Registration No :

Total Number of Pages : 02

B.Tech
RCS4C003/ RIT4C003

4th Semester Regular/ Back Examination: 2022-23
SUBJECT: Computer Organization and Architecture
BRANCH(S): CST,CSEAI,CSE,CSEAIME ,IT
Time : 3 Hour
Max Marks : 100
Q.Code : M261

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.

The figures in the right hand margin indicate marks.

Part-I

Q1 **Answer the following questions:** (2 x 10)

a) Draw the basic functional units of a computer.
b) Write down the operation of control unit.
c) List out the various addressing techniques.
d) Calculate the following: Add 5_{10} to 6_{10} in binary and subtract -6_{10} from 7_{10} in binary.
e) What is underflow in floating point arithmetic?
f) Divide $(12)_{10}$ by $(3)_{10}$
g) Discuss the principal operation of micro programmed control unit.
h) What is I/O control method?
i) Define hazard. Give an example for data hazard.
j) Evaluate hit ratio and effective access times in cache.

Part-II

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** (6 × 8)

a) Explain instruction set Architecture. Give examples.
b) Explain in detail about different instruction types and instruction sequencing.
c) What is RTL? Describe various methods of RTL. List the basic symbols and its use in RTL.
d) List the steps of multiplication algorithm.
e) State the purpose of Look Ahead Carry Adder. Derive the expressions for propagate and generate functions of a 4-bit Look Ahead Carry Adder and draw its schematic.
f) Examine with a neat block diagram how floating point addition is carried out in a computer system.
g) Give comparison between memory mapped I/O and I/O mapped I/O.
h) Describe the working principle of USB.
i) Describe hyper-threading.

j) Design and develop an instruction pipeline working under various situations of pipeline stall.

k) Mention the need for cache memory. Explain the following three mapping methods with examples.
   i) Direct
   ii) Associative
   iii) Set associative

l) What is hardware multi-threading? Explain different types of multi-threading occurs in parallel architectures.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 What is zero address instruction format? Give an example. Enumerate the most commonly used addressing modes of CPU instructions. Registers R1 and R2 of a computer contain the decimal values 1200 and 4600. what is the effective address of the memory operand of the following instruction: **(16)**
Load 25(R1), R5.

Q4 Write down the Booth's algorithm. List the two attractive features of Booth's algorithm. Give an example for worst case of Booth's algorithm. **(16)**

Q5 Summarize the virtual memory organization followed in digital computers. **(16)**

Q6 Assume the following sequence of instructions are executed on a 5 stage pipelined processor **(16)**
Or r1, r2, r3
Or r2, r1, r4
Or r1, r1, r2
   i) Indicate dependences and their type.
   ii) Assume there is no forwarding in this pipelined processor. Indicate hazards and add NOP instructions to eliminate them.
   iii) Assume there is a full forwarding. Indicate hazard and add NOP instructions to eliminate them.

Registration No :

Total Number of Pages : 02

Course: B.Tech
Sub_Code: RCI4D002

4th Semester Regular / Back Examination: 2022-23
SUBJECT: CONCRETE TECHNOLOGY
BRANCH(S): CIVIL
Time : 3 Hour
Max Marks : 100
Q.Code : M561

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.

The figures in the right hand margin indicate marks.

Part-I

Q1 **Answer the following questions:** **(2 x 10)**

a) What are the four main compounds of Ordinary Portland Cement? State their percentage by mass.

b) As per IS specification, residue of cement should not exceed what percent when sieved on a 90 micron IS sieve?

c) Distinguish between course aggregate and fine aggregate.

d) What do you mean by bulking of sand?

e) What do you mean by fresh concrete?

f) Define workability of concrete.

g) What do you mean by curing of concrete? What is the curing period of concrete?

h) What is the size of the concrete cube used for testing its compressive strength?

i) What do you mean by mix design?

j) What is self compacting concrete?

Part-II

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** **(6 × 8)**

a) Discuss briefly about the ingredients of Portland cement along with their functions.

b) Explain the process of hydration of cement.

c) What is the role of admixture? Distinguish between mineral admixture and chemical admixture.

d) Explain the various factors which affect the workability of concrete. Distinguish between segregation and bleeding.

e) Explain Abram's law. Draw the figure to show the relationship between water cement ratio and compressive strength of concrete.

f) Explain the purpose of curing of concrete. Also explain the various methods adopted for curing of concrete.

g) Explain the various parameters which control the strength of concrete.

h) Describe briefly the flexure strength of concrete.

i) What do you mean by non destructive testing of concrete? Explain any one method of non destructive testing.

j) Distinguish between modulus of elasticity and dynamic modulus of elasticity.

k) Explain the various factors which influence creep of concrete.

l) Explain the concept of quality control of concrete.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 a) Explain any two tests conducted to determine the physical properties of cement. (8)

b) What do you mean by sieve analysis of aggregates? Explain grading of fine and coarse aggregates. (8)

Q4 a) Explain the slump test method and its outcome. Why this test is conducted? (8)

b) Explain the step wise procedure of manufacture of concrete. (8)

Q5 a) Explain the procedure for conducting the compression test of concrete. (8)

b) What do you mean by shrinkage of concrete? Explain the types of shrinkage. (8)

Q6 a) What do you mean by mix design of concrete? What are the various factors which influence the mix proportions? (8)

b) Explain about light weight aggregate concrete. (8)

Registration No : | | | | | | | | | | |

Total Number of Pages : 02

Course: B.Tech
Sub_Code: RCS4C002/ RIT4C002

4th Semester Regular / Back Examination: 2022-23
SUBJECT: Design and Analysis of Algorithm
CST,CSEAI,CSE,CSEAIME,ELECTRICAL & C.E,ELECTRONICS & C.E, CSIT,IT
Time : 3 Hours
Max Marks : 100
Q.Code : M603

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.
The figures in the right hand margin indicate marks.

Part-I

Q1 **Answer the following questions:** **(2 x 10)**

a) Write any four properties of an algorithm.
b) How the Backtracking of algorithm differs from that of branch and bound algorithm?
c) State the principle of optimality. Find two problems for which the principle does not hold.
d) Define Dis-joint set. Write the operation supported by the dis-joint set.
e) Differentiate between Deterministic and nondeterministic algorithm.
f) Differentiate between Dynamic Programming and Greedy method.
g) What is the time required for finding the shortest path in a graph with n-vertices and e- edges?
h) Define max clique problem versus clique decision problem.
i) Show that given a maximum flow in a network with edge, a maximum cut of N can be computed in O(m) times.
j) Define polynomial time reducibility.

