Department of Materials' Science and Metallurgical Engineering

University Institute of Engineering and Technology

Electrical engineering materials, ECE S305

Year: 23- 24 End Semester Exam 3rd year

Max.time: 3h **Max.marks:50**

Part A: (1 marks each)

A1) Give example of hard magnetic materials.
A2) Write three characteristics of dielectrics
A3) Susceptibility of diamagnetic material is ----------.
A4) Name few antiferromagnetic materials.
A5) Draw a schematic of the B-H and M-H loops of a typical ferromagnetic material. What is the difference between these two loops?
A6) Relation between magnetic susceptibility and permeability is----------.
A7) Write three characteristics of soft magnetic materials.
A8) Write an expression of spin and orbital magnetic moment.
A9) Write an expression for Bohr magneton and its unit.
A10) Curie Weiss formula is----------

Part B: (4 marks each)

B1 (a) Find the capacitance of a layer of Al_2O_3 that is 0.8 mm thick and 20000 mm^2 of surface area. $\varepsilon_r = 80$.

(b) Why Cu do not display net magnetic moment.

B2) Calculate the maximum, or saturation, magnetization that we expect in iron (at. number 26). The lattice parameter of BCC iron is 2.866 Å. Compare this value with 2.1 tesla (a value of saturation flux density experimentally observed for pure Fe).

B3) Derive the relation between susceptibility and permeability.

B4) A diamond cube 2mm× 2mm×2mm is introduced as a dielectric. The total charge q on one face of crystal is 3×10^{-5}C. Calculate the voltage acting on the crystal. The dielectric constant of diamond is 5.5.

B5) Suppose that the average displacement of the electrons relative to the nucleus in a copper (29) atom is 10^{-8} Å when an electric field is imposed on a copper plate. Calculate the electronic polarization. The lattice parameter of Cu is 3.6151 Å

Part C: (20 marks)

C1) (a) Calculate the polarization of $BaTiO_3$ crystal. The shift of Ti ion from the body centre is 0.06Å.The oxygen anions from the side faces shift by 0.06 Å while the oxygen ions of the top and bottom faces shift by 0.08 Å, all in direction opposite to that of Ti ion. latice parameters; a=4.03 Å and c=3.98 Å.

C1) (b) A 2 mm thick alumina dielectric is used in a 60 Hz circuit. Calculate the voltage required to produce a polarization of 5×10^{-7} C/m^2.

C2) Explain the following in one or two lines i) Ferrimagnetism, ii) Ferromagnetism. iii) Hard magnet, iv) Hysteresis loop, v) Magnetic moment, vi) Magnetic permeability, vii) Magnetocrystalline anisotropy, viii) Paramagnetism, ix) Permanent magnet, x) Shape anisotropy.

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

UNIVERSITY INSTITUTE OF ENGINEERINGAND TECHNOLOGY, CSJM UNIVERSITY, KANPUR

Measurement and Instrumentation (ECE-303-S)

Semester: 2023-24 (Odd Semester) **Year: 3rd Year (2K21)**

B.Tech(ECE) End Semester Examination

Time: 3 h **Maximum marks: 50**

Section A

10 marks (10 questions of 1 mark each)

1. Name the material used for T type thermocouple.
2. Define fidelity.
3. What is the role of attenuator in XY-recorder.
4. Give two drawback of wheatstone bridge.
5. What is the function of pot in sawtooth generator
6. Give the relatilonship for resistance of photo-conductive cell.
7. Name two synthetic peizoelectric material used to make transducers.
8. For LVDT,define single axis senstivity.
9. Draw labelled diagram of capacitve strain transducer.
10. Give the relationship for displacement in helical spiral spring.

Section B

20 marks (do any 5 questions of 4 marks each)

1.
   a. The dead zone in a certain pyrometer is 0.125 percent of span. The calibration is 400°C to 1000°C. What temperature change might occur before it is detected.
   b. The coil of a PMMC instrument has 60 turns, on a former that is 18 mm wide, the effective length of the conductor being 25 mm. It moves in a uniform field of flux density 0.5 Tesla. The control spring constant is 1.5×10^{-6} Nm/degree. Calculate the current required to produce a deflection of 100 degree. **(2+2)**
2.
   a. What are the advantage of magnetic tape recorders.
   b. Draw circuit diagram of triangular wave generator using opamp and give the relationship for time-period. **(2+2)**
3. Explain the construction and working of resistance thermometer with suitable diagram and also explain how electrical output is generated from it.
4. Explain the construction and working of series type ohmmeter with suitable circuit diagram
5. Derive the balance condition for Maxwell's and Hay's bridge with suitable diagram and differentiate them.
6. Write a short note on smart sensors.

