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SCHOOL OF ENGINEERING AND TECHNOLOGY

END-SEMESTER EXAMINATION: DECEMBER 2019

(Academic Session: 2019 – 20, Semester Term: Aug 2019– Dec 2019)

Name of the Program: B.Tech.
Stream: CE
PAPER TITLE: Solid Mechanics
Maximum Marks: 40
Total No of questions: 09

Semester: III

PAPER CODE: ECE42103
Time duration: 3 hours
Total No of Pages: 02

Answer all the Groups

Group A

(Answer all the questions)

$5 \times 1 = 5$

1. **a)** What is Shear force?
   b) What is Factor of safety?
   c) What is Compound Stress?
   d) What is Cripling load?
   e) What is Modulus of Elasticity?

Group B

(Answer any three questions)

$3 \times 5 = 15$

2. Derive the bending equation of beam by assuming all the notations as usual.

3. A cantilever beam AB of span 'L' and constant cross-section is fixed at A and free at B. It is subjected to a u.d.l. of intensity 'w'. If 'E' be the Young's modulus of the beam material and 'I' is the moment of inertia of the beam cross-section about the axis of bending, show that the free-end deflection of this beam at B is given by $WL^4 / (8EI)$.

4. When a bar of certain material, 4cm x 4cm in cross-section, is subjected to a pull of 160 kN the extension on a gauge length of 20cm is 0.01cm and decrease in each side of the section is 0.0005cm. Calculate the Young's modulus of Elasticity "E", Poisson's ratio "μ", modulus of Rigidity "G", and bulk modulus of Elasticity "K" of the material.

5. A beam of circular cross-section of diameter "d" is simply supported on a span of 8m. A load of 2 kN is applied at a distance of 3m from one end. Determine the diameter of the section if maximum bending stress developed in the beam is 90.54 Mpa

6. A 0.5 cm thick rectangular plate of length 20 cm and width 15 cm is subjected to tensile stresses of 120 Mpa and 40 Mpa respectively along longer and transverse shorter directions parallel to the plane of the plate. Find the change in area of the plate if the Young's modulus is $2x10^5$ Mpa and Poisson's ratio is 0.3.

Group C

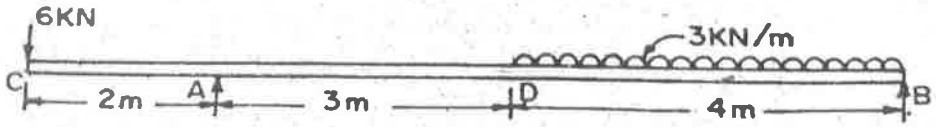
(Answer any two questions)

$2 \times 10 = 20$

7. A 1m long rectangular concrete short column, 250mm x 300mm cross-sectional overall dimensions, have four 20 mm diameter reinforcing steel bars placed symmerically near at four corners of the column. The column is compressed between two rigid parallel plates at an axial load P = 300 kN. (a) Calculate the compressive stress in each material and total shortening of the column if $E_s = 2 \times 10^5$ Mpa and $E_c = 2 \times 10^4$ Mpa. Assume both materials obey Hook's law. (b) If the permissible stresses in concrete & steel are 6 Mpa and 140 Mpa find the safe maximum compressive load that may be applied.

8. During testing on a sample of steel bar of 25 mm in diameter, it is found that a pull of 50 kN produces an extension of 0.095 mm on a gauge length of 200 mm, and a torque of 200 Nm applied to a similar bar produces an angle of twist of 0.9-degrees on a length of 250 mm. Find the values of Young's modulus E, modulus of rigidity G, Poission's ratio μ, and bulk modulus of elasticity K.

9. Draw SFD & BMD of the Beam given below. Find also 'Point of contraflexure'.



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END-SEMESTER EXAMINATION: DECEMBER 2019

(Academic Session: 2019 – 20, Semester Term: Aug 2019– Dec 2019)

Name of the Program: **B. Tech** Semester: **III**
Stream: **ECE**
PAPER TITLE: **ANALOG ELECTRONICS** PAPER CODE: **EEC42101**
Maximum Marks: 40 Time duration: 3 hours
Total No of questions: 13 Total No of Pages: 02

Note:
1. Follow all the Instructions given on the cover page of the Answer Booklet Strictly.
2. All parts of a Question should be answered consecutively. Each Answer should start from a fresh page.
3. Assumptions made if any, should be stated clearly at the beginning of your answer.
4. No Mobile Phones will be permitted in the Examination Hall.

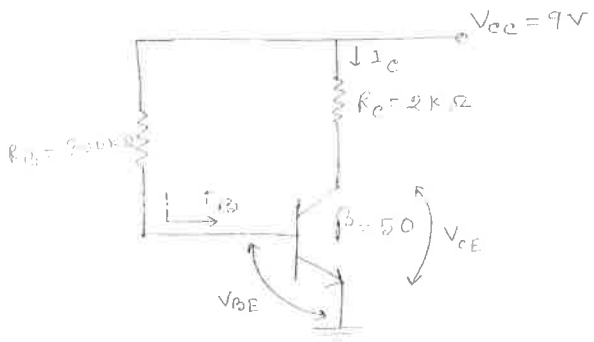
Answer all the Groups

Group A

(Answer all the questions)

$5 \times 1 = 5$

1. What is piezoelectric crystal?
2. What is Class C power amplifier?
3. What is rectifier efficiency?
4. Draw the small signal model of a FET.
5. Find the collector current and V_{CE} for the given circuit as shown in figure. (Consider V_{BE}=0.6V for a Silicon Transistor)



Group B

(Answer any three questions)

$3 \times 5 = 15$

6. What is negative feedback? Write the effects of negative feedback on an amplifier. [1+4=5]
7. What is relaxation oscillator? Draw the circuit diagram of Colpitts Oscillator and derive its oscillation frequency. [1+4=5]

8. Write the miller theorem and explain it with proper diagram. [2+3=5]
9. What is Thermistor? Draw bias compensation using a Thermistor and explain it. [1+4=5]
10. What is transformer utilization factor (TUF)? Draw the Full wave bridge rectifier circuit and explain it with input and output wave form. [1+4=5]

Group C

(Answer any two questions)

$2 \times 10 = 20$

11. What is positive feedback? Explain effect of negative feedback on bandwidth of an amplifier in details. Explain Wien bridge oscillator with proper circuit diagram. [1+4+5=10]
12. Write the advantages of h-parameters. Draw the common-source FET amplifier circuits with voltage divider bias. Find out the amplifier gain, input impedance and output impedance of common source FET amplifier for small signal analysis. [3+2+5=10]
13. What is biasing? Draw the self-bias transistor circuit and derive and stability factors S, S' and S''.
A half-wave rectifier uses a dide of forward resistance R_f=150Ω, supplies current to a load R_L= 1000Ω. If the transformer primary to secondary turn ratio is 10:1 and transformer primary is fed from a supply of 240V(rms). Calculate I_{DC}, $V_{DC\ diode}$, I_{rms}, and η. [1+5+4=10]

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END-SEMESTER EXAMINATION: DECEMBER 2019

(Academic Session: 2019 – 20, Semester Term: Aug 2019– Dec 2019)

Name of the Program: B.Tech. | Semester: III
Stream: ME/EE/ECE
PAPER TITLE: Energy Resources | PAPER CODE:EEE42105
Maximum Marks: 40 | Time duration: 3 hours
Total No of questions: 9 | Total No of Pages: 2

Answer all the Groups

Group A

(Answer all the questions)

$5 \times 1 = 5$

1. **a)** What is the energy payback period of a wind generator?
   b) What is the heating value of producer gas?
   c) Which country is having maximum (geothermal based) installed capacity for electric as well as thermal power?
   d) What is wave energy?
   e) What is the range of the efficiency of a commercial solar cell?