Part-II

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** **(6 × 8)**

a) State the fractional Knapsack problem? Find an optimal solution to the Knapsack instance n= 3, m = 20, (P1, P2, P3) = (25, 24, 15) and (W1, W2, W3) = (18, 15, 10)
b) Analyze the situations where quick sort performs the best and worst. Find the best and worst case time complexity of quick sort.
c) Explain the greedy algorithm to solve the following Activity Selection Problem.

Job	1	2	3	4	5	6
Start time	1	3	0	5	3	7
Finish Time	4	5	6	7	9	9

d) Construct a min-heap using heapify procedure with the following elements and demonstrate each step:

4, 5, 18, 13, 16, 35, 8, 26, 45.

e) What is single source shortest path problem? How it is different from all pair shortest path problem?

f) Suppose that all characters in the pattern p are different. Show how to accelerate NAIVE-STRING-MATCHING to run in time O(n) on an n-character text T.

g) Define Big-Oh and Big-omega notation. Find Big-Oh for the function $f(n)=4n^2+2n+7$

h) Derive time complexity of job sequencing with deadlines. Explain the most suitable technique to solve this problem.

i) The directed Hamiltonian cycle is NP-complete. Prove that the undirected Hamiltonian cycle is reducible to the directed Hamiltonian cycle

j) Solve the following recurrence relation:

$T(n) = 2T(n/2) + n^3$

$T(n) = 16T(n/4) + n$

k) Give the control Abstraction for divide-and-conquer. Use divide and conquer paradigm to devise recurrence relation for analysis of quick sort. use the same to find best case analysis for quick sort

l) Construct a Huffman tree for the following data obtain its Huffman code

Character	A	B	c	d	e	f
No. of Occurrences	2	3	3	4	6	10

Part-III

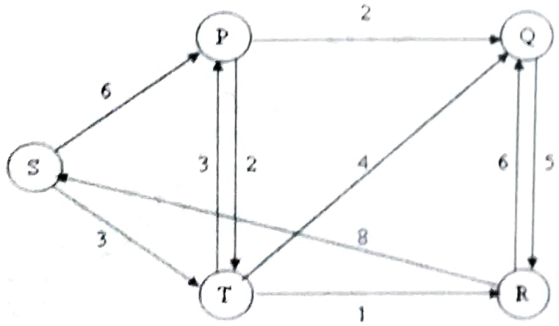
Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 a) Describe and justify Kruskal's algorithm for finding the minimum spanning tree of an undirected graph.

b) Let the dimensions of matrices A,B,C,D respectively be 10X5, 5X15, 15X8, 8X20 generate matrix product chains that produces minimum number of matrix multiplications using dynamic programming.

Q4 a) Explain the algorithm for finding length of LCS. Determine LCS of "ROURKELA" and "IOUEA".

b) Find out the shortest path from following graph G using Bellman Ford algorithm taking source vertex S. What its time complexity? **(8)**



G

Q5 a) Explain the 2-approximation algorithm with proof for solving the Travelling Salesman Problem. **(8)**

b) Discuss the concept of pattern matching algorithm? Write the Rabin-karp algorithm for the string matching. Suppose T = "kalhonaho", P = "hona", then Find the position where Pattern matching occurs. **(8)**

Q6 a) Discuss the relation between P, NP, NP-complete and NP-Hard problem with suitable example. **(8)**

b) Discuss the 4 – queen's problem. Draw the portion of the state space tree for n = 4 queens using backtracking algorithm. **(8)**

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B.Tech
RBM4C001/REE4C001/REL4C001

4th Semester Regular/Back Examination: 2023
SUBJECT: Digital Electronics
BRANCH(S): BIOMED, EEE, ELECTRICAL
Time : 3 Hour
Max Marks : 100
Q.Code : M217

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.
The figures in the right hand margin indicate marks.

Part-I

Q1 **Answer the following questions:** **(2 x 10)**

a) Write the binary equivalent of $(101.11)_8$

b) What is the importance of Priority encoder?

c) Draw CMOS logic circuit & write its one application.

d) What is the specialty of EX-OR gate?

e) Compare synchronous counter with asynchronous counter.

f) What is the minimum number of flip-flops needed to design a mod-16 counter?

g) Define PLA & PAL.

h) Write some applications of MUX & DMUX.

i) How JK Flipflop is converted to T-Flipflop?

j) What is FPGA?

Part-II

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** **(6 × 8)**

a) Draw TTL circuit & explain its operation.

b) Draw the truth table & circuit for full Adder. Also mention its output equations.

c) Implement the given functions using single 3:8 decoder.

$$f_1(A,B,C) = \prod(2,3,4,5,7)$$

$$f_2(A,B,C) = \sum(1,3,5)$$

d) Do a conversion of SR-FF to D-FF with detailed truth table & K-Map analysis.

e) Discuss any two error detecting codes & also any two correcting codes with examples.

f) Design a 2-bit synchronous up counter.

g) Write down two applications of each for MUX, Flipflop, Counter, Ex-OR gate, shift register & CMOS.

h) Simplify the expression using K-maps: $F(x, y, z) = \pi(0,2,4,5,7)$

i) Explain operation of ring counter with suitable output wave diagram.

j) The initial contents of the 4-bit serial in parallel out shift register is 1011. What will be contents of the given shift register after 5 clock pulses applied?

k) Explain operation of successive approximation A/D converter.

l) Draw a ROM structure & discuss its function.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 **a)** Discuss operation of the carry look ahead adder with the proper logic flows. **(8)**

b) Obtain the simplified form for the given expression using K-map. **(8)**

Also, draw the minimization result using NAND gate only.

$F(A, B, C, D) = \Sigma m(1, 3, 4, 6, 8, 9, 11, 13, 15) + \Sigma d(0, 2, 14)$

Q4 **a)** A majority circuit is a combinational circuit whose output is equal to 1 if the input variables have more 1's than 0's. The output is 0 otherwise. Design a 3 input majority circuit. **(8)**

b) Find the Boolean function for 8:1 MUX. **(8)**

Q5 **a)** Design a decade counter by using JK-FF or T-FF. **(8)**

b) Explain shifting of data in serial left & serial right manner with suitable logic circuits. **(8)**

Q6 **a)** How analog to digital conversion happens, Show it stepwise. **(8)**

b) Explain PLD & CPLD. **(8)**

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Course: B.Tech
REC4C002/ REI4C002/ RME4G001

4th Semester Regular/ Back Examination: 2022-23
SUBJECT: Digital Systems Design
BRANCH(S): ECE, ELECTRONICS & C.E, ETC, AEIE, EIE, MMEAM, MECH
Time : 3 Hour
Max Marks: 100
Q.Code : M160

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.
The figures in the right hand margin indicate marks.

