drive the plant in kW if the actual COP is the half of the ideal COP? **RTU-2018, 2013**

Q.12 A gas refrigeration system working on reversed Brayton cycle as a temperature of 250K at the inlet of compressor. If the temperature at the end of constant pressure cooling is 300K and raising the temperature of air in refrigerator is 50K, then find the net work out? (Take CP = 1 kJ/kg-K) **RTU-2018,2013**

Q.13 Why air cycle refrigeration is preferred in air craft. List its advantages.

RTU-2017, 2012

Q.14 The higher we go, the cooler we find, and then why air craft is air conditioned when they cruise at an altitude of 8000 m? **RTU-2018,2016,2015**

Q.15 Discuss the actual vapour compression cycle with the help of p-h and T-s diagram. What is the effect of discharge pressure and suction pressure on the COP of vapour compression refrigeration cycle? **RTU-2013,2016, 2017, 2018**

Descriptive/Design Questions (All questions carry Four marks each.)

Q.16 A compound refrigeration system using R-12 as refrigerant consists of three evaporators of capacities 20TR at -5°C, 30 TR at 0°C and 10 TR at 5°C. The vapours leaving the evaporators are dry and saturated. The system is provided with individual expansion valve and flash intercoolers. The condenser temperature is 40°C and the liquid refrigerant leaving the condenser is sub-cooled to 30°C. Assuming isentropic compression at each stage, find:
    a.   the mass of refrigerant passing through each compressor
    b.   the power required to drive the system
    c   COP of the system

Q.17 Saturated ammonia vapour enters a 15 cm dia x 14 cm stroke twin cylinder single acting compressor at 0.2365 MPa whose volumetric efficiency is 79% and speed 420 rpm. The delivery pressure is 1.1672 MPa. The liquid ammonia at 21°C enters the expansion valve. For ideal cycle find:
    a.   The rate of circulation of ammonia
    b.   The refrigeration in ton
    c.   COP of the cycle
Take specific heat and density of ammonia as 2.19 kJ/kg.k and 0.77 kg/m3.

RTU-2014

Q.18 An air craft moving with speed of 1000 km/ hour uses simple gas refrigeration cycle for air conditioning. The ambient pressure and temperature are 0.35 bar and -10° C respectively. The pressure ratio of compressor is 4.5. The heat exchanger effectiveness is 0.95. The isentropic efficiencies of compressor and expander are 0.8 each. The cabin pressure and temperature are 1.06 bar and 25° C. Determine temperatures and pressures at all points of the cycle. Also find the volume flow rate through compressor inlet and expander outlet for 100TR.Take Cp =1.005 kJ/kg-K. R =0.287 kJ/ kg K and Cp/ Cv =1.4 for air. **RTU-2015**

Q.19 A Bell Coleman refrigeration system is used to produce 10 tons of refrigeration. The cooler and refrigerator pressure are 4.2 bars and 1.4 bars. Air is cooled in the cooler to 45° C and the temperature of air at the inlet of the compressor is -20° C. For the ideal cycle, Calculate COP, mass of air circulated/min, theoretical piston displacement of the compressor and the power required per ton of refrigeration. Assume Cp for air as 1.005 kJ/ kg-K. Find the cylinder dimensions if the compressor is single acting. Single cylinder with stroke/diameter ratio of 1.2 and runs at 600 rpm. Take $\gamma = 1.4$, K = 0.287. **RTU-2014**

Swami Keshvanand Institute of Technology, M & G, Jaipur
Department of Mechanical Engineering
Assignment No# 01 (VI Semester)
Subject: Computer Integrated Manufacturing Systems (CIMS)

Note:
> ➢ All the students are required to submit the assignment on A4 size paper and mention your RTU roll number, section and other details on first page.
> ➢ Students must submit the assignment before first midterm examination.

Part A: short answer type questions (10x2=20 Marks)

Q.1. What are the goals of automation in manufacturing industry?

Q.2. What are the nine major elements of CIM system?

Q.3. Define automation.

Q.4. What is the difference between production and manufacturing?

Q.5. What is Process planning?

Q.6. Write four advantages of computer aided process planning

Q.7. Why adaptive control system is useful in CNC?

Q.8. What is the role of CIM in manufacturing?

Q.9. What is the role of GT in CAD/CAM?

Q.10. What is CNC software?