Section C

20 marks (do any 2 questions of 10 marks each)

1.. (a) Explain working and construction of piezo-electric microphone and also define the
(i) D-coefficient (ii) G-coefficient (iii) H-coefficient

(b) The basic D'arsonval movement with internal resistance of 100 ohm and full scale deflection of 1 mA is to be converted in mutirange voltmeter with range s of 0-10V, 0-50V,0-250V and 0-500V using aryton shunt. Design the aryton shunt for the same. **(6+4)**

2. Explain the working and construction of spectrum analyzer with a suitable block diagram.
3. (a) Explain kelvin's double bridge with suitable diagram and derive it's balance condition.
(b) what are the components of bonded strain gauge and what are the factor should be considered for every component while construction. **(3+7)**

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING
U I E T, C S J M UNIVERSITY, KANPUR
END SEMESTER EXAMINATION
***Signals & Systems* (ECE-S302)**

Semester: 2023-24 (Odd Semester) Year: 5th Semester
Time: 3Hours Max. Marks: 50
All questions are compulsory.

Section A

Attempt all questions [10 x 1 = 10]

1. The Z transform of an anti-causal is : $X(Z) = \frac{3-4z}{1-2z+5z^2}$
   The value of X(0) is
   i) 3 ii) 0 iii) -4/5 iv) 1/5
2. DTFT is a special case of
   i) Z-transformation ii) Laplace transform iii) Continuous time fourier transform iv) None
3. If two or more inputs and two or more outputs are given to the system then that system is called _
   i) SISO ii) SIMO iii) MISO iv) MIMO
4. An LTI system acts as a _____
   i) Filter ii) Comparator iii) Integrator iv) None of the above.
5. The change of input signals shape when it is transmitted through a system is called _____
   i) Distortion ii) Discriminator iii) Interpolator iv) None of the above
6. Define the correlation theorem.
7. Define causal, non-causal and anti-causal system.
8. What is power spectral density?
9. What is the main advantage of using integrators over differentiators in realization of systems?
10. What is system bandwidth?

Section B

Attempt all questions [short questions] [5 x 4 = 20]

11. Determine the Z transform of the following infinite and finite duration signals with ROC,
    a) $x(n) = 2^n u(n-2)$ b) x(n)={1,2,3,4}
12. Realize the system with the following transfer function in direct form I.
$$H(s) = \frac{s+4}{s^2+3s+5}$$
13. Find the DTFT of
    i) x(n)={1,1,-2,2} ii) $x(n) = 3^n u(n)$
14. Find the inverse Z transform of the function
    i) $x(n) = \ln(1+z^{-1})$, $|z|>0$ ii) $x(z) = \frac{10z}{(z-1)(z-2)}$; $ROC; |z| < 2$
15. Define the cross correlation and auto correlation of signals.

P.T.O

Section C

Attempt all questions [long question] [2 x 10 = 20]

16. a) Determine whether the system is linear, time invariant, causal and stable.

$$y(n)+y(n-1)=x(n)+x(n-2).$$

b) Find the impulse response of the system

$$y(n+1)+2y(n)=x(n) \quad \text{with } y(0)=0$$

17. a) Using Fourier transform, find the convolution of the signals

$$x_1(t)= te^{-t}u(t) \text{ and } x_2(t)= te^{-2t}u(t)$$

b) Consider an LTI system whose response to the input $x(t)= (e^{-t} + e^{-3t})u(t)$ is $y(t)=(2e^{-t} - 2e^{-4t})u(t)$

Obtain the differential equation relating the input and output of the system.

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING
UNIVERSITY INSTITUTE OF ENGINEERINGAND TECHNOLOGY, C.S.JM UNIVERSITY, KANPUR

Electronics Circuits (ECE-S 301)

Semester: 2023-24 (5th Semester) **Year: 3rd Year (2K21)**

END Semester Examination-I

Time: 3 hrs. **Maximum marks: 50**

All questions are compulsory

Section A

10 marks (10 questions of 1 mark each)