Group B

(Answer any three questions)

$3 \times 5 = 15$

2. What is the importance of MPPT in an SPV system? Explain various strategies used for operation of an MPPT.

3. What are the main advantages and disadvantages of biomass energy?

4. What do you understand by geothermal energy? What are geothermal fields?

5. Comment on the variation of tides with location.

6. What are the main obstacles in the way of widespread use of fuel cells? Describe the classification of fuel cells.

Group C

(Answer any two questions)

$2 \times 10 = 20$

7. i) Explain the process of gasification of solid bio-fuels. What is the general composition of the gas produced and what is its heating value? What are its main applications?

ii) Calculate the volume of a cow dung based biogas plant required for cooking needs of a family of five adults and lighting needs with two 100 CP lamps for three hours daily. Also, calculate the required number of cows to feed the plant. Assume standard values of data where required.

8. i) What are the environment impacts of geothermal energy?

ii) A 0.6-km thick hot aquifer is located at a depth of 2.5 km and has a porosity of 5%. The density of the under sediments is 3000 kg m^{-3} and its specific heat is 750 J kg^{-1} K^{-1}. The temerature gradient in the overlying material is 35°C km^{-1}. Assuming the density and specific heat of water as 1000 kg m^{-3} and 4200 J kg^{-1} K^{-1} respectively, find the: a) heat content per square kilometre above 45 °C and the initial temperature of the aquifer, if the average surface temperature is 12°C, b) time constant for useful heat generation with pumped water extraction at a rate of 0.75 m^3 s^{-1} km^{-2}, c) thermal power extractable per square killometre initially and after 25 years.

9. i) What are the main advantages and disadvantages of OTEC system? What are relative advantages and limitations of floating and shore-based OTEC plants?

ii) A single basin type tidal power plant has a basin area of 2 km^2. The tide has an average range of 13 m. power is generated only during the ebb cycle. The turbine stops operating when the head on it falls below 3m. Calculate the average power generated by the plant in single emptying process of the basin if the turbine generator efficiency is 0.7. Estimate the average annual energy generation of the plant.

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END-SEMESTER EXAMINATION: DECEMBER 2019

(Academic Session: 2019 – 20, Semester Term: Aug 2019– Dec 2019)

Name of the Program: B.Tech
Stream: ECE
PAPER TITLE: **SEMICONDUCTOR DEVICES**
Maximum Marks: 40
Total No of questions: 09

Semester: III

PAPER CODE: **EEC42103**
Time duration: 3 hours
Total No of Pages: 01

Note:

1. Follow all the Instructions given on the cover page of the Answer Booklet Strictly.
2. All parts of a Question should be answered consecutively. Each Answer should start from a fresh page.
3. Assumptions made if any, should be stated clearly at the beginning of your answer.
4. No Mobile Phones will be permitted in the Examination Hall.

Answer all the Groups

Group A

(Answer all the questions)

$5 \times 1 = 5$

1. a) Draw the E-k diagram for a direct band gap semiconductor.
   b) Calculate the minimum wave length for the spontaneous emission in of GaAs LED (E_g=1.43 eV).
   c) What do you mean by Pinch-off condition in JFET?
   d) Draw the output characteristics of a BJT operated in CB configuration.
   e) Describe briefly the Short Channel Effects of MOS transistor.

Group B

(Answer any three questions)

$3 \times 5 = 15$

2. Briefly explain the operation of p-i-n photodiode.
3. Draw and explain the summing amplifier and differential amplifier circuit using OPAMP.
4. Derive the expression of continuity equation.
5. Briefly explain the operation with internal structure of an astable multivibrator circuits using 555 Timer.
6. Calculate Differential & Common Mode Gain and define CMRR.

Group C

(Answer any two questions)

$2 \times 10 = 20$

7. Draw and explain an Astable multivibrator circuits using 555 Timer. Calculate the frequency and duty cycle of the 555 astable multivibrator for C=0.01 μF R_A= 10kΩ and R_B=50KΩ. [6+4]

8. a) Determine the junction capacitance of a Si p-n junction diode at T=300 K when a reverse bias voltage 5 V is applied across the junction. The doping concentration of p and n regions are $8\times10^{18}cm^{-3}$ and $3\times10^{19}cm^{-3}$ respectively and cross sectional area of the junction is $5\times10^{-5}cm^{-2}$.
   b) What is early effect?
   c) Why is collector area larger than emitter area? [5+3+2]

9. a) Derive the expression of the contact potential for p-n junction diode.
b) A Si p-n junction diode with doping concentration in p and n region $10^{17}cm^{-3}$and 5×10^{15} cm^{-3} respectively is in equilibrium. Calculate the contact potential for the junction at room temperature. [6+4]

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END-SEMESTER EXAMINATION: DECEMBER 2019

(Academic Session: 2019 – 20, Semester Term: Aug 2019– Dec 2019)

Name of the Program: B.Tech. Semester: III
Stream: ME
PAPER TITLE: Engg. Thermodynamics PAPER CODE:EME42105
Maximum Marks: 40 Time duration: 3 hours
Total No of questions: 09 Total No of Pages:02

Group – A

(Answer all questions)

1. [5×1]

i. Define internal energy.
ii. What is the maximum work obtainable from two finite bodies at temperatures T_1 and T_2?
iii. What is available and unavailable energy?
iv. What is PMM-II? Why is it impossible?
v. State the Kelvin Planck and Claussius Statement of Second Law of Thermodynamics

Group – B

(Answer any three questions) [3×5]

2. Derive the equation of work-done by Adiabatic Processes. [5]

3. a) Define COP. [2]
b) Derive the First and Second Tds Equations [3]

4. Show that "heat" is a path function, and not a property of the system. [5]

5. How does Bernoulli's equation compare with S.F.E.E? [5]

6. A reversible heat engine operates between two reservoirs at temperatures of 600°C and 40°C. The engine drives a reversible refrigerator which operates between reservoirs at temperature 40° C and -20° C. the heat transfer to the heat engine is 2000kJ and the net work output of the combined engine refrigerator plant is 360 kJ. Evaluate the heat transfer to the refrigerant and the net heat transfer to the reservoir at 40°C. [5]

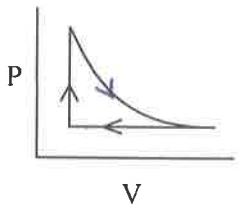
08.12.19

Group – C

(Answer any two questions) [2×10]