Part-I

Q1 **Answer the following questions:** (2 x 10)

a) Differentiate between Analog and Digital system. What are the advantages of a digital system?
b) Using 2's complement perform subtraction (1000100 – 1010100).
c) Define integrated circuit. What are the characteristics that describe the performance of IC digital logic families?
d) Explain why NAND-NAND realization is preferred over AND-OR realization?
e) When did the first PLD appear?
f) What are gate primitives?
g) What are Fan-in and Fan-out?
h) The initial state of MOD-16 down counter is 0110. What state will it be after 37 clock pulses?
i) In a positive edge triggered JK flip flop, J = 1, K = 0 and clock pulse is rising Q will be _____.
j) Which are the basic refresh modes for dynamic RAM?

Part-II

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** (6 × 8)

a) Explain parity generator and checker with suitable example.
b) Design a half adder using at most three NOR gates.
c) Describe the read and write cycle of a DRAM. Also describe about the fast page mode.
d) Design a combinational circuit that accepts a three-bit binary number and generates an output binary number equal to the square of the input number.
e) Calculate analog output of 4-bit DAC for digital input 1011. Assume $V_{FS} = 5V$.
f) Design a counter with the following binary sequence: 0, 4, 2, 1, 6 and repeat. Use JK flip-flops.
g) With an example explain in detail the test bench creation.
h) Discuss the TTL parameters. Draw the TTL inverter circuit.

i) Design a MOD-10 synchronous counter using T flip flops.
j) Compare TTL and CMOS logic families based on following:
(a) Propagation delay (b) Power dissipation
k) Briefly explain the pulse mode asynchronous sequential circuit.
l) Explain the different methods of state assignment.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 **(a)** Design a combinational circuit with four input lines that represent a decimal digit in BCD and four output lines that generate the 9's complement of the input digit. **(08)**

(b) Draw and explain logic diagram of arithmetic logic unit (ALU). **(08)**

Q4 **(a)** Using a decoder and external gates, design the combinational circuit defined by the following three Boolean functions: **(09)**

$F1 = x'y'z + xz'$

$F2 = x'yz' + xy'$

$F3 = xyz' + xy$

(b) Explain various steps in the analysis of synchronous sequential circuits with suitable example. **(07)**

Q5 **(a)** Design a 4-bit synchronous 8421-decade counter with ripple carry. **(08)**

(b) With respect to Register Transfer logic, explain Inter register transfer with necessary diagrams. **(08)**

Q6 **(a)** Write VHDL program for 4:1 MUX using behavioral modeling. **(10)**

(b) Explain PLA with necessary diagrams. **(06)**

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Total Number of Pages : 02

Course: B.Tech
Sub_Code: RCS4C001

4th Semester Regular/Back Examination: 2022-23
SUBJECT: Discrete Mathematics
BRANCH(S): CST,CSEAI,CSE,CSEAIME
Time : 3 Hour
Max Marks : 100
Q.Code : M218

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.
The figures in the right hand margin indicate marks.

Part-I **(2 x 10)**

Q1 **Answer the following questions:**

a) Show that $\sim \forall x(P(x) \rightarrow Q(x))$ and $\exists x(P(x) \wedge \sim Q(x))$ are logically equivalent.
b) Let C be "Today is clear", R be "It is raining today" and S be "It is snowing today". Then translate the symbolic notation $C \rightarrow \neg(R \wedge S)$ into acceptable English.
c) Using induction, show that $1 + 2 + 3 + \cdots n = \frac{n(n+1)}{2}$.
d) Define Partial order set. Also provide suitable example of it.
e) Suppose A = {1,2,3,4}. Which order pair(s) are in the relation R = {(a, b) | a divides b}?
f) Solve the recurrence relation $a_n = 6\,a_{n-1} - 9\,a_{n-2}$.
g) Give an example of an abelian group which has exactly 4 elements.
h) Define Lattice.
i) Prove or disprove that a simple digraph is remain a simple graph after removing its direction.
j) How many edges must be there in a planar graph having 7 regions and 5 vertices?

Part-II

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** **(6 × 8)**

a) Translate the statement "If either labor or management is stubborn, then the strike will be settled iff the government obtains an injuction, but troops are not sent into the mills. '' in symbolic form. Also construct its truth table.
b) Prove or disprove that every partial order sets are totally ordered.
c) Solve the recurrence relation $a_n = 6a_{n-1} - 9a_{n-2}$ with the initial conditions $a_0 = 1, a_1 = 6$.
d) Use mathematical induction to prove that $n^3 - n$ is divisible by 3 whenever n is a positive integer.
e) Students are awarded 4 grades A, B, C, and D. How many students must be there in a group so that at least 6 students get the same grade?
f) Let R be the relation on the set of real numbers such that aRb iff $a - b$ is an

integer. Is R an equivalence relation? Justify your answer.

g) Find the particular solution of the recurrence relation $a_n + 5a_{n-1} + 6a_{n-2} = 3n^2$.

h) State Lagrange's theorem. Also discuss the converse of the theorem.

i) Find all the distinct left cosets of $H = 5\mathbb{Z}$ in the group $(\mathbb{Z}, +)$.

j) Explain Boolean algebra with the help of an example.

k) If G is minimally connected then prove that G is a tree.

l) Prove or disprove that there is no connected Eulerian simple graph that has even number of vertices and odd number of edges.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 **(8x2)**

a) Define generalized Pigeon-hole principle. Students are awarded 4 grades A, B, C, and D. How many students must be there in a group so that at least 6 students get the same grade?

b) Solve the following recurrence relation using generating function
$a_n - 2a_{n-1} - 15a_{n-2} = 0$, for $n \geq 2$ and $a_0 = 0, a_1 = 1$.

Q4 **(8x2)**

a) What is a Tautology? Construct the truth table of $(P \rightarrow Q \wedge R) \vee (\neg P \wedge Q)$.

b) In a distributive lattice, show that if an element has a complement, then this complement is unique.

Q5 **(16)**

Define integral domain. Show that every field is an integral domain but converse is not true. When an integral domain becomes a field? Explain the answer in details.

Q6 **(8x2)**

a) Show that a graph G is connected iff it has a spanning tree.

b) Prove that every plannar graph is 6-vertex colorable.

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Course: B.Tech
Sub_Code: REE4C002/REL4C002

4th Semester Regular / Back Examination: 2022-23
SUBJECT: Electrical Machine-1
BRANCH(S): EEE, ELECTRICAL
Time : 3 Hour
Max Marks : 100
Q.Code : M162

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.
The figures in the right hand margin indicate marks.

Part-I (2 x 10)

Q1 **Answer the following questions:**

a) What is Amper Law?
b) What is the purpose of interpoles and compensating windings in dc machines?
c) Derive the torque equation of the DC Machine.
d) What is the voltage regulation of the transformer?
e) Define Biot Savart Law.
f) What is the All-day efficiency of a transformer?
g) What is the function of the dummy coil in the Dc machine?
h) In a transformer at what power factor zero voltage regulation is obtained?
i) Explain the difference between zero sequences and 3rd harmonic current.
j) The full-load copper-loss and iron–loss of a transformer are 2000 W and 4000 W respectively. The copper loss and iron loss at the half load will be respectively.