1. When a negative voltage feedback is applied to an amplifier, its bandwidth.....
   (a) Is increased (b) Insufficient data (c) Is decreased (d) Remains the same
2. Which type of feedback is used by Hartley oscillator?
   a) Voltage series feedback b) Current series feedback
   c) Voltage shunt feedback d) Current shunt feedback
3. At what condition the output signal can be continuously obtained from input signal?
   a) When the product of input voltage and feedback voltage is equal to 1
   b) When the product of amplifier gain and transfer ratio is equal to 1
   c) When the product of feedback voltage and transfer ratio is equal to 1
   d) When the product of amplifier gain and input voltage is equal to 1
4. Which of these is incorrect for a Wien Bridge oscillator?
   (a) Low distortion (b) Good stability at the resonant frequency
   (c) Difficult to tune (d)Based on frequency selective form of a Wheatstone bridge
5. Which of these are incorrect about Darlington amplifier?
   (a) It has a high input resistance (b) The output resistance is low
   (c) It has a unity voltage gain (d) It is a current buffer
6. Which device was used for the amplification of audio signals before the invention of power amplifiers?
   (a) Diode (b) Op-amp (c) Vacuum tubes (d) SCR
7. Heat sinks reduce the
   a) Transistor power b) Ambient temperature c) Junction temperature d) Collector current
8. A tuned amplifier is used in ..... applications
   a) Radio frequency b) Low frequency c) Audio frequency d) None of the above
9. The Q of a tuned amplifier is 50. If the resonant frequency for the amplifier is 1000kHZ, then bandwidth is .....
   a) 10kHz b) 40 kHz c) 30 kHz d) 20 kHz
10. When all the values of Resistors used in Differential amplifier are same then it becomes Unity Gain differential Amplifier. **True / False**

Section B

20 marks (5 questions of 4 mark each).

11. Why does the gain of an R-C coupled amplifier falls in

    i) low frequency range

    ii) high frequency range

12. An amplifier having a gain of 500 without feedback has an overall negative feedback applied which reduces the gain to 100.Calculte the fraction of output voltage feedback. if due to ageing of components, the gain without feedback falls by 20%, Calculate the percentage fall in gain without feedback.

13. Deduce the condition of oscillation and frequency of oscillation of Wien bridge oscillator

14. Explain the principal of chopper amplifier with neat diagram.

15. Discuss the input offset voltage of bipolar differential pair.

Section C

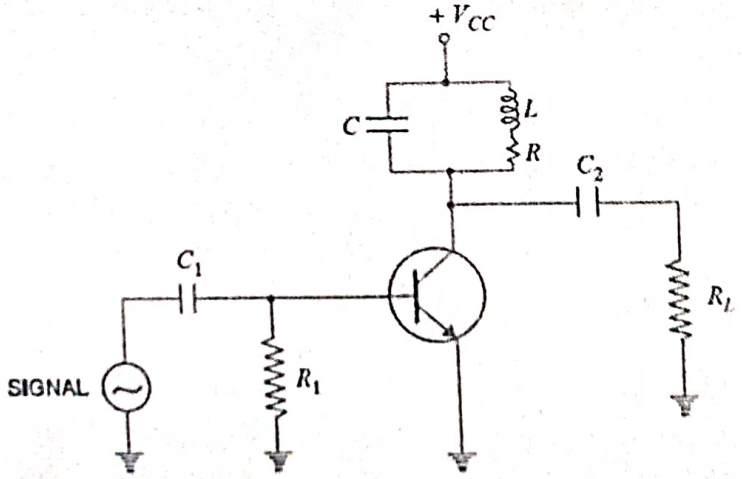
20 marks (2 questions of 10 marks each, each question can have two parts)

16 a) Draw the circuit of a push-pull amplifier and explain its operation. Derive an expression for its maximum conversion efficiency.

b) In the circuit shown in given Fig., C = 500 pF and the coil has L = 50.7 μH and R = 10Ω and RL = 1 MΩ. **Find**

(i) the resonant frequency

(ii) (ii) d.c. load and a.c. load.



17. Write **short notes** of the following: -

a) MOS Power transistors.

b) Stagger tuned amplifiers.

E-mail: registrarcsjmukhp@gmail.com
csjmu@kanpuruniversity.org
Kalyanpur, Kanpur-208017

CHHATRAPATI SHAHU JI MAHARAJ UNIVERSITY, KANPUR

छत्रपति शाहू जी महाराज विश्वविद्यालय, कानपुर

Department of Materials Science and Metallurgical Engineering
University Institute of Engineering and Technology
Electrical Engineering Materials (ECE-S305)
2nd Mid Semester Examination

Time 1.5 hrs. **Max. marks: 30**

All questions are compulsory

Section A (1 mark each)

A1) Semiconductors measure the strength of a magnetic field by using the -----

A2) Thermistors is used as----------

A3) GaAs is an ----------S C with band gap of ---------

A4) Name two direct band gap SC----------

A5) In an indirect band gap SC the top of V.B and bottom of C.B lies at------

A6) In an n type semiconductor fermi level lies in near valence band. T/F

A7) Band gap of Ge is ----------,

A8) Name two compound semiconductors along with their band gap.