7. a) Establish the inequality of Claussius. [4]
   b) Derive the entropy change of Universe for mixing of two fluids having temperature T_1 and T_2. [6]

8. a) Show that the free expansion process is irreversible. [4]
   b) A piston cylinder device operates 1 kg of fluid at 20 atm. pressure. The initial volume is $0.04m^3$. The fluid is allowed to expand reversibly following a process $pV^{1.45}$=constant so that the volume becomes double. The fluid is then cooled at constant pressure until the piston comes back to the original. Keeping the piston unaltered, heat is added reversibly to restore it to the initial pressure. Calculate the work done. [6]



9. a) To produce net work in a thermodynamic cycle, a heat engine has to exchange heat with two thermal reservoirs. Explain. [4]
   b) In a gas turbine, the gases flow at the rate of 5kg/s. the gases enter the turbine at a pressure 7 Bar with a velocity 120m/s and leaves at a pressure 2 Bar with velocity 250m/s. The turbine is insulated. If the enthalpy of the gas at inlet is 900kJ/kg and at outlet 600kJ/kg, determine the capacity of the turbine. [6]

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Moderated: 09.12.19

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END-SEMESTER EXAMINATION: DECEMBER 2019

(Academic Session: 2019 – 20, Semester Term: Aug 2019– Dec 2019)

Name of the Program: B.Tech.
Stream: CE
Semester: III

PAPER TITLE: Introduction to Civil Engineering
PAPER CODE: ECE42107

Maximum Marks: 40
Time duration: 3 hours

Total No of questions: 09
Total No of Pages: 02

(Any other information required for the student may be mentioned here)

Answer all the Groups

Group A

(Answer all the questions)

$5 \times 1 = 5$

1. a) Mention and explain the different components of a building structures?
   b) List out different types of design loads acting on building structures.
   c) What is footing ?
   d) What are the basic difference between modular and traditional bricks?
   e) What is "Jamb" and "Sill" of any opening?

Group B

(Answer any three questions)

$3 \times 5 = 15$

2. (a) What are requirements of a good stair? (2.5)
   (b) List out the characteristics of an ideal paint. (2.5)

3. (a) Distinguish between load bearing wall and non load bearing wall. (2.5)
   (b) Summarize the requirements of a roof. (2.5)

4. (a) Explain about defects in painting. (2.5)
   (b) Describe about rules of brick bonding. (2.5)

5. (a) Mention the situations in which pile foundation is required. (2.5)
   (b) Explain about the characteristics of a good timber. (2.5)

6. (a) Explain what are the advantages of seasoning timber (2)
   (b) List out the tests available for quality assessment of brick in construction work and explain any two tests. (3)

Group C

(Answer any two questions)

$2 \times 10 = 20$

7. (a) Classify different type of stairs and explain in detail. (8)

   (b) Explain English bond with neat sketches. (2)

8. (a) Draw a plan of dog-legged stair for a building in which the vertical distance between the floors is 3.6 m. The stair hall measures 2.5 m x 5 m. Assume. 150 mm rise and 250 mm tread of stair. (7)

   (b) Describe about the classification of masonry bricks as per quality. (3)

9. (a) Discuss about Mosaic flooring and Tilled flooring. (4)

   (b) Find the dimensions of a combined trapezoidal footing for two columns A and B, spaced 5 m centre to centre. Column A is 40 cm x 40 cm in size and column B is 30 cm x 30 cm in size transmits loads of 900 kN and 600 kN respectively. The maximum length of footing is limited to 7m only. Assume safe bearing capacity of soil is 120kN/m^2. Use any other suitable data if required. (6)

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END-SEMESTER EXAMINATION: DECEMBER 2019

(Academic Session: 2019 – 20, Semester Term: Aug 2019– Dec 2019)

Name of the Program: B.TECH
Stream: COMPUTER SCIENCE AND ENGINEERING
PAPER TITLE: FORMAL LANGUAGE AND AUTOMATA THEORY
Maximum Marks: 40
Total No of questions: 9

Semester: III
PAPER CODE: ECS42103
Time duration: 3 hours
Total No of Pages: 2

(Instruction for students: Cleanliness carries bonus marks)

Answer all the Groups

Group A

(Answer all the questions)

$5 \times 1 = 5$

1. a)Define a Finite State Machine. [1]
   b) What do you understand by automata theory? [1]
   c)What is the basic difference between $S_1 \subseteq S_2 \& S_1 \subset S_2$? [1]
   d) Given an alphabet Σ, what do you understand by strings and language over Σ. [1]
   e) What is a parse tree? [1]

Group B

(Answer any three questions)

$3 \times 5 = 15$

2. Construct a DFA/NFA and also state the regular expression from the regular grammar G with productions $M \rightarrow aN\ ;\ N \rightarrow bN|aP\ ; P \rightarrow bQ;\ Q \rightarrow N| \in$ where M is the start symbol. Construct the regular grammar of the NFA that accepts $L(aa*(a+b))$. [3+2]

3. What is a grammar? Construct a DFA that accepts the language over (a,b) such that the number of a's in the string is odd and the number of b's in the string is even. Express each and every step to construct the regular expression from the DFA. [1+2+2]

4. Construct the state diagram of the deterministic finite automaton of a binary adder. Define the corresponding finite automaton in form of tuples. [3+2]

5. State a context free grammar which represents the set of integer numbers in C. Prove that the complement of the language L= {ω| every strings holds "101" as a substring } is regular. [3+2]

6. Minimize the given DFA. Explain each step of minimization.

[3+2]

	0	1
A	B	F
B	G	C
C	A	C
D	C	G
E	H	F
F	C	G
G	G	E
H	G	C

Group C

(Answer any two questions)

$2 \times 10 = 20$

7. State and explain the properties of context free language.
Define Greibach Normal Form. Convert the given grammar G = $(\{A_1, A_2, A_3\}, \{a,b\}, P, A_1)$ into Greibach normal form which consists of the productions: $A_1 \rightarrow A_2A_3$; $A_2 \rightarrow A_3A_1|b$; $A_3 \rightarrow A_1A_2|a$. [4+6]

8.What is Turing machine? Construct a Turing Machine which accepts the language $\{L = a^n b^n c^n | n > 0\}$, for $\sum$ = {a,b,c} & Γ = {a,b,c,X,Y,Z,□} also state and explain the sequence of turing configuration for the string 'aaaabbbcccc'. [2+8]

9. Construct the DFA over Σ={a,b,0,1} for $L_3 = L_1 \cdot L_2$

$$L1 = \{\omega | \eta_a(\omega) \bmod 3 > \eta_b(\omega) \bmod 3\} \ \&$$

$$L2 = \{\omega | \omega \in (0+1)^* with \text{ “101” } as\ a\ substring\ or \text{ “000” } as\ a\ substring\}$$

Give the regular expression for $L_1, L_2 \& L_3$.