Part-II

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** (6 × 8)

a) The emf per turn for a single phase, 2310/220 V, 50 Hz transformer is approximately 13 V. Calculate (i) the Number of primary and secondary turns and (ii) the Net cross-sectional area of the core, for the maximum flux density of 1.4 T.
b) Explain the short circuit test and find out the total resistance and reactance of the transformer.
c) Explain different types of cooling systems used in Transformer.
d) 230 V dc is shunt motor that has an armature resistance of 0.25 Ω. What resistance must be added in series with the armature circuit to limit the starting current 90 A? With this starting resistance in the circuit, what would be the back emf when the armature current decreases to 30 A?
e) Explain the inrush current of the transformer during starting condition.
f) Explain the flux-linkage vs current characteristics of the magnetic circuit.
g) By using a phasor diagram explain the Scott connection of the transformer.
h) Derive the emf equation of the DC generator.

i) Explain the open circuit test and find the constant loss.

j) A 6-pole lap wound D.C. shunt generator has 70 slots with 18 conductors per slot. The ratio of pole arc to pole pitch is 0.6. The diameter of the bore of the pole shoe is 0.35m. The length of the pole shoe is 0.3m. Calculate the speed at which it runs if the air gap flux density is 0.32 wb/m2 and the e.m.f. induced in the armature is 510V.

k) The efficiency of a 1000 KVA, 110/220 V, 50 Hz, the single-phase transformer is 98.5 % at half load at 0.8 pf leading and 98.8 % at full-load upf. Determine (i) iron loss (ii) Full-load copper-loss.

l) Explain the voltage built-up principle of the D.C Generator.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 What are the losses taking place in D.C. Machine and how they are very with load current and derive the condition for maximum efficiency. **(16)**

Q4 Explain the commutation of the Dc motor and draw the necessary diagram. **(16)**

Q5 Draw the equivalent circuit, approximate equivalent circuit, and the phase diagram of the transformer. **(16)**

Q6 What is the armature reaction of the DC machine Explain the cross-magnetization and demagnetization effect. **(16)**

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Total Number of Pages : 02

Course: B.Tech

Sub_Code: REE4D001/ REL4D001/ REC4C001

4th Semester Regular/ Back Examination: 2022-23

SUBJECT: Electro-Magnetic Theory

BRANCH(S): EE, EEE, ETC, ECE

Time : 3 Hour

Max Marks : 100

Q.Code : M351/ M352

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.

The figures in the right hand margin indicate marks.

Part-I **(2 x 10)**

Q1 **Answer the following questions:**

a) Define an orthogonal system. A point P is represented by (–2, 6, 3). Express the point P in other coordinate systems.

b) Write the point form of Gauss's law. Derive the Poisson's equation from it.

c) Considering the principle of charge conservation, derive the continuity equation.

d) Write the Maxwell's equations both for static and time varying fields.

e) What do you mean by polarization of a TEM wave? Define the penetration depth of a medium.

f) Write the relation between transmission coefficient and reflection coefficient. How standing wave is formed?

g) Name the parameters that characterize the dielectric separating the conductor of a transmission line. Define characteristic impedance of a transmission line.

h) An air line has characteristic impedance of 70 Ω and phase constant of 3 rad/m at 100 MHz. Calculate the capacitance per meter of the line.

i) What are waveguides? What is dominant mode in a waveguide? In a rectangular waveguide for which a = 1.5 cm, b = 0.8 cm, $\sigma = 0$, $\mu = \mu_0$, $\varepsilon = 4\varepsilon_0$, and $H_x = 2sin\left(\frac{\pi x}{a}\right)cos\left(\frac{3\pi y}{b}\right)sin(\pi \times 10^{11}t - \beta z)$ A/m. determine the mode of operation.

j) Write short note on half-wave dipole antenna.

Part-II

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** **(6 × 8)**

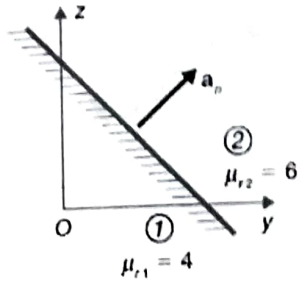
a) Express the unit vector which points from $z = h$ on the z axis toward $(r, \varphi, 0)$ in cylindrical coordinates. A field is given as $G = \left[\frac{2x}{1+y^2}\right]a_x + (y + z + 1)a_y + (5x - z^2)a_z$. Find (a) a unit vector in the direction of G at P (1, 2, –3). (b) The angle between G and the y = 0 plane at Q (2, 0, 4).

b) Charge is distributed uniformly along an infinite straight line with constant density ρ_l. Develop the expression for E at the general point P. On the line described by $x = 2$ m, $y = -4$ m there is a uniform charge distribution of density $\rho_l = 20$ nC/m. Determine the electric field E at (–2, –1, 4) m.

c) Plane z = 0 and z = 4 carry current K = $-10\,a_x$ A/m and K = $10\,a_x$ A/m, respectively. Determine H at (a) (1, 1, 1) (b) (0, –3, 10)

d) An AWG #12 copper conductor has an 0.0808 inch diameter. A 50-foot long conductor of this type carries a current of 20 A. Find the electric field intensity E, drift velocity U, the voltage drop, and the resistance for the 50-foot length.

e) Region *1*, where $\mu_{r1} = 4$, is the side of the plane $y + z = 1$ containing the origin as shown in the figure below. In region 2, $\mu_{r2} = 6$. $B_1 = 2.0a_x + 1.0a_y(T)$. Find B_2 and H_2.



f) Derive the expression for Ampere's circuital law in point form showing the displacement current density.

g) An electric field is represented by $E_y = 10\cos(6\pi 10^8 t - \beta x)a_y$ is propagating through a lossless medium having $\mu_r = 1$, $\varepsilon_r = 78$ at a frequency of 300 MHz. Find (a) the various parameters associated with the wave. (b) the corresponding magnetic field H.

h) A perpendicularly polarized wave propagates from a region having $\varepsilon_r = 8.5$, $\mu_r = 1$, $\sigma = 0$ to free space with an angle of incidence of 15^0. The incident field is 1.0 μV/m, find the reflected and transmitted electric field; incident, reflected and transmitted magnetic field.

i) Calculate the conductivity and skin depth of polythene of dielectric constant 2 and loss tangent 0.0002 at 100 MHz.

j) If a transmission line of characteristic impedance 50 Ω is terminated in complex impedance 25+j100 Ω, what will be the reflection coefficient and the VSWR of the line?