A9) Conductivity of SC increases with temperature T/F

Part B: (3× 3=9 marks)

B1 A silicon rod 1.25 mm in diameter is doped with one antimony atom per million silicon atoms. A current of 10 A is passed through the rod when the rod is in a magnetic field. If6 V is measured across the silicon semiconductor, calculate the strength of the magnetic field. $n_e = n_d = 5\times10^{23}\ e^{-}/m^3$

B2) At room temperature n pn junction $n_i = n_o = 10^{10}/cm^3$, donor ion concentration, $N_d = 10^{17}/cm^3$, (acceptor ion concentration),N_a $10^{16}/cm^3$. Calculate i)W_p and w_n; ii) the width of depletion region(W_o) and iii), contact potential, V_o

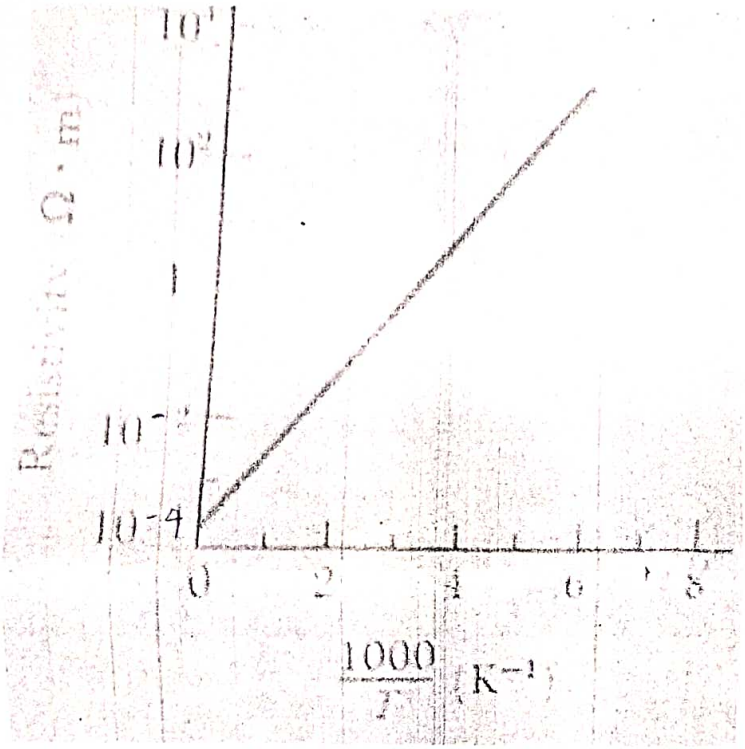
B3) Calculate the number of extrinsic charge carriers per cubic meter in an n-type semiconductor when one out of every 1,000,000 atoms in silicon is replaced by an antimony

E-mail:registrarcsjmuknp@gmail.com

csjmu@kanpuruniversity.org

Part C: (6× 2=12)

C1) A thermistor made from an Fe,O, $MgCr_2O_4$ defect semiconductor is 1 mm diameter and 10 mm long. Calculate (a) the current produced in the thermistor in a 16-V circuit at 27°C and (b) the temperature when a current of 12.5 mA flows in the 16-V thermistor circuit. (See Figure below)



C2) (ZnO has a zinc blende structure. (a) Calculate the lattice parameter and density of ZnO unit cell. (b) If the ZnO is doped with one extra Zn ion per 100 Zn ions, estimate the number of charge carrier in one cubic centimeter of zinc blende.

Given r_{zn}=0.74 Å, r_O=1.32 Å

MICROPROCESSOR (ECE-S304)

Semester: 2023-24 (Odd Semester) **Year: 3rd Year (2K21)**

Mid Semester-II Examination-2023

Time: 1.5 Hrs. **Maximum marks: 30**

All questions are compulsory

Section –A.

Note : Attempt all the Questions. Each Question carries 1 Mark.

1 Calculate, how many address lines are necessary to address 4 Megabytes of memory.

2 Explain the special purpose registers of 8085.

3 Explain the Implicit addressing mode with example.

4 Write at least four instruction that reset the Accumulator.

5 Explain the function of ALE.

6 If A = 48 H then after the execution of ANI C8 H what is the value of PSW.

7 Explain the various control signal of Microprocessor.

8 Whether the following signals are Input or Output.

i) TRAP ii) HLDA

9 After the execution of XRA M, what is the status of flag.

Section –B

Note : Attempt all the Questions. Each Question carries 3 Mark.