Part B: Analysis/Application/Problem Solving Questions (5x4=20 Marks)

Q.11. Why there is a need of interpolator on a CNC machine? Explain absolute and incremental coordinate systems with neat sketch.

Q.12. What is APT language? Explain the different types of statements used in APT language to write the part programme.

Q.13. What is canned cycle? What are the advantages of standardized fixed cycles over general part programming?

Q.14. Explain the Direct Numerical Control System (DNC) with a neat sketch. Write four differences between NC and CNC Machine.

Q.15. Enlist the different levels of automation also explain the programmable automation in detail.

Part C: Descriptive/Design Questions (4x5=20 Marks)

Q.16. Explain with a block diagram the implementation of a CAD/CAM processes in an engineering organisation.

Q.17. Explain the adaptive control system with neat sketch. Write functions of adaptive control system.

Q.18. With a neat diagram explain the working of generative CAPP system. Mention the advantages and limitations of it.

Q.19. Write the complete APT part program to perform the profile milling operation for the part drawing shown below. Tooling = 20 mm diameter end mill with two teeth, cutting speed = 125 mm/min, and feed = 0.10 mm/tooth. The part is 10 mm thick. Use the lower left corner of the part as the origin in the x-y axis system. The two holes in the part have already been drilled and will be used for clamping the part during milling.
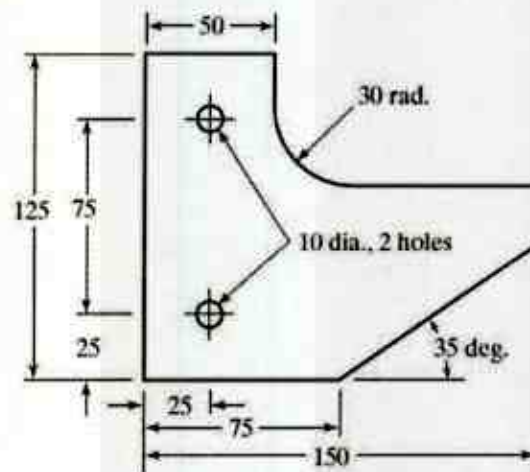
ALL DIMENSIONS ARE IN MM

Q.1 Find the maximum stress induced in the following cases taking stress concentration into account:

    a. A rectangular plate 60 mm x 10 mm with a hole 12 mm diameter as shown in Fig.1.1.a and subjected to a tensile load of 12 kN.

    b. A stepped shaft as shown in Fig.1.1.b and carrying a tensile load of 12 kN.
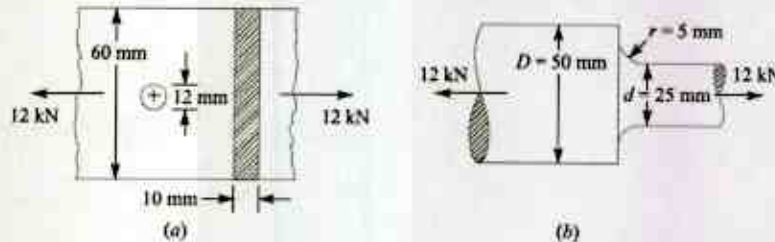
Fig.1.1

Q.2 A rod of a linkage mechanism made of steel 40Crl (S_{ut} = 550 N/mm²) is subjected to a completely reversed axial load of 100 kN. The rod is machined on a lathe and the expected reliability is 95%. There is no stress concentration. Determine the diameter of the rod using a factor of safety of 2.

Q.3 A component machined from a plate made of steel 45C8 (S_{ut} = 630 N/mm²) is shown in Fig.1.2. It is subjected to a completely reversed axial force of 50 kN. The expected reliability is 90% and the factor of safety is 2. The size factor is 0.85. Determine the plate thickness t for infinite life, if the notch sensitivity factor is 0.8.   **(R.T.U. 2017)**
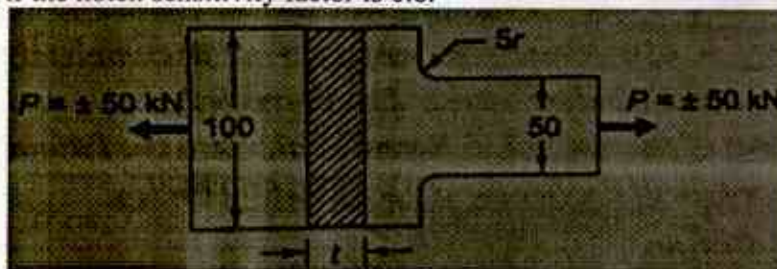
Fig.1.2