[6+4]

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END-SEMESTER EXAMINATION: DECEMBER 2019

(Academic Session: 2019 – 20, Semester Term: Aug 2019– Dec 2019)

Name of the Program: B.Tech.
Stream: MECHANICAL ENGINEERING
PAPER TITLE: Partial Differential Equation
Maximum Marks: 40
Total No of questions:09

Semester: III

PAPER CODE: SMA42105
Time duration: 3 hours
Total No of Pages:01

Symbols used here : $p = \frac{\partial z}{\partial x}, q = \frac{\partial z}{\partial y}, r = \frac{\partial^2 z}{\partial x^2}, s = \frac{\partial^2 z}{\partial x \partial y}, t = \frac{\partial^2 z}{\partial y^2}$

Answer all the Groups

Group A

(Answer all the questions)

$5 \times 1 = 5$

1. a) Find the order and degree of $r + p^2 + q = 0$
   b) Find one solution of linear PDE $2yp + xq - 9 = 0$
   c) Solve $p^2 - q^2 = 0$.
   d) Find the auxiliary equation of the PDE $xyp^2 - q = 0$ using Charpit Method.
   e) Classify the PDE with justification $6r + 5t = 0$

Group B

(Answer any three questions)

$3 \times 5 = 15$

2. Solve the following PDE $px + qy = pq$

3. Verify whether the following functions are independent or not $u = x + y, v = x - y$.

4. Show that there does not exists any real characteristic for a 2nd order elliptic PDE.

5. Solve using direct integration $s = \sin x \cos y$

6. Form a PDE by elimination of function $z = f(xy)$

Group C

(Answer any two questions)

$2 \times 10 = 20$

7. Reduce the following PDE to its canonical form $r + 2s + t = 0$

8. Solve the PDE $r + t = 0$ in a rectangular $xy - plane$, $0 < x < a, 0 < y < b$ satisfying the following boundary conditions $z(x, 0) = 0, z(x, b) = 0, z(0, y) = 0, z(a, y) = f(y)$.

9. Using separation of variables solve $r = a^2 t$ and discuss all possible solutions.

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END-SEMESTER EXAMINATION: DECEMBER 2019

(Academic Session: 2019 – 20, Semester Term: Aug 2019– Dec 2019)

Name of the Program: B.Tech.
Stream: CE, EE, & ECE
PAPER TITLE: Transform Calculus
Maximum Marks: 40
Total No of questions: 09

Semester: III

PAPER CODE: SMA42101
Time duration: 3 hours
Total No of Pages: 02

(Any other information required for the student may be mentioned here)

Answer all the Groups

Group A

(Answer all the questions)

$5 \times 1 = 5$

1. **a)** Let $\mathcal{F}[f(t)] = F(\omega)$, then for a real number t_0, $\mathcal{F}[f(t - t_0)] = ?$
   b) State Final value theorem?
   c) Obtain the Fourier cosine series of $f(x) = \sin x$ in the interval $0 < x < \pi$.
   d) Find the period of $(\cos x + \cos 2x)$.
   e) What is the value of $\mathcal{L}[t \cos 2t]$?

Group B

(Answer any three questions)

$5 \times 3 = 15$

2. Show that, $\mathcal{F}[f(at)] = \frac{1}{a}F\left(\frac{\omega}{a}\right)$ and $\mathcal{F}[af(t) + bg(t)] = aF(\omega) + bG(\omega)$, where $\mathcal{F}[f(t)] = F(\omega)$ and $\mathcal{F}[g(t)] = G(\omega)$; a, b are constants.

3. Use partial fraction technique to find inverse Z-transform of $F(z) = \dfrac{3z^2 - z}{(z-2)^2(z-1)}$.

4. Find Fourier sine transformation of $f(x) = \begin{cases} x, & 0 < x < l \\ 0, & elsewhere \end{cases}$

5. Find the Fourier series up to two harmonic from the following data:

x	0	$\frac{\pi}{3}$	$\frac{2\pi}{3}$	π	$\frac{4\pi}{3}$	$\frac{5\pi}{3}$
$f(x)$	1.98	1.30	1.05	1.30	-0.88	-0.25

6. Find $\mathcal{Z}\{c^{-n} \sin n\theta\}$, where c *and* θ are constants.

Group C

(Answer any two questions)

$2 \times 10 = 20$

7. a) Solve the difference equation $y_{n+2} + 6y_{n+1} + 9y_n = 2^n$ given that $y_0 = 0 = y_1$ using Z-transform.

b) Let $Z\{a_n\} = F(z) = \frac{3z^2 - 4z + 7}{(z-1)^3}$, then find the first four terms $(a_0, a_1, a_2, and\ a_3)$ of the sequence $\{a_n\}$. **6+4**

8. a) The temperature distribution $u(x,t)$ in a thin, homogeneous semi-infinite bar can be given by:

$\frac{\partial u}{\partial t} = k\frac{\partial^2 u}{\partial x^2}, x > 0, t > 0$ with the initial conditions $u(x,0) = \begin{cases} 1, & 0 < x < 1 \\ 0, & x \geq 1 \end{cases}, u(0,t) = 0\ for\ t > 0.$

Using appropiate Fourier transformation solve the above equation to find the temperature distribution $u(x,t)$.

b) Find the complex form of the Fourier integral representation for the function $f(x) = \begin{cases} 1 + x, & |x| \leq 1 \\ 0, & |x| > 1 \end{cases}$ **7+3**

9. a) Using Laplace transformation, solve the following initial valued problem:

$$y'' + 3y' + 2y = f(t), y'(0) = 0, y(0) = 0, \quad where\ f(t) = \begin{cases} 4t, & 0 \leq t < 1 \\ 8, & t > 1 \end{cases}$$

b) Find $\mathcal{L}\left\{\int_0^t e^u(u + \sin u)\ du\right\}$. **7+3**

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END-SEMESTER EXAMINATION: DECEMBER 2019

(Academic Session: 2019 – 20, Semester: Aug. 2019 – Dec. 2019)

Name of the Program: B.Tech
Semester: III

Paper Title	**: Electrical Machine-I**	**Paper Code**	**: EEE42103**
Maximum Marks	: 40	Time duration	: 3 hours
Total No of questions	: 9	Total No of Pages	: 2

(Any missing or misprinted data may be suitably assumed)

Group A

(Answer all five questions)

[5X1]

1. a) Why the starting current is very high in a D.C. motor?

   b) What are the losses that take place in a transformer?

   c) Why are brushes required in a D.C. motor?

   d) Why is the transformer core laminated?

   e) What is the function of a commutator in a D.C. machines?

Group B

(Answer any three questions)

[3X5]

2. Discuss different methods of speed control of a D.C. motor.

3. Derive the torque equation of a D.C. machine.

4. Mention the properties of an ideal transformer.

5. Develop the phasor diagram of a single phase transformer under no-load condition.

6. Compare various methods of electric braking in a D.C. motor.

Group C

(Answer any two questions)

[2X10=10]

7. A single-phase, 250/500Volt transformer gave the following test results:
   Open-circuit test 250Volt, 1Amp, 80 Watt on low voltage side
   Short-circuit test 20Volt, 12Amp, 100Watt on high voltage side
   Calculate the circuit parameters and show them on an equivalent circuit.