10 Calculate the execution time of the instruction JZ Addr(16 bit), if the crystal frequency of an 8085 system is 4MHz and if PSW = EA H.

11 Write an ALP to set 4 LSB's, reset 4 MSB's and compliment rest of the bits of register pair DE.

12 Explain the working of following Instructions with example –

i) RLC

ii) ORI FF H

iii) CMA

Section – C

Note :Attempt all the Questions. Each Question carries 6 Mark.

13 10, 8 bit numbers are stored in memory from 4550 H onwards. Write an ALP to add these numbers and store the result at the end of the block. For addition use only double addition instruction.

14 Explain the difference between the conditional and unconditional branching. Give all the instructions related to branching. Also give the various machine cycles for conditional and unconditional branching instruction.

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING
UNIVERSITY INSTITUTE OF ENGINEERINGAND TECHNOLOGY, CSJM UNIVERSITY, KANPUR

MICROPROCESSOR (ECE-S304)

Semester: 2023-24 (Odd Semester) **Year: 3rd Year (2K21)**

Mid Semester-I Examination

Time: 1.5 Hrs. **Maximum marks: 30**

All questions are compulsory

Section –A.

Note : Attempt all the Questions. Each Question carries 1 Mark.

1 One T- state is 0.5 microsecond, then the processor operates at which frequency.

2 What is Machine cycle? Explain.

3 Explain Accumulator.

4 Explain Status signal of microprocessor.

5 A memory connected to a microprocessor has 16 address lines and 8 data lines. What will be the memory capacity?

6 Whether the following signals are Input or Output.

i) ALE ii) Ready

7 Explain Direct addressing mode with example.

8 Number of bytes required for LHLD Address to convert in to hex code.

9 After the execution of DCX Rp, what is the status of flag.

Section –B

Note : Attempt all the Questions. Each Question carries 3 Mark.

10 Explain the working of following Instructions –

i) DAD Rp

ii) INX Rp

iii) SHLD Addr(16 bit)

11 Calculate the execution time of the instruction MVI R_d, data(8 bit), if the crystal frequency of an 8085 system is 6MHz.

12. Explain the working of the following signals –

i) X_1, X_2

ii) SOD

iii) AD_7-AD_0

Section – C

Note :Attempt all the Questions. Each Question carries 6 Mark.

13(a) Explain the PSW with giving suitable example.

(b) Draw the functional block diagram of microprocessor 8085.

14 Perform the subtraction X-Y, where X & Y are two,24 bit numbers present in registers B,C,D & E,H,L and store the result in memory from location 2000 H onwards by using RIAM

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING
SCHOOL OF ENGINEERING & TECHNOLOGY,
MID SEMESTER EXAMINATION
Signals & Systems (ECE-S302)

Semester: 2023-24 (Odd Semester) **Year: 5th Semester**
Time: 1Hour 30 Minutes **Max. Marks: 30**

All questions are compulsory.

Section A [9 x 1 = 9]

1. signal $u(t)$ is

   a) Energy Signal b) Power signal c) Neither energy nor power d) none

2. $h(n) = \delta(n) + \delta(n+1) + \delta(n-1)$

   a) Causal and stable b) causal but not stable c) Not causal but stable d) none

3. The value of $\delta(3t)$ and $\delta(3n)$ are respectively

   a) $\frac{1}{3}\delta(t)$and $\delta(n)$ b) $\frac{1}{3}\delta(t)$and $3\delta(n)$ c) $3\delta(t)$and $\frac{1}{3}\delta(n)$ d) $\frac{1}{3}\delta(t)$and $\frac{1}{3}\delta(n)$

4. $x(t) = |\cos t| + |\sin t|$ Find the period of signal?

   a) π b) 1 e) $\frac{\pi}{2}$ f) $\frac{1}{2}$

5. Shift in time of a certain sequence is equivalent to

   a) change in magnitude spectrum
   b) change in phase spectrum
   c) Change in both
   d) Change in phase spectrum keeping magnitude same

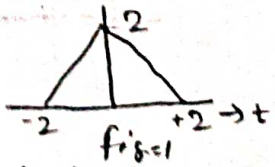
6. Define a stable and a unstable system.
7. Laplace transformation is applicable for ….signal.
8. What are the basic operations on signals?
9. Sketch the r(-t) u(t+2).