Q.4 A cantilever beam made of steel SAE 1030 of circular cross-section as shown in Fig. 1.3, is subjected to a load which varies from – F to 3 F. Determine the maximum load that this member can withstand for an indefinite life using a factor of safety as 2. The expected reliability is 90%, the theoretical stress concentration factor is 1.42 and the notch sensitivity is 0.9.
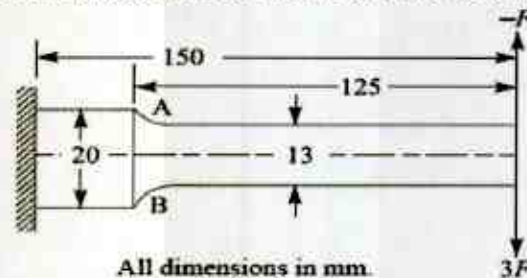
All dimensions in mm.   3F   Fig.1.3

Q.5 A 50 mm diameter shaft is made from carbon steel having ultimate tensile strength of 630 MPa and yielding strength of 510 MPa. It is subjected to a torque which fluctuates between 2000 N-m to – 800 N-m. Using Soderberg method, calculate the factor of safety.

Q.6 A forged steel bar, 50 mm in diameter, is subjected to a reversed bending stress of 250 N/mm². The bar is made of steel 40C8 (S_{ut} = 600 N/mm²). Calculate the life of the bar for a reliability of 90%.

Q.7 A steel cantilever is 200 mm long. It is subjected to an axial load which varies from 150 N (compression) to 450 N (tension) and also a transverse load at its free end which varies from 80 N up to 120 N down. The cantilever is of circular cross section. Its diameter is 2d for the length of 50 mm and d for the remaining length. Determine required diameter at the change of section for infinite life using a factor of safety of 2.0. Material properties are: Ultimate stress = 550 MPa, Yielding stress = 330 MPa, endurance limit = 300 MPa, stress concentration factor = 1.44 for bending and 1.64 for axial loading, size factor = 0.85, surface finish factor = 0.90, notch sensitivity index = 0.9. Take correction factor for reversed axial loading is 0.70 and for reversed bending is 1.0.
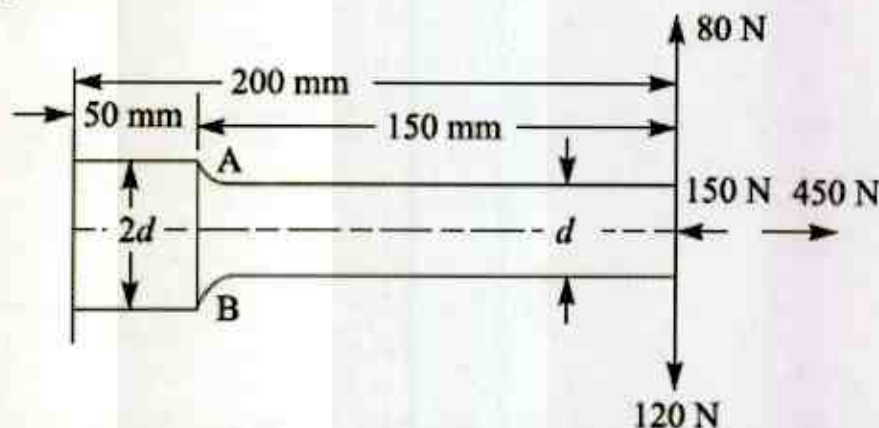

Fig.1.4

Q.8 A machine component is subjected to two dimensional stress. The tensile stress in the X direction varies from 40 to 100 N/mm² while the tensile stress in the Y direction varies from 10 to 80 N/mm². The frequency of variation of these stresses is equal. The corrected endurance limit of the component is 270 N/mm². The ultimate tensile strength of the material of the component is 660 N/mm². Determine the factor of safety used by the designer. **(R.T.U. 2017)**

Q.9 A polished steel bar is subjected to axial tensile force that varies from zero to P_{max}. It has a groove 2 mm deep and having a radius of 3 mm. The theoretical stress concentration factor and notch sensitivity factor at the groove are 1.8 and 0.95 respectively. The diameter of the bar is 30 mm. The ultimate tensile strength of the bar is 1250 MPa. The endurance limit in reversal bending is 600 MPa. Find the maximum force that the bar can carry for 10^5 cycles with 90% reliability.