8. An 8 pole generator has 500 armature conductors and has a useful flux per pole of 0.065 Wb. What will be the e.m.f. generated if it is lap connected and runs at 1000 r.p.m.? What must be the speed at which it is to be driven to produce the same e.m.f. if it is wave wound?

9. With proper circuit diagram, explain briefly Hopkinson's test for determination of efficiency of a D.C. shunt motor. What are the main advantages and limitations of Hopkinson's test?

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END-SEMESTER EXAMINATION: DECEMBER 2019

(Academic Session: 2019 – 20, Semester Term: Aug 2019– Dec 2019)

Name of the Program: B.Tech.
Stream: CSE/ME/CE/EE/ECE
PAPER TITLE: INTRODUCTION TO MATERIALS
Maximum Marks: 40
Total No of questions: 12

Semester: III

PAPER CODE: SPH42107
Time duration: 3 hours
Total No of Pages: 03

Answer all the Groups

Group A

(Answer any five questions)

$5 \times 1 = 5$

1. **a)** Lead in the superconducting state has critical temperature of 6.2 K at zero magnetic field and a critical field of 0.064 MAm^{-1} at 0 K. Find the critical field at 4K.
   b) Atoms of radius r are arranged in a FCC crystal. What is the length of the body diagonal of the FCC crystal?
   c) In case of screw dislocated structures what is the angle between burger vector and dislocation line?
   d) Liquid Nitrogen temperature is 77 K. Name a superconductor that will be superconducting in a bath of liquid Nitrogen.
   e) For azimuthal quantum number l, what are the possible values of magnetic quantum numbers?
   f) Find atomic packing factor of a FCC lattice.
   g) Gibbs phase rule for general system: (a) P+F=C-1 (b) P+F=C+1(c) P+F=C-2 (d) P+F=C+2
   h) What is recrytallyzaytion temperature?

Group B

(Answer any three questions)

$3 \times 5 = 15$

2. **a)** Compute the line energy of dislocations in BCC iron (lattice parameter a = 2.87 Å.) The Burgers vector in iron is of the 1/2<111> type. The shear modulus of iron is 80.2 GNm^{-2}.
   b) Calculate diffusion flux of carbon through a plate of iron in steady-state condition. The concentrations of carbon at positions of 5 and 10 mm beneath the carburizing surface are 1.2 kg/mm^3 and 0.8 kg/mm^3 respectively (assume the concentration profile to be linear). The diffusion coefficient is 3×10^{-11} m^2/s.
   c) Explain Kirkendall effect with diagram. Which of the intermediate phase act as a source of hardness in an alloy?

[1.5+1.5+ (1.5+0.5)]

3. a) Explain Meissner effect of the superconductive materials. Which type of semiconductor does not follow the Meissner effect strictly?

b) Prove geometrically that crystals cannot have 5-fold or 7-fold rotational symmetry.

c) 70 grains per square inch are measured at a magnification of 100× for a metal specimen. Calculate the ASTM grain size number

[(1.5+0.5) + 2+1]

4. a) What is a critical field of a superconductor? How many critical fields does a type I or a type II superconductor have?

b) What is a Schottkey defect?

c) In a Bohr model, find the relation between nth level energy and n, n being the principal quantum number.

[1.5+1.5+2]

5. a) Discuss possible point defects and line defects.

b) Determine the composition, in atom percent, of an alloy that consists of 97 wt% aluminum and 3wt % copper. Atomic weight of Aluminium and Copper are 26.98 g/mol and 63.55 g/mol respectively.

[2.5+2.5]

6. Discuss Hume- Rothary rule for solid solutions. Write down the different arrangements of atoms in solid solutions.

[2.5+2.5]

7. Define – i) Toughness ii) Hardness iii) Ductility iv) Malleability v) True Strain. **[1+1+1+1+1]**

Group C

(Answer any two questions)

$2 \times 10 = 20$

8. a) Write the expressions for the variation of susceptibility with temperature for paramagnetic, ferromagnetic and antiferromagnetic materials.

b) Draw a typical B-H loop and describe the different magnetization processes according to domain theory of ferromagnetism, which lead to the formation of B-H loop. What is soft and hard magnetic material?

c) Show that relative permeability of a medium, $\mu_r = 1 + \chi$, where χ is susceptibility of the medium.

d) Write the number of free and confined directions for nanomaterials of different dimensionalities.

e) The potential energy U of a system of two atoms varies as a function of their distance of separation r as $U = -\frac{C}{r^4} + \frac{D}{r^8}$. Calculate equilibrium bond length r_0.

[1.5+ (1+3+1) + 1+ 1+1.5]

9. a) Find the Miller indices of the direction which is common to both (101) and (111) planes of a cubic crystal.

b) Determine the interplanar spacing between the two parallel planes with Miller indices (*h, k, l*) in a cubic crystals.

c) The distance between two successive (222) planes in a simple cubic lattice is 1 Å. Determine the lattice parameter.

d) Calculate the fraction of ionic character of GaAs. Electronegativities of Ga, As, are respectively 1.6, 2.0.

e) Give examples of material having zero thermal expansion, negative thermal expansion. Write down reason of zero thermal expansion.

[2+3+1.5+1.5+ (1+1)]

10.a) Define linear coefficient of thermal expansion. How is that related to volume coefficient for thermal expansion in an isotropic system?

b) What is thermal stress? How is it related to coefficient of thermal expansion?

c) What is thermal conductivity? Describe Wiedemann-Franz law.

d) If there are 10^{10} m^{-2} of edge dislocations in a simple cubic crystal, how much would each of these climb down on an average when the crystal is heated from 0 to 1000 K? The enthalpy of formation of vacancies is 100 kJ mol^{-1}. The lattice parameter is 2 Å. The volume of one mole of the crystal is 5.5×10^{-6} m^3 (5.5 cm^3). Given, R=8.31 J/mol-K.

[3+2+2+3]

11.a) What does superconduction mean? At which temperature is it observed? Name two BCS superconductors and two high temperature superconductors.

b) Distinguish between Bohr atomic theory and Orbital theory of atoms.

c) Describe Covalent bonding within methane (CH_4).

d) Define a ferrimagnet.

[(1+1+1+1) +3+2+1=10]

12.(a) With a neat sketch explain Iron – Carbon diagram.
(b) What is ferrite, cementite, austenite, martensite?

[6+4=10]

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END-SEMESTER EXAMINATION: DECEMBER 2019

(Academic Session: 2019 – 20, Semester Term: Aug 2019– Dec 2019)

Name of the Program: B.Tech.
Stream: CE
PAPER TITLE: SURVEYING - I
Maximum Marks: 40
Total No of questions: 9

Semester: III

PAPER CODE: ECE42105
Time duration: 3 hours
Total No of Pages: 2

Answer all the Groups

Group A

(Answer all the questions)

$5 \times 1 = 5$

1. **a)** What is the fundamental difference between plane surveying and geodetic surveying?
   b) What do you mean by triangulation?
   c) What is declination?
   d) What are the different types of 'Alidade'?
   e) What do you mean by positive RL and negative RL?