k) Establish a relation between the wave phase velocity, the wave group velocity, and the wave dispersion. The cutoff wavelength of a waveguide is given as 69.70 mm. What should be the length of the guide in order to ensure that a signal at 8.6 GHz emerging out of the guide is delayed by 1 μs with respect to the signal that propagates outside the waveguide?

l) A center-fed dipole antenna with a *z*-directed current has electrical length $\frac{L}{\lambda} \ll \frac{1}{30}$. (*a*) Show that the current distribution may be assumed to be triangular in form. (*b*) Find the components of the vector magnetic potential **A**.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 Explain Gauss's law in electrostatics in point and integral from. What is the condition for finding the electrical field quantities? What are its applications? State the point form of Ohm's law. What is the analogous relation in static electric field? Describe Joule's law taking the case of a conductor of uniform cross sectional area. Mention its common form in electric circuit. Explain ampere's force law. What is the net force on a circular current loop in a uniform magnetic field? **(16)**

Q4 Describe the electric and magnetic boundary conditions in various interfaces. **(16)**

Q5 Derive the parameters related to oblique incidence of a plane wave. Extend it considering two special cases: one with the E field perpendicular to the plane of incidence, the other with the E field parallel to it. **(16)**

Q6 Write the Maxwell's equations considering the time varying E and H fields. Derive, with the help of the relevant Maxwell's equation, the expression for the magnetic field H for a uniform plane wave propagating along $z\left(E_z = H_z = 0; \frac{\partial}{\partial x} = \frac{\partial}{\partial y} = 0\right)$ in free space if the electric field is given by $E = (20a_x + 30a_y)\cos(3\pi \times 10^{10}t - 100\pi z)$. **(16)**

Registration No :

Total Number of Pages : 02

Course: B.Tech

Sub_Code: REN3E001 / REN4E001

4th Semester Regular / Back Examination: 2022-23

SUBJECT: Engineering Economics

ELECTRICAL & C.E, ELECTRONICS & C.E, ...

Time : 3 Hour

Max Marks : 100

Q.Code : M520

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.

The figures in the right hand margin indicate marks.

Part-I **(2 x 10)**

Q1 **Answer the following questions:**

a) If the price rises by 3 %, the quantity demanded falls by 1.5 %. Calculate the price elasticity of demand.

b) Define elasticity of supply.

c) Distinguish between 'short-run' and 'long run' in the context of production.

d) Define total, average and marginal costs.

e) What do you mean by the perfectly competitive market?

f) What is the margin of safety?

g) What is the difference between capital-recovery factor and sinking-fund factor?

h) What is capitalized Cost?

i) What do you mean by spill-over benefit?

j) What is demand-pull inflation?

Part-II

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** **(6 × 8)**

a) Suppose that demand is given by the equation QD = 500 – 50P, where QD is the quantity demanded, and P is the price of the good. Supply is described by the equation QS = 50 + 25P where QS is quantity supplied. What is the equilibrium price and quantity?

b) What are the different types of price elasticity of demand? Explain with diagrams and examples.

c) What is the relationship between average cost and marginal cost? If the marginal cost is rising does it mean that the average cost must also be rising?

d) Explain three stages of production in the short-run.

e) Distinguish between perfect competition and monopoly.

f) Illustrate and explain how equilibrium price and quantity change when either the supply or demand curve shifts: 1) an increase in Demand; 2) an increase in Supply; 3) a decrease in Demand; 4) a decrease in Supply

g) A person is just 30 years old. He plans to invest an equal sum of Rs. 20,000 every year for the next 30 years from the end of next year. The bank gives 10 % interest compounded annually. Find the maturity value of his account when he is 60 years old.

h) From the given table find IRR

End of Year	0	1	2	3	4	5
Cash Flows (Rs)	-1000	-800	500	500	500	1200

i) The Acme Chemical Company paid Rs 45,000 for research equipment, which it believes will have zero salvage value at the end of its 5-year service life. Compute the depreciation schedule for the equipment by using the straight-line depreciation method

j) Distinguish between GDP and GNP

k) Explain in brief the agency functions of a commercial bank.

l) What are the two basic methods of depreciation? Explain by giving examples

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 List the "Ceteris Paribus" variables that affect demand and illustrate a shift in a Demand Curve. Now discuss how a change in each of these variables would lead to the shift you have illustrated in your drawing. **(16)**

Q4 Consider the following data of a company for the year 2022-23 **(16)**

Sales: Rs. 2,40,000
Fixed costs: Rs. 50,000
Variable costs: Rs 75,000

Find the following:

(i) P/V ratio
(ii) BEP
(iii) Margin of safety
(iv) Find sales to earn a profit of Rs 1,00,000.

Q5 National Homebuilders, Inc, plans to purchase new cut-and-finish equipment. Two manufacturers offered the estimates below. **(16)**

	Vendor A	**Vendor B**
First cost (Rs.)	15,000	18,000
Annual M&O cost (Rs.)	3500	3100
Salvage value (Rs.)	1000	2000
Life, years	6	9

a) Determine which vendor should be selected on the basis of a present worth comparison, if the MARR is 15% per year.

(b) National Homebuilders has a standard practice of evaluating all options over a 5-year period. If a study period of 5 years is used and the salvage values are not expected to change, which vendor should be selected?

Q6 Examine the effects of inflation. How can inflation be controlled? **(16)**

Registration No: | | | | | | | | | | |

Total Number of Pages : 03

Course: B.Tech
Sub Code: RME4C002

4th Semester Regular / Back Examination: 2022-23
SUBJECT: Engineering Thermodynamics
BRANCH(S): MECH, MMEAM
Time : 3 Hour
Max Marks : 100
Q.Code : M268

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.
The figures in the right hand margin indicate marks.

Part-I

Q1 **Answer the following questions :** **(2 x 10)**

a) What do you mean by a steady flow process? Write down the general energy equation for steady flow process.
b) Write down the entropy balance equation for steady flow processes.
c) What do you mean by 'dead state'?
d) Define the coefficient of (i) Volume expansion, (ii) Isothermal Compressibility
e) What are the four basic components of a steam power plant?
f) Draw the T-s diagram for ideal jet propulsion cycle.
g) How is a reversed Brayton cycle used for refrigeration?
h) Define the volumetric efficiency of a compressor.
i) What do you mean by Optimum pressure ratio of a gas turbine?
j) Represent Rankine cycle on a T-s diagram.