Department of Mechanical Engineering
Engineering Thermodynamics(3ME4-05)
Assignment : 1 (2019-20)(III ME-All Sections)

a. All students are required to submit the assignment on or before the due date.

b. Assignment submitted after due date would not be consider for Internal marks assessment.

PART-A (Short Answer Type 30-40 words)(Each Question carries One Mark)

1. Show that heat and work are path functions.
2. Write Joule's law and define internal energy related to a system.
3. Draw the P-v & T-s diagram for polytropic process taking different values of index.
4. A watermelon weighs 2.5 kg and has a volume of 300 cm³ in a refrigerator at 8⁰C. What is the watermelon's density? List 3 intensive and 2 extensive properties of watermelon.
5. Is density a unique measure of mass distribution in a volume? Does it very? If so, on what kind of scale (distance)?
6. Write the expression of time rate basis SFEE and deduce same for a nozzle to evaluate its velocity at exit.
7. What would be the work interaction in a free expansion process?
8. What is Irreversibility?
9. Why entropy is referred as a point function?
10. Why second law is called as the law of degradation of energy?

PART-B (Medium Answer Type 80-90 Words)(Each Question carries 2 Marks)

11. A mercury thermometer measures temperature by measuring the volume expansion of a fixed mass of liquid mercury due to change in density. The change in density with temperature is linear in nature and given by $\rho_{Hg} = 13595 - 2.5T$ kg/m³(T in Celsius). Find the relative change (%) in volume for a change from 10⁰C to 20⁰C.

12. A tank is connected to high pressure line in which fluid at 10 bar and 600K flows. The tank is insulated and having a volume of 1m³ and contains fluid at 0.1 MPa and 27⁰C. The tank is quickly filled with fluid by opening the valve between the tank and high pressure line. If the fluid pressure finally in tank is 1 MPa. Determine the mass of fluid which enters the tank. (Take C_v=0.718 kJ/kg-K;C_p=1.005 kJ/kg-K).

13. A House requires 2×10⁵kJ/hr of heat for space heating in winter. Heat pump is used to absorb heat from cold air outside in winter and send heat to the house. Work required to operate the heat pump is 3×10⁴kJ/hr. Determine heat absorbed from outside and coefficient of performances.

14. When a system is taken from state a to b in figure along path acb, 90 kJ of heat flow into the system, and system does 42 kJ of work.

    a.) How much will the heat flows into the system along path adb be, if the work done is 14.5 kJ?
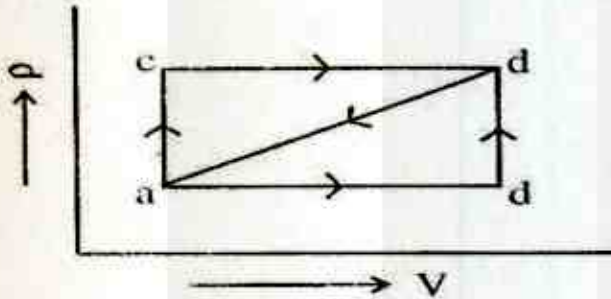
b.) When the system is returned from b to a along curved path, the work done on the system is 25 kJ. Does the system absorb or liberate heat, and how much of the heat is absorbed or liberated?

15. One kg of water at 273K is brought into contact with a heat reservoir at 373K. When the water has reached 373K, find the entropy change of the water, of the heat reservoir and of the universe. (Take Specific heat of water C=4.187 kJ/kg K).

PART-C (Long Answer Type 120-150 Words)(Each Question carries 4 Marks)

16. A reversible heat engine operates between teo reservoirs at temperatures of 600°C and 40°C. The engine derives a reversible refrigerator which operates between reservoirs at temperatures of 40°C and -20°C. The heat transfer to the heat engine is 2000 kJ and the net work output of the combined engine refrigerator plant is 360 kJ.

   a.) Evaluate the heat transfer to the refrigerant and the net heat transfer to the reservoir at 40°C.

   b.) Reconsider (a) given that efficiency of the heat engine and the COP of the refrigerator are each 40% of their maximum possible values.

17. Establish the energy balance equation for variable flow processes considering tank filling and tank discharging.

18. Two kg of air at 500 kPa, 80°C expands adiabatically in a closed system until its volume is doubled and its temperature becomes equal to that of the surrounding which is at 100kPa, 5°C. For this process determine (a) the maximum work, (b) the change in availability and (c) the irreversibility. For air take $c_v = 0.718$ kJ/kgK, $u = c_v T$, where c_v is constant and pV=mRT where p is pressure in kPa, V volume in m³, m mass in kg, R a constant equal to 0.287 kJ/kgK, and T temperature in K.