Group B

(Answer any three questions)

$3 \times 5 = 15$

2. **a)** Write down the uses of contour map.
   b) How will you distinguish between a valley line and a ridge line? [3+2]

3. The following records were taken in a closed traverse where errors were observed in latitude and departure. Adjust the correction by **'Bowdich's Rule'** and write the corrected latitude and departure.

Line	Length	Consecutive Coordinate	
		Latitude	Departure
AB	70.0	+21.500	-65.450
BC	80.0	-80.755	-5.250
CD	43.0	-41.000	+13.550
DE	38.0	-14.250	+35.150
EA	115.0	+114.150	+22.315

4. A man on the deck of a ship observes a luminous object, which is 50 m above sea level. If the man's eye is 10 m above the sea level, find the distance between him and the object.
5. A traverse ABCDA is made in the form of a square taking in the clockwise order. If the fore bearing of AB is $120^0 30'$, find the bearing of other sides.
6. Explain indirect ranging.

Group C

(Answer any two questions)

$2 \times 10 = 20$

7. **a)** What is 'Tie-Line or Cut-off Line'?
   b) What are the sources of errors in theodolite?
   c) Write down the steps of extending a line using theodolite. [2+5+3]

8. **a)** Explain different types of 'Bench Mark'?
   b) The following observations were taken with a levelling instrument at an interval of 20 m.
   2.375, 1.730, 0.615, 3.450, 2.835, 2.070, 1.835, 0.985, 0.435, 1.630, 2.255 and 3.360 m.
   The instrument was shifted after the fourth and eighth reading. The last reading was taken on a bench mark of RL110.200 m. Find the RL of all points. Use **'Rise-Fall' method**. [4+6]

9. **a)** What is 'Cut-off Lines'?
   b) Convert the following QBs to WCBs.
   i) QB of AB = S $36^0$30' W
   ii) QB of BC = S $43^0$30' E
   iii) QB of CD = N $26^0$45' E
   iv) QB of DE = N $40^0$15' W
   c) A 20 m steel tape was standardized on a flat ground at a temperature of 20^0C and under a pull of 15 kg. The tape was used in a catenary at a temperature of 30^0C and under a weight of 10 kg. The cross sectional area of the tape is 0.22 cm^2, and its total weight is 400 gm. The Young's modulus and the coefficient of the linear expansion of steel are 2.1×10^6 kg/cm^2 and 11×10^{-6} per ^{0}C respectively. Find the correct horizontal distance. [1+2+7]

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END-SEMESTER EXAMINATION: DECEMBER 2019

(Academic Session: 2019 – 20, Semester Term: Aug 2019– Dec 2019)

Name of the Program:B.Tech. Semester: III
Stream: CE
PAPER TITLE: Fluid Mechanics and Hydraulics PAPER CODE: ECE42101
Maximum Marks: 40 Time duration: 3 hours
Total No of questions: 09 Total No of Pages: 02

Answer all the Groups

Group A

(Answer all the questions)

$5 \times 1 = 5$

1. a)What is Gauge pressure?
   b)What is Reynold's Number?
   c)What is center of buoyancy?
   d)What is the value of momentum correction factor for laminar flow through a circular pipe?
   e)Write down the difference between uniform flow and steady flow.

Group B

(Answer any three questions)

$3 \times 5 = 15$

2. Find the velocity distribution for viscous flow between two parallel plates. From that find out the ratio of maximum velocity and average velocity. (3+2=5)
3. Derive the expression of Bernoulli's equation. (5)
4. Write a short note on stability of floating and submerged bodies. (5)
5. A fluid flow field is given by $V=x^2yi + y^2zj - (2xyz + yz^2)$. Prove that it is a case of possible steady incompressible fluid flow. Calculate the velocity and acceleration of the above fluid at the point (2,1,3). (5)
6. 250 litres/s of water is flowing in a pipe having diameter of 300mm. If the pipe is bent by 135° (that is change from initial to final direction is 135°) find the magnitude and direction of the resultant force in the bend. The pressure of water flowing is 39.24 N/cm^2. (5)

Group C

(Answer any two questions)

$2 \times 10 =$

7. a) Using Buckingham's π theorem show that the discharge Q consumed by an oil ring is given by $Q= Nd^3\varphi[\frac{\mu}{\rho ND^2}, \frac{\sigma}{\rho N^2D^3}, \frac{w}{\rho N^2D}]$ (10)

8. a) Two reservoir are connected by a pipe line of diameter 600mm and length 4000m. The difference of water level in the reservoirs is 20m. At 1000m from the upper reservoir a small pipe is connected to the

pipeline. The water can be taken from the small pipe. Find the discharge to lower reservoir if, i) No water is taken from the small pipe ii) 100 litre/s water is taken from small pipe. Take f=0.005 and neglect minor losses. (7)

b)Write a short note on Cipolletti weir. . (3)

9. a)Derive the expression of hydraulic jump for non-uniform flow. (6)

b) A sluice gate discharges water into a horizontal rectangular channel with a velocity of 6m/s and depth of flow is 0.4m. The width of channel is 8m. Determine whether a hydraulic jump will occur and if so, find its height and loss of energy per kg of water. Also determine the power lost in the hydraulic jump. (4)

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END-SEMESTER EXAMINATION: DECEMBER 2019

(Academic Session: 2019 – 20, Semester Term: Aug 2019– Dec 2019)

Name of the Program:B.Tech. **Semester:III**

Stream:ME

PAPER TITLE: Fluid Mechanics **PAPER CODE: EME42101**

Maximum Marks: 40 **Time duration: 3 hours**

Total No of questions: 9 **Total No of Pages:**

Answer all the Groups

Group A

(Answer all the questions)

$5 \times 1 = 5$

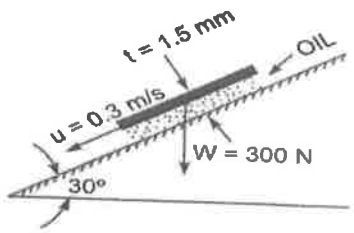
1. a)What is ideal fluid and real fluid?
   b)Pitot tube is used for measurement of ----------.
   c)What is center of Pressure and center of Buoyancy? How do you signify these two terms?
   d)Continuity equation deals with the law of conservation of ----------.
   e)What is Laminar flow and turbulent flow of fluid? How significant with respect to flow.