Part-II

Q2 Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve) **(6 × 8)**

a) Calculate the change of entropy of a 5 kg of perfect gas when it is heated from 423 K to 473 K under constant volume conditions. Its specific heat varies with temperature as:

$C_v = (0.45 + 0.009\ T)$ kJ/kg K

b) Define the following:
i) Available energy
ii) Second law efficiency

c) Show that for a perfect gas

$$\left[\frac{\partial u}{\partial T}\right]_p = c_p - \alpha P v$$

Where the coefficient of volume expansion α is given by

$$\alpha = \frac{1}{v}\left[\frac{\partial v}{\partial T}\right]_p$$

d) Derive the Maxwell's equations.

e) Why is a Carnot cycle not practicable for a steam power plant?

f) What is the effect of regeneration on Brayton cycle efficiency? Define the effectiveness of regenerator.

g) Describe an absorption refrigeration cycle?

h) Briefly explain about a back pressure turbine.

i) What is an air standard cycle? Why are such cycles conceived?

j) A refrigerating system operates on the reversed Carnot cycle. The higher temperature of the refrigerant in the system is 35^0C and the lower temperature is -15^0C. The capacity is to be 12 tonnes. Neglect all losses. Determine:

i) Coefficient of performance
ii) Heat rejected from the system per hour
iii) Power required.

k) A SI engine, operating in an Otto cycle, has its inlet parameters 323K and 1 bar while it develops a maximum pressure of 25 bar. Determine

i) The air standard efficiency of the cycle
ii) The mean effective pressure

Take,
the bore = 250 mm, stroke = 375 mm, clearance volume = 0.00263 m^3 and the index of compression = 1.4

l) What is the need of staging the compression process?

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 a) Give the exergy balance for a closed system **(8)**

b) Calculate the available energy in 40 kg of water at 75^0C with respect to the surroundings at 5^0C , the pressure of water being 1 atm. **(8)**

Q4 a) Steam at 20 bar and 360^0C is expanded in a steam turbine to a pressure of 0.08 bar. It then enters a condenser, where it is condensed to saturated liquid water. The pump feeds back the water into the boiler. **(10)**

i) Assuming ideal processes, find per kg of steam the net work and the cycle efficiency.

ii) If the turbine and the pump have each 80% efficiency, find the percentage reduction in the net work and the cycle efficiency.

b) State the advantages of Regenerative cycle over simple Rankine cycle. **(6)**

Q5 **a)** Derive an expression for the **(6)**

i) Net work output

ii) Thermal efficiency of a diesel cycle.

b) In a gas turbine plant, working on the Brayton cycle with a regenerator of 75% effectiveness, the air at the inlet to the compressor is at 0.1 MPa, 30^0C, the pressure ratio is 6, and the maximum cycle temperature is 900^0C. If the turbine and compressor have each an efficiency of 80%, find the percentage increase in the cycle efficiency due to regeneration. **(10)**

Q6 A two-stage air compressor with perfect intercooling takes in air at 1 bar pressure and 27^0C. The law of compression in both the stages is $pv^{1.3}$ = constant. The compressed air is delivered at 9 bar from HP cylinder to an air receiver. Calculate per kilogram of air, (a) the minimum work done, and (b) the heat rejected to the intercooler. **(16)**

Derive the relation used for minimum work.

Registration No:

Total Number of Pages: 02

BTech
RME4D001

4th Semester Regular/Back Examination: 2022-23
SUBJECT: IC Engines and Gas turbines
BRANCH(S): MECH
Time: 3 Hour
Max Marks: 100
Q.Code : M100

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.
The figures in the right-hand margin indicate marks.

Part-I

Q1 **Answer the following questions :** (2 x 10)

a) Distinguish between Indicated power and Brake power.
b) What are the assumptions made in analyzing the air-standard cycle?
c) Define Clearance volume, swept volume, Cylinder volume and compression ratio.
d) What are the differences between the analysis of the air-standard cycle and that of the fuel-air cycle?
e) What are the advantages and disadvantages of using gaseous fuels in IC engines?
f) What is the function of an ignition system?
g) Which engine is more suitable for supercharging? Justify your answer.
h) What is meant by slip factor in compressors?
i) What are the basic propellants are used in rockets?
j) Draw T-S diagram of a gas turbine cycle with intercooled compression.

Part-II

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** (6 × 8)

a) An IC engine working on Otto cycle has a cylinder of diameter 100 mm and stroke 125 mm. The clearance volume is 300 cc. Find the air standard efficiency. Assum C_p = 1.004 kJ/kgK and Cv = 0.717 kJ/kgK for air.
b) A diesel engine has a compression ratio of 20 and cut-off taking place at 5% of the stroke. Assume γ = 1.4 and calculate the air standard efficiency.
c) Explain the phenomenon of knock in CI engines.
d) What is meant by ignition limit?
e) Describe the pintle nozzle with the help of a neat sketch.
f) What is natural gas? What are the advantages and disadvantages of using natural gas as alternative fuel?
g) What are the requirements for an ideal carburettor?

h) A test on a single cylinder, four stroke oil engine having bore 18cm and stroke 36 cm yielded the following results:

Speed: 285 RPM,	Brake torque: 393 N-m
Indicated m.e.p: 7.2 bar,	Fuel consumption: 3.5 kg/hr,
Cooling water flow: 4.5 kg/minute,	Cooling water temperature rise: 36^0C
Air-fuel ratio by mass: 25,	Exhaust gas temperature: 415^0C
Barometric pressure: 1.013 bar,	Room temperature: 21^0C

The fuel has a calorific value of 45200 kJ/kg and contains 15% by mass of hydrogen. Determine:

i) The indicated thermal efficiency and

ii) The volumetric efficiency based on atmospheric conditions.

Take R = 0.287 kJ/kgK, C_v for dry exhaust gases = 1.005 kJ/kgK and for superheated steam C_p = 2.05 kJ/kgK

i) List down the requirements of a good spark plug.

j) Discuss the relative advantages and disadvantages of closed cycle and open cycle gas turbine plants.

k) What is the technique used in the measurement of particulate?

l) What is the cause of the formation of NO_x in petrol engine exhaust? Discuss the effect of air-fuel ratio and spark advance on NO_x emission.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 a) In an SI engine, working on the ideal Otto cycle, the compression ratio is 5.5. The pressure and temperature at the beginning of compression are 1 bar and 27^0C respectively. The peak pressure is 30 bar. Determine the pressure and temperature at the salient points, the air standard efficiency and mean effective pressure. Assume ratio of specific heats to be 1.4 for air. **(8)**

b) What will be the percentage change in the efficiency of an Otto cycle having a compression ratio 10, when the specific heat at constant volume increases by 1.5%? **(8)**

Q4 a) Describe the capacitive-discharge ignition with the help of a circuit diagram. **(8)**

b) Describe the factors that affect spark advance. **(8)**

Q5 Describe with suitable sketches the combustion phenomenon in SI engines and explain the two phases of combustion. **(16)**

Q6 Derive the expressions for efficiency and specific work output for a simple gas turbine cycle in terms of pressure ratio. State the assumptions taken. **(16)**

Registration No :

Total Number of Pages : 02

B.Tech
RAU4G001/RCI4G001/RME4C003

4th Semester Regular / Back Examination: 2022-23
SUBJECT: Introduction to Physical Metallurgy and Engineering Material
BRANCH(S): AUTO, C&EE,CIVIL, MMEAM,MECH
Time : 3 Hour
Max Marks : 100
Q.Code : M607

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.
The figures in the right hand margin indicate marks.