19. Write the statements of Second law of thermodynamics. Prove that both the statements are equivalent.

a. All students are required to submit the assignment on or before the due date.

b. Assignment submitted after due date would not be consider for Internal marks assessment.

PART-A (Short Answer Type upto 25 Words)

1. Add the vectors $x_1 = 4Cos(\omega t + 10^0)$ and $x_2 = 6Sin(\omega t + 60^0)$ analytically.
2. Define SHM, DOF, Time period and Natural frequency.
3. Derive equation of motion for a simple spring mass system using energy method.
4. What is compound pendulum? Explain center of percussion and its significance.
5. Explain the classification of vibrations on the basis of direction with respect to axis of body with suitable examples.
6. Define resonance. Why is it undesirable?
7. Assuming that the amplitudes of successive cycles in a damped system is given. How would you ascertain whether the damping is viscous damping or coulomb damping?
8. What is vibration isolation? Write names of materials used for vibration isolation.
9. Explain the salient characteristics of a hysteretic damping. How is it different from viscous damping?
10. Represent the following complex numbers in exponential form: (i) 3+7i, (ii) -5+4i.

PART-B (Medium Answer Type 80-90 Words)

1.) A body of mass 10 kg is hung on two helical springs in series. When individually treated, the first spring is elongated 2 cm by a force of 6 N, while the other is elongated by 2 cm by a force of 4 N. Calculate the natural frequency of vibrations of the series system.

2.) A body of mass 1.5 kg lies on a dry horizontal plane and is connected by a spring to a rigid support. The body is displaced from the unstressed position by an amount equal to 0.3 m with the tension of 60 N in the spring for this new position. How many cycles of motion will be performed after being released from this position? How much time will it take to perform this motion if the coefficient of friction is 0.25?

3.) A vibrating system is defined by the following parameters: m = 3 kg, k = 100 N/m, c = 3 N-s/m. Find: (i) Damping factor, (ii) Natural frequency of damped vibrations, (iii) Logarithmic Decrement, (iv) Number of cycles after which the original amplitude is reduced to 20%.

4.) An electric motor is supported on a spring and a dashpot. The spring has the stiffness 5000 N/m and the dashpot offers resistance of 600 N at 5 m/sec. The unbalanced mass of 0.4 kg rotates at 6 cm radius and the total mass of vibratory system is 20 kg. The motor runs at 500 rpm. Determine:
(i) Damping factor
(ii) Amplitude of vibration and phase angle
(iii) Resonant speed and resonant amplitude
(iv) Maximum forces exerted by the spring and dashpot on the motor.

5.) A trailer has 1000 kg mass when fully loaded and 350 kg when empty. The spring of the suspension has a stiffness of 350 kN/m. The damping ratio is 0.5 when the trailer is fully loaded. It travels on the road at 90 km/hr. The road has a sinusoidal profile with a wavelength of 5 m. Find the amplitude ratio of the trailer when it is fully loaded.

PART-C (Long Answer Type 120-150 Words)

1.) Determine the natural frequency of vibrations for the spring pendulum as shown in figure below using: (i) Newton's 2nd law of motion, (ii) D' Alembert's principle, (iii) Energy principle.
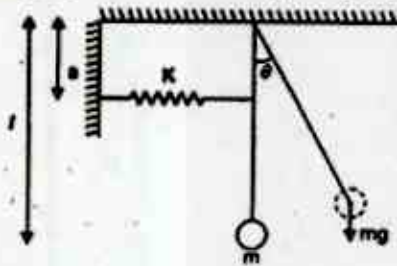
2.) Derive the differential equation of motion for a general spring-mass-damper system and obtain the solution of the differential equation for the following cases: (i) Underdamping, (ii) Critical damping, (iii) Overdamping.

3.) Derive the expression for amplitude (Y_0) and phase angle $(\varnothing)$ for a general spring-mass-damper system, wherein the mass is subjected to a harmonic excitation $F_0 \sin \omega t$.

4.) Draw the frequency response curves for viscous damped vibrations with constant harmonic excitation, and write the important observations from the curves. Also, derive the condition for which the peak of the curves is achieved.