Group B

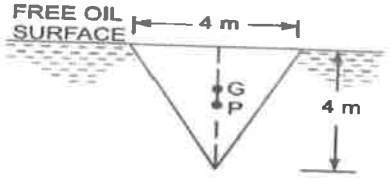
(Answer any three questions)

$5 \times 3 = 15$

2. Describe the variation of viscosity with temperature for liquid and gas. (5)
3. Calculate the dynamic viscosity of an oil, which is used for lubrication between a square plate of size 0.8m X 0.8m and an inclined plane with angle of inclination 30° as shown in Fig. The weight of the square plate is 300N and slides down the inclined plane with a uniform velocity of 0.3m/s. The thickness of the oil film is 1.5mm.(5)



4. Determine the total pressure and center of pressure on an isosceles triangular plate of base 4m and altitude 4m when it is immersed vertically in an oil Sp. Gr. 0.9. The base of the plate coincides with the free surface of oil.(As shown in Fig.)(5)



5. The stream function for a two-dimensional flow is given by $\psi=2xy$, Calculate the velocity at the point P (2,3). Find the velocity potential function ϕ. (5)

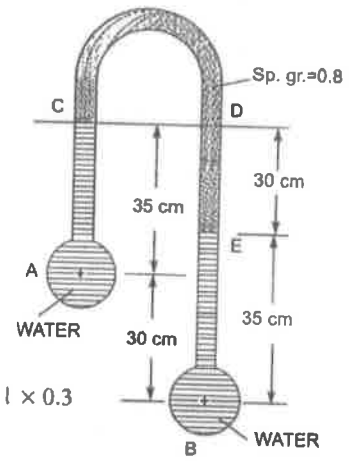
6. What is Stream line, Streak line and Path line flow? Derive the equation of 3-D fluid flow for stream linefor a Cartesian coordinate system. (5)

Group C

(Answer any two questions)

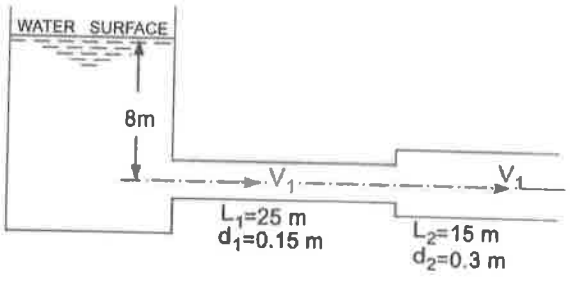
$2 \times 10 = 20$

7. i) Derive the expression of Continuity equation in 3-D for cartesian co-ordinate system. (6)
ii) An inverted U-Tube manometer is connected to two horizontal pipes A and B through which water is flowing. The vertical distance between the axes of these pipes is 30cm. When an oil of Sp. Gr. 0.8 is used as a gauge fluid, the vertical height of water column in the two limbs of the inverted manometer (when measured from the respective center lines of the pipes) is found to be same and equal to 35cm. Determine the difference of pressure between the pipes. (As shown in Fig.)(4)



8. i) Derive the expression of total force and Center of Pressure of an inclined plane surface submerged in liquide. (4))
ii) In a vertical pipe conveying oil of Sp. Gr. 0.8, Two pressure gauges have been installed at A and B where the diameters are 16cm and 8cm respectively. A is 2m above B. The pressure gauge reading have shown that the pressure at B is greater than at A by $0.981 N/cm^2$. Neglecting all losses calculate the flow rate. If the gauges at A and B are replaced by tubes filled with the same liquid and connected to a U-Tube containing mercury, calculate the difference of level of mercury in the two limbs of the U-Tube. (6)

9. i) Derive the expression of discharge through circular Orifice Plate. (6)
ii) A horizontal pipe line 40m long is connected to a water tank at one end and discharges freely into the atmosphere at the other end. For the first 25m of its length from the tank, the pipe is 150mm diameter and its diameter is suddenly enlarged to 300mm. The height of water level in the tank is 8m above the center of the pipe. Considering all loses of head which occur, determine the rate of flow. Take f (Friction Factor)=0.01 for both sections of the pipe.



Draw the HGL and TEL for these given Fig.(inlet pressure head and kinetic head is zero and outlet pressure is also zero.) (4)

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END-SEMESTER EXAMINATION: DECEMBER 2019

(Academic Session: 2019 – 20, Semester Term: Aug 2019– Dec 2019)

Name of the Program: B.Tech
Stream: ME
Semester: III

PAPER TITLE: Dynamics
Maximum Marks: 40
Total No of questions: 09

PAPER CODE: EME42103
Time duration: 3 hours
Total No of Pages: 02

Answer all the Groups

Group A

(Answer all the questions)

$5 \times 1 = 5$

1. **a)** Differentiate between Static Equilibrium and Dynamic Equilibrium with an example.
   b) The velocity of a particle is given by $v = 20t + 15t^2$, where t denotes time. What is the distance covered in 2 seconds?
   c) Plane motion of a rigid body can be reduced to pure rotation about a certain point known as _____ considered in the plane of the body.
   d) For an elastic impact, the coefficient of restitution is _____.
   e) State the law of conservation of energy.

Group B

*(Answer any **three** questions)*

$3 \times 5 = 15$

2. A fighter plane at a height of 300 m fires a projectile horizontally with an initial velocity of 150 m/s. Will the projectile hit the target located on the ground at a ground distance of 1 km from the plane?

3. A golf ball dropped from rest on to a cement road rebounds $8/10^{th}$ of the height through which it fell. Neglecting air resistance, determine the coefficient of restitution.

4. A ball, under its own weight, deflects a helical spring by 25 mm. How much will the ball compress the spring, if it is dropped from a height of 0.3 m.

5. The armature of an electric motor has a speed of 1800 rpm at the instant power is cut off.
   (i) If it comes to rest in 6 s, calculate the angular deceleration assuming that it is constant.
   (ii) How many complete revolutions does the armature make during this period?

6. State the significance of instantaneous centre for a rigid body in plane motion with a suitable example.

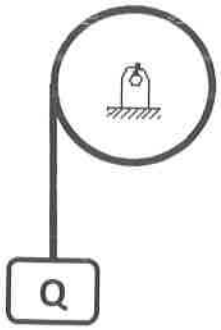
Group C

*(Answer any **two** questions)*

$2 \times 10 = 20$

7. A ball is tossed with a velocity of 10 m/s vertically upward from a window located 20 m above the ground. Determine:
   (i) the velocity and elevation of the ball above the ground at any time t
   (ii) the highest elevation reached by the ball and the corresponding value of t
   (iii) the time and velocity when the ball hit the ground.

8. A solid right circular drum of radius 0.3 m and weight 143.3 N is free to rotate about its geometric axis. Wound around the circumference of the drum is a flexible chord carrying at its free end a weight Q = 44.4 N. If the weight Q is released from rest:
   (i) find the time required for it to fall through the height 3 m
   (ii) with what velocity will it strike the floor?



9. **Write short notes on:**
   (i) d'Alembert's principle
   (ii) Rigid body dynamics
   (iii) Impulse
   (iv) Semi-elastic impact

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END-SEMESTER EXAMINATION: DECEMBER 2019

(Academic Session: 2019 – 20, Semester Term: Aug 2019– Dec 2019)

Name of the Program: B. Tech
Stream: CSE+EE
PAPER TITLE: Introduction to Electronics
Maximum Marks: 40
Total No of questions: 10

Semester: III

PAPER CODE: EEC 42107
Time duration: 3 hours
Total No of Pages: 03

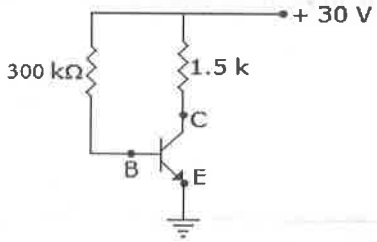
Note:
1. All parts of a Question should be answered consecutively. Each Answer should start from a fresh page.
2. Assumptions made if any, should be stated clearly at the beginning of your answer.
3. No Mobile Phones will be permitted in the Examination Hall.