Section B Attempt all of the following: [very short questions] [3 x 3 = 9]

10. Find the Fourier Transform of $x(t) = e^{at}$ and plot its amplitude spectrum and phase spectrum.
11. Sketch the following signals i) u (n+2) u (-n+3) ii) sinωt u (t-1) u (9-t) iii) 2r (t-2).
12. i) Find the even and odd component of the given signal. x(n) = {-2, 5,1,-3}.
    ii) Determine whether the given signal periodic or not, if periodic, determine the fundamental period. $x(t) = 3\sin 200\pi t + 4\cos 100t$

Section C Attempt all of the following: [short/ long question] [2 x 6 = 12]

13. a) Prove the power of the energy signal is zero over infinite time.
    b) Calculate the power and energy of given signal of Fig. 1.



    c) Define the FIR and IIR system with example.
14. a) Determine whether the following system is linear, causal , time invariant and stable:

$$y = y(n-2) + nx(n) + x(n+2)$$

    b) Distinguish between Energy and Power signals.

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
UNIVERSITY INSTITUTE OF ENGINEERINGAND TECHNOLOGY, CSJM UNIVERSITY, KANPUR

Measurement and Instrumentation (ECE-S-303)

Semester: 2023-24 (odd Semester) **Year: 3rd Year (2K21)**

Mid Semester Examination

Time: 1.5h **Maximum marks: 30**

All questions are compulsory

Section A

9 marks (9 questions of 1 mark each)

S.No.	Questions	CO
1	Compare accuracy and precision.	CO1
2.	Why horse shoe magnet is used instead of flat magnet in galvanometer?	CO2
3	What leads to development of R-2R DAC instead of weighted resistor DAC?	CO3
4	What is non-constructional difference between Hay's bridge and Maxwell's bridge, as both are used for measuring unknown inductance.	CO2
5	What is the purpose of laminating the iron core of galvanometer?	CO2
6	What is difference between the scale of shunt type ohmmeter and series type ohmmeter.	CO1
7	What is the limit of helix angle of helical spiral spring.	CO4
8	Give the relation for mechanical strain for cantilever beam.	CO4
9	Define sensitivity of voltmeter.	CO1

Section B

9 marks (3 questions of 3 marks each)

10	Draw a suitable diagram of 4 bit R-2R DAC and derive the Input-Output relationship of it.	CO3
11	In a series type ohmmeter , the internal battery has a a voltage of 3V.It is desired to read half scale at a resistance value of 2000Ω.Calculate (a) the value of shunt resistance and current limiting resistance, and (b) range of value of shunt resistance to accommodate battery voltage variation in the range of 2.7 to 3.1V.	CO2
12	Explain diaphragm element with suitable diagram and Input-output relationship	CO4

Section C

12 marks (2 questions of 6 marks each, Each question can have parts)

13	Design an aryton shunt to provide ammeter with current ranges of 5A,10A and 20A.A D'Arsonval movement with an internal resistance Rm=50Ω and full scale deflection current of 1mA is used in the configuration.	CO3
14	Explain the dynamic behaviour of galvanometer,	CO2

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
UNIVERSITY INSTITUTE OF ENGINEERING AND TECHNOLOGY, CSJM UNIVERSITY, KANPUR

Electronic Instrumentation (ECE-303)

Semester: 2023-24 (Odd Semester) **Year: 3rd Year (2K21)**

Mid Semester Examination-II

Time: 1.5 h **Maximum marks: 30**

All questions are compulsory

Section A

9 marks (9 questions of 1 mark each)

1. What is the limitation on primary frequency of LVDT.
2. Give seeback series..
3. Give the expression for displacement of cantilever beam.
4. Which material is used in K type thermocouple?
5. Give the example of lead wire insulation in bonded strain gauge for temperature range of 75 to 260 °C.
6. What are the factors on which sensitivity of below element depends.
7. Why wire in resistance thermometer is winded in bifiliar from?
8. What is an inverse transducer?
9. Define neutral temperature.

Section B

9 marks (3 questions of 3 marks each)

1. Give theory of strain gauge and derive the following relationship

$$G = 1+2\mu+\frac{\frac{d\rho}{\rho}}{\frac{dl}{l}}$$

2. In an inverting amplifier, a thermistor of resistance 5 KΩ at room temperatures placed in the feedback path as shown in fig., Find the value of output voltage (V) of the inverting amplifier at 35 °C where material constant β=3455

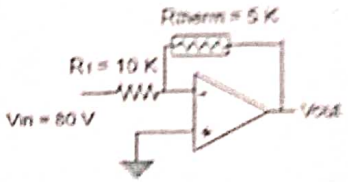

Fig.

3. Explain working and construction varaible reluctance inductive transducer.

Section C

12 marks (2 questions of 6 marks each)

1. Explain loading effect in potentiometer and derive the relationship for error due to loading effect and draw the graph for the variation of error w.r.t. loading effect..
2. Explain capacitive displacemenmt transducer with suitable diagram and derivation of variation of capacitance.