Part-I

Q1 **Answer the following questions:** **(2 x 10)**

a) Differentiate between metals and ceramics (two properties).
b) Find the atomic packing factor of a BCC unit cell.
c) Show [111] and (100) in a simple cubic unit cell.
d) Differentiate between interstitial and substitutional solid solutions.
e) Draw and label an isomorphous system.
f) Differentiate between T-T-T and C-C-T diagram.
g) What do you mean by a composite? Give an example.
h) What the two major types are of voids in common crystal structures?
i) What do you mean by recrystallization?
j) What is temperature and carbon % at the eutectic point of the Fe-Fe_3C diagram?

Part-II

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** **(6 × 8)**

a) What is a phase? State Gibb's phase rule for metals and alloys. Find out the degrees of freedom at peritectic, eutectic and eutectoid point of Fe-Fe_3C diagram.
b) Compare the characteristics of voids in iron-carbon system with necessary sketches.
c) Show that the c/a ratio of HCP unit cell is 1.633.
d) Explain yield point phenomena in mild steel.
e) Explain Lever rule and its application taking the example of an isomorphous system.
f) Explain the factors governing solids solubility.
g) Differentiate: hardening vs. tempering.
h) Explain the factors affecting hardenability.
i) Write short note on "Cermets".

j) Draw the cooling curve of pure iron explaining its allotropic changes.

k) Compare SC, BCC and FCC systems with suitable diagrams.

l) Compare and contrast between steel and cast iron.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 Describe the different characteristics of primary bonds with suitable diagrams. **(16)**

Q4 Draw a neat sketch of Iron-cementite phase diagram. Show different phase fields. Explain different invariant reactions taking place in the system. **(16)**

Q5 What do you mean by Metal matrix composites? Describe one manufacturing procedure for fiber reinforced composite. **(16)**

Q6 What are "Optical fibres"? Explain the principle, structure, application of optical fibres. **(16)**

Registration No : | | | | | | | | | | |

Total Number of Pages : 02

B.Tech
RAU4C001/RME4C001

4th Semester Regular/ Back Examination: 2022-23
SUBJECT: Kinematics & Dynamics of Machines
BRANCH(S): AUTO, MMEAM, MECH
Time : 3 Hour
Max Marks : 100
Q.Code : M222

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.

The figures in the right hand margin indicate marks.

Part-I (2 x 10)

Q1 Answer the following questions:

a) What is a machine? Differentiate between a machine and a structure with example.
b) Explain Grubler's criterion for determining degree of freedom for mechanisms.
c) Define limiting friction.
d) What do you understand by 'gear train'? What are the various types of gear trains?
e) Define D-Alembert's Principle.
f) Define Brake. Write down the classification of brakes.
g) Explain the term module and pitch circle diameter.
h) Explain slip of belt.
i) Define dynamometer. What are the types of dynamometers?
j) What are the different forms of teeth used in gear system?

Part-II (6 × 8)

Q2 Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)

a) Derive the condition for transmitting maximum power in a flat belt drive.
b) In a screw jack, the helix angle of thread is α and the angle of friction is ϕ. Show that its efficiency is maximum, when $2\alpha = (90^\circ - \phi)$.
c) Obtain an expression for the length of an open belt drive.
d) State and prove the law of gearing.
e) Write down the characteristics of materials used for brake lining.
f) Write down the difference between self-energizing and self-locking brake.
g) Describe the construction and operation of a prony brake or rope brake absorption dynamometer.
h) Derive an expression for the correction torque or couple to be applied to a crankshaft if the connecting rod of a reciprocating engine is replaced by two lumped masses at the piston pin and the crank pin respectively.
i) Sketch and explain any one inversion of a double slider crank chain.
j) Derive an expression for the friction moment for a flat collar bearing in terms of the inner radius r1, outer radius r2, axial thrust W and coefficient of friction μ. Assume uniform intensity of pressure.

k) Explain briefly the differences between simple, compound, and epicyclic gear trains. What are the special advantages of epicyclic gear trains?

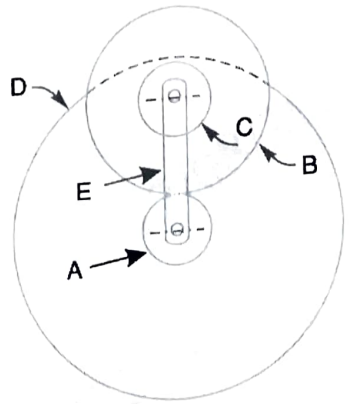
l) State and Prove the Aronhold Kennedy's Theorem of three instantaneous centres.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 A reverted epicyclic gear train for a hoist block is shown in figure. The arm E is keyed to the same shaft as the load drum and the wheel A is keyed to a second shaft which carries a chain wheel, the chain being operated by hand. The two shafts have common axis but can rotate independently. The wheels B and C are compound and rotate together on a pin carried at the end of arm E. The wheel D has internal teeth and is fixed to the outer casing of the block so that it does not rotate. **(16)**

The wheels A and B have 16 and 36 teeth respectively with a module of 3 mm. The wheels C and D have a module of 4 mm. Find : 1. the number of teeth on wheels C and D when the speed of A is ten times the speed of arm E, both rotating in the same sense, and 2. the speed of wheel D when the wheel A is fixed and the arm E rotates at 450 r.p.m. anticlockwise.



Q4 Derive an expression for the minimum number of teeth required on the wheel and pinion in order to avoid interference in involute gear teeth. **(16)**

Q5 a) How are velocity and acceleration of the slider of a single slider crank chain determined analytically? **(8)**

b) Power is transmitted using a V-belt drive. The included angle of V-groove is 30°. The belt is 20 mm deep and maximum width is 20 mm. If the mass of the belt is 0.35 kg per metre length and maximum allowable stress is 1.4 MPa, determine the maximum power transmitted when the angle of lap is 140°. $\mu = 0.15$. **(8)**

Q6 a) A cone clutch is to transmit 7.5 kW at 900 r.p.m. The cone has a face angle of 12º. The width of the face is half of the mean radius and the normal pressure between the contact faces is not to exceed $0.09 N/mm^2$. Assuming uniform wear and the coefficient of friction between contact faces as 0.2, find the main dimensions of the clutch and the axial force required to engage the clutch. **(8)**

b) Sketch and explain the various inversions of a slider crank chain.