Answer all the Groups

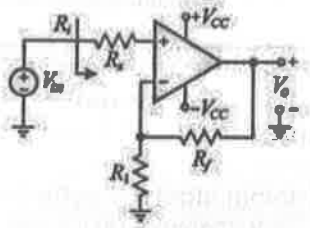
Group A

Answer any five of the following questions **5 x 1 = 5**

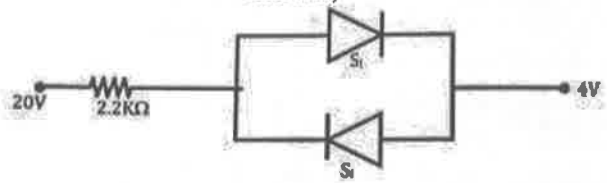
1. **a)** Write down the expression and value of ripple factor in a half wave rectifier.
b) In figure what is value of I_C if β_{dc} = 100. Neglect V_{BE}



c) Assuming ideal op-amp behavior, find out the expression of input resistance *Ri* of the amplifier from the below circuit



d) For a transistor the value of β=50, what is the value of α?
e) Determine the current I for the circuit shown;



f) Write down the applications of clamper circuit.

GROUP –B

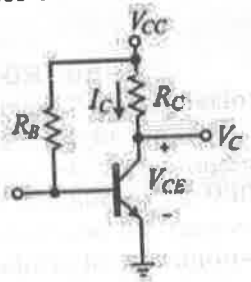
(Short Answer Type Questions)

Answer *any three* of the following **3 x 5 = 15**

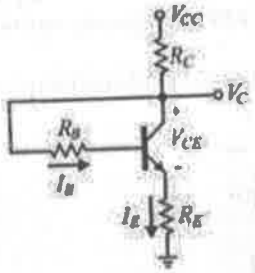
2. **a)** In a two-diode full wave rectifier circuit, the voltage across each half of the transformer secondary is 100V (rms). The load resistance is 950Ω and each diode has a forward resistance of 50Ω. Find the load current and the rms value of the input current.
b) Draw and explain the output waveform for common-emitter configuration of a junction transistor.
c) Why doping is required in semi conductive material? **[2+2+1]**

3. **a)** An amplifier has gain of -1000 and feedback of β=-0.1. If it had a gain change of 10% due to temperature, what will be the change in gain of the feedback amplifier?
b) Draw the h-parameter equivalent circuit of low frequency CE mode transistor amplifier and hence calculate the voltage gain in terms of h parameter. **[2+3]**

4. **a)** Write down dc load line equation for the BJT in the circuit shown.

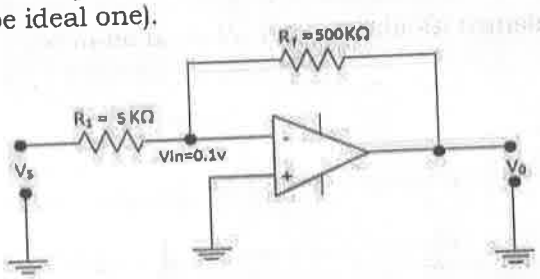


b) The h parameters for a Common emitter (CE) configuration are h_{fe}=100, h_{ie}=2600 Ω, find out the current gain (h_{fc}) and input impedance (h_{ic}) for a transistor in common collector (CC) configuration.
c) For the circuit shown, determine I_B, I_E, V_c. Assume the Si transistor is operating in the forward active mode. **[2+1+2]**



$V_{CC} = 5\,V$
$\beta = 75$
$R_B = 20K$
$R_C = 10K$
$R_E = 2K$

5. **a)** What do you mean by input offset voltage (V_{ios})? Prove that $V_0 = (1+\frac{R_f}{R_1})V_{ios}$ [Where V_0= output voltage, R_f = feedback resistance & R_1=forward resistance]
b) An inverting amplifier has R_f = 500kΩ & R_1 = 5kΩ. Determine the voltage gain & input resistance. Determine the output voltage and input current if the input voltage is 0.1V (Assume the op-amp to be ideal one). **[2+3]**



6. **a)** Explain the working principle of RC couple transistor amplifier using suitable circuit diagram & show the different frequencies of this technique.
b) An amplifier has voltage gain with feedback of 100. The gain without feedback changes by 20 % and gain with feedback should not vary more than 2 %. Determine the value of open loop gain (A) and feedback ratio (β). **[3+2]**

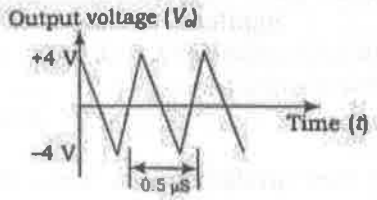
GROUP –C
(Long Answer Type Questions)

Answer *any two* of the following **2 x 10 = 20**

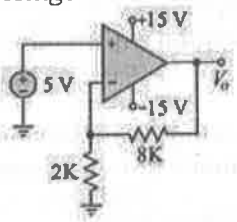
7. **a)** Draw and explain the circuit diagram for self-bias considering an n-p-n transistor in CE configuration.
b) Derive the expression for its stability factor with respect to I_{CO}.
c) An operational amplifier has a differential gain of 10^3 and a CMRR of 100, input voltages are 120 μV and 80 μV. Determine the output voltage.
d) Calculate the output voltage of an OP-AMP Summing amplifier for the following set of voltages and resistors and also draw the circuit diagram for it. Use R_f= 1MΩ. (V_1=+1V, V_2= +2V, V_3=+3V, R_1=500KΩ, R_2=1MΩ, R_3=1MΩ) **[4+2+2+2]**

8. **a)** Explain the operation of half wave rectifier along with circuit diagram and waveform. Formulate the following quantities along with derivation: **i)** V_{dc} **ii)** I_{rms}
b) Derive the expression for a current to voltage converter using OP-AMP with the help of a proper circuit diagram.
c) How an inductor reduces the ripple factor from a dc signal?
d) What are the advantages of Bridge Rectifier? **[4+3+2+1]**

9. **a)** Define CMRR. The CMRR of an operational amplifier is about 120 dB and difference–mode voltage gain is 10,000. Determine common-mode gain.
b) What are the characteristics of ideal OPAMP?
c) The output voltage of an operational amplifier is shown in the figure. When input voltage is triangular 8 V wave peak-to-peak amplitude with frequency 2 MHz, what is the slew rate of the operational amplifier?



d) Discuss about Integrator. Write some applications of integrator.
e) In the circuit shown, the output voltage is **[2+2+2+2+2]**



10. Write short notes any two of the following: **[2x5 =10]**
a) Voltage Series & Current Shunt Feedback
b) Need for Transistor Biasing & Operating Point
c) Differential Amplifier
d) Positive & Negative Clamper

(BEST OF LUCK)