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
UNIVERSITY INSTITUTE OF ENGINEERING AND TECHNOLOGY, CSJM UNIVERSITY, KANPUR

Electronic Instrumentation (ECE-303)

Semester: 2022-23 (Odd Semester) **Year: 3rd Year (2K20)**

Mid Semester Examination-II

Time: 1.5 h **Maximum marks: 30**

All questions are compulsory

Section A

9 marks (9 questions of 1 mark each)

1. What is resolution of 6bit DAC with a reference voltage 12V.
2. What do you understand unlimited bandwidth of an ideal OPAMP.
3. Define peltier Effect.
4. Give the expression for displacement of cantilever beam.
5. Which material is used in T type thermocouple?
6. Give the relationship and unit for luminous intensity.
7. Find the sensitivity of the photomultiplier which has 6 stage and gain per stage is 5.the cathode sensitivity is 24 μA/lm, if the maximum safe current is 3A, calculate the maximum safe illumination.
8. What are the factors on which sensitivity of below element depends.
9. Define thermoelectric lines.

Section B

9 marks (3 questions of 3 marks each)

1. Give theory of strain gauge and derive the following relationship

   $G = 1+2\mu+\frac{\frac{d\rho}{\rho}}{\frac{dl}{l}}$

2. Explain with suitable diagram the working and construction of a photomultiplier.
3. Explain working and construction of LVDT.

Section C

12 marks (2 questions of 6 marks each)

1. Explain loading effect in potentiometer and derive the relationship for error due to loading effect and draw the graph for the variation of error w.r.t. loading effect..
2. Explain capacitive thickness transducer with suitable diagram and derivation of variation of capacitance.

E-mail:registrarcsjmuknp@gmail.com
csjmu@kanpuruniversity.org
0512-2580044
Kalyanpur, Kanpur-208024

CHHATRAPATI SHAHU JI MAHARAJ UNIVERSITY, KANPUR

छत्रपति शाहू जी महाराज विश्वविद्यालय, कानपुर

Department of ~~Materials Science and Metallurgical~~ Electronics & Communication Engineering

University Institute of Engineering and Technology

Electrical Engineering Materials (ECE-S305)

1st Mid Semester Examination

Time 1.5 hrs. **Max. marks: 30**

All questions are compulsory

Section A (1 mark each)

A1) GaAs is direct band gap semiconductor. T/F

A2) Second form of Ohm's law is---------

A3) Diamond is an------ with band gap----------eV.

A4) Write an expression for conductivity of semiconductor and metal mentioning each term.

A5) Materials with conductivity less than 10^{-12} Ωcm^{-1} are considered insulating or dielectric. **T/F**

A6) In an intrinsic semiconductor Fermi level lies in near valence band. T/F

A7) Fermi level in metals lies at ----------.

A8) Name two elemental semiconductors along with their band gap.

A9) Conductivity of metal increases with temperature. T/F

Part B: (3× 3=9 marks)

B1 *Assuming that all of the valence electrons contribute to current flow,(a) Calculate the mobility of an electron in copper (FCC) and (b) calculate the average drift velocity for electrons in a 100 cm copper wire when 10 V are applied. Given: The lattice parameter of copper is 3.6151× 10^{-8} cm, the conductivity of Cu=5.98 10^5 Ω cm^{-1}.*

B2) Draw energy vs. k diagram for direct and indirect band gap semiconductor.

B3) Neatly sketch band diagram of Si, C and Li.

E-mail:registrarcsjmuknp@gmail.com

csjmu@kanpuruniversity.org

Part C: (6× 2=12)

C1) For germanium at 25°C, estimate (a) the number of charge carriers, (b) the fraction of the total electrons in the valence band that are excited into the conduction band, and (c) the constant n_0. Given: ρ_{Cu}=43 Ωcm, E_g=0.67 eV, μ_n = 3900 cm^2/Vsec and μ_p = 1900 cm^2/Vsec, Boltzmann constant, k_B=8.63 ×10^5 eV/K and lattice parameter of diamond cubic germanium is 5.6575 × 10^{-8} cm.

C2) (a) Calculate the electrical conductivity of pure copper at (a) 400°C and (b) -100°C.

Given: The resistivity of copper at room temperature is 1.67× 10^{-6} ohm cm, and the temperature resistivity coefficient is 0.0043 ohm/ (ohm °C).

Department of Humanities

U. I. E. T., C. J. M. University

Communication Practicum (HSS-S 301), Branch: ECE

Semester: 2023 (5th Odd Sem.) **Year: 3rd Year (2K21)**

Mid Semester Examination

Time: 1.5h **Total Marks: 30**

Section A

Q1. Consider the Style and Tone in the given messages and Revise: (1x9=9)

a. Financial Head: The Quarterly Accounting Report was submitted on time.
b. You missed the deadline for submitting the proposal.
c. Every applicant should write her name on top.
d. The supervisor has sanctioned the leave for several days.
e. We are very sorry to cause you inconvenience.
f. Lab-in-charge has ordered computers which are of high quality and high efficiency.
g. I read an advertisement in the newspaper about a job opening for the post of Junior Engineer, so I am interested to apply for the post of Junior Engineer in your esteemed company.
h. I cannot assist you. Do it on your own.
i. An interesting presentation was delivered by you.

Section B

*Q2. Attempt **any three** of the following:* (3x3=9)

I. What points should a writer consider while writing negative messages?
II. For writing persuasive messages, what technique should you apply? Give examples to support your answer.
III. You have missed the submission deadline for the chemistry project. Write a message to the instructor/s informing them about the same. Invent the necessary details. (75-50 words)
IV. Draft your message in a persuasive tone in 50-75 words:
A. Tell me something about yourself

Section C

3. Attempt **any two** of the following: (100-125 words) (2x6=12)

a) Discuss the AIDA strategy for writing persuasive messages.

P.T.O

b) Write an application to the Electronics and Communication/ Chemical Department, Head of IIT, Kanpur for the Summer Internship Program.

c) Assume your friend has got appointed as Junior Engineer in HAL. Write a congratulatory message to your friend.

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING
SCHOOL OF ENGINEERING AND TECHNOLOGY, C.S.JM UNIVERSITY, KANPUR

Electronics Circuits (ECE-S 301)

Semester: 2023-24 (5th Semester) **Year: 3rd Year (2K21)**

Mid Semester Examination-I

Time: 1.5 h **Maximum marks: 30**

All questions are compulsory

Section A

9 marks (9 questions of 1 mark each).

Fill in the blank:

1. The best method of bias is _____.
2. If the operating point changes_____results.
3. For a transistor, the no. of h-parameters is _____.
4. Transformer coupling is mostly used for _____amplification.
5. Amplifiers are coupled to _____.

M.C.Q :

6. In an amplifier, the coupling capacitors are used
   a) To match the impedance b) To control the output
   c) To limit the band width d) To prevent d.c mixing with input or output
7. What is the purpose of impedance matching between the output of previous stage and input of next Stage in cascaded amplifier?
   a) To achieve high efficiency b) To achieve maximum power transfer
   c) To achieve reduced distortion d) To achieve reduced noise
8. The common emitter amplifier is characterised by
   a) low voltage gain b) very high input impedance c) signal phase reversal d) low voltage gain
9. What is the effect of cascading the amplifier stages?
   a) To increase the voltage gain and increase the bandwidth.
   b) To increase the voltage gain and reducethe bandwidth.
   c) To decrease the voltage gain and increase the bandwidth
   d) To decrease the voltage gain and reduce the bandwidth.

(P.T.O)

Section B

9 mark (3 questions of 3 marks each).

10. How will you obtain impedance matching with transformer coupling?
11. What are the various methods of cascading a two stage transistor amp. Draw the circuit diagram.
12. A two- stage common emitter R-C coupled amplifier uses transistor of the type BC 149B of which the h-parameters are hie= 4.5 kΩ and hfe =330. If the load resistance RL=5.5 KΩ, find the required value of the coupling capacitor C so that the lower cut-off frequency is 60 Hz.

Section C

12marks (2 questions of 6 marks each, each question can have parts)

13. a) Briefly discuss the internal capacitance of MOSFET with their parameter.

b) A transistor is connected as a common-emitter amplifier with load resistance R_L=10 KΩ. The h-parameters are h_{ie}= 5 kΩ and h_{fe} =330. Calculate the overall voltage gain for mid frequency range when four stages are connected in cascade by RC coupling. Assume that source resistance is negligible to h_{ie}.

14 Write short notes of the following: -

a) High frequency response of common Emitter amplifier

b) Discuss the effects of negative feedback on amplifiers characteristics.

Department of Humanities

U. I. E. T., C. J. M. University

Communication Practicum (HSS-S 301), Branch: ECE

Semester: 2023 (5th Odd Sem.) **Year: 3rd Year (2K21)**

Mid Semester Examination

Time: 1.5h **Total Marks: 30**

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