Registration No :

Total Number of Pages : 02

Course: B.Tech
Sub_Code: RME4D002

4th Semester Regular/Back Examination: 2022-23
SUBJECT: Mechanical Measurement, Metrology & Reliability
BRANCH(S): MECH
Time : 3 Hour
Max Marks : 100
Q.Code : M102

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.
The figures in the right hand margin indicate marks.

Part-I

Q1 **Answer the following questions:** (2 x 10)

a) What are the factors affecting the accuracy of the measuring system?
b) Differentiate between analog transducers and digital transducers.
c) Define the term reliability.
d) What is the difference between allowance and tolerance?
e) Describe the working principle of a strain gauge.
f) State and explain "Taylor's Principle" for Gauge design.
g) The following 10 observations were recorded when measuring a voltage: 41.7, 42.0, 41.8, 42.9, 42.1, 41.9, 42.5, and 41.8. Estimate (a) The mean. (b) The standard deviation.
h) What do you mean by Ra and Rz values of surface measurement?
i) Mention the main components of a pressure measurement system.
j) Write the difference between maintainability and availability.

Part-II

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** (6 × 8)

a) What are the various possible sources of errors in measurements? What do you understand by systematic error and random errors?
b) Distinguish between line standard and end standard. Explain with examples.
c) Draw the circuit diagram of a strain gauge ballast circuit and explain its working principle.
d) Write short note on (a) Vibrometers and (b) Accelerometers.
e) With a neat sketch explain the flow measurement using pitot tube.
f) Explain the different methods to measure the effective diameter of a thread. Derive the expression for effective diameter in case of three wire method.
g) Illustrate a method for measurement of the gear tooth thickness.

h) Explain the concepts of straightness, flatness, and circularity as geometric tolerances. Provide examples of how these tolerances are specified and measured.

i) Design the "Inspection" type of Plug and ring gauges to control the production of a part 50H7d8. Given: 50 mm lies in the step 30-50. For "d" shaft FD = $-16\ D^{0.44}\mu$. IT6 =10i and above it, tolerance magnitude is multiplied by 10 at each fifth step.

j) Write the advantages and limitations of acceptance sampling over 100% inspection.

k) Differentiate between the sequential acceptance sampling plans based on MTTF and MTBF.

l) Discuss the concepts of system reliability, reliability improvement, and maintainability. Explain how these factors are interrelated and contribute to the overall performance of an engineering system.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 What is the need of calibration? Explain the classification of various standards with suitable examples. **(16)**

Q4 Discuss the operating principles of load cells and dynamometers for measuring force. Compare their suitability for static and dynamic force measurements, and address potential sources of error. **(16)**

Q5 Explain bath-tub-curve and it's utility. **(16)**

A lot contains 1000 items out of which 10 are defective is to be inspected. A sample of 36 items is taken and if it contains 0 defective, the lot is accepted. If it contains 1, 2 or 3 defectives in first sample, then a 2nd sample of 59 items is taken and if total number of defectives in 1st and 2nd samples is less than 3 the lot is accepted. Calculate the probability of acceptance of the lot.

Q6 Design "General" and "Work shop" type of GO and NOGO gauges for 50 mm C7 Hole. **(16)**

Given: $F.D = 0.52\ D^{0.2}$, 50 mm lies in diameter step 30 to 50 mm. Take gauge tolerance as 10% of work tolerance and assume wear allowance if work tolerance exceeds 100 microns.

Registration No :

Total Number of Pages : 04

Course : B.Tech
Sub_Code : REC4C003

4th Semester Regular/ Back Examination: 2022-23
SUBJECT: NETWORK THEORY
BRANCH(S): ECE, ELECTRONICS & C.E, ETC
Time : 3 Hour
Max Marks : 100
Q.Code : M597

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.
The figures in the right hand margin indicate marks.

Part-I

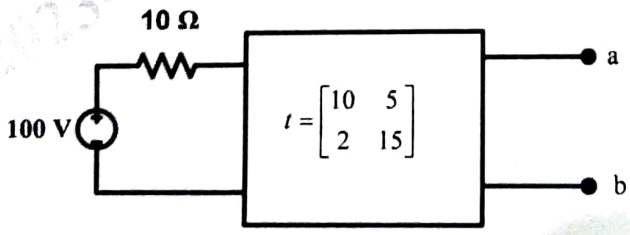
Q1 **Answer the following questions:** **(2 x 10)**

a) For an ideal transformer having n:1 turn ratio, obtain the two-port network representation in terms of h-parameter.
b) When a three-phase supply system is called balanced supply system?
c) State reciprocity theorem. What is the limitation of this theorem?
d) What is DOT convention?
e) How does an inductor act at $t = 0^+$ and $t = \infty$.
f) What is the significance of poles and zeros of a transfer function?
g) Distinguish between steady state and transient response.
h) State the limitation of Final value theorem.
i) Explain the principle of duality with suitable example.
j) State the condition of reciprocity and symmetry in a two port network in terms of h-parameter.

Part-II

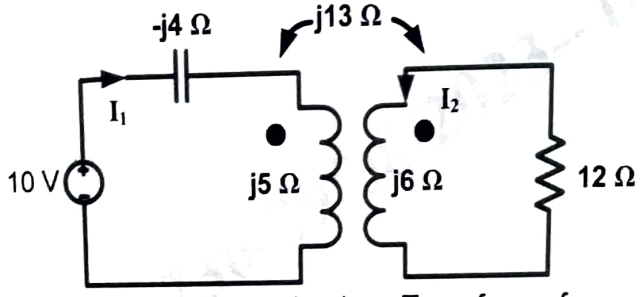
Q2 **Only Focused-Short Answer Type Questions - (Answer Any Eight out of Twelve)** **(6 × 8)**

a) Obtain the Thevenin equivalent representation across the terminal a-b of the two-port network shown in figure below.



b) A coil having an inductance of 100 mH is magnetically coupled to another coil having an inductance of 900 mH. The coefficient of coupling between the coils is 0.45. Calculate the equivalent inductance of the two coils when connected in (i) Series aiding, (ii) Parallel aiding, (iii) Series opposing, and (iv) Parallel opposing

c) Find the currents I_1 and I_2 in the coupled circuit shown in the figure below.

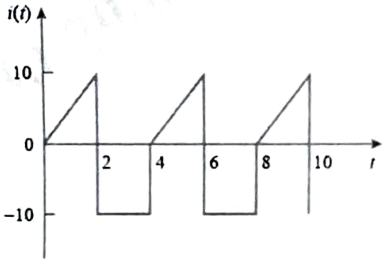


d) Determine the inverse Laplace Transform of:

$$F(s)=\frac{20}{(s+3)(s^2+8s+25)} \text{ and } F(s)=\frac{1}{[s^2(s+3)]}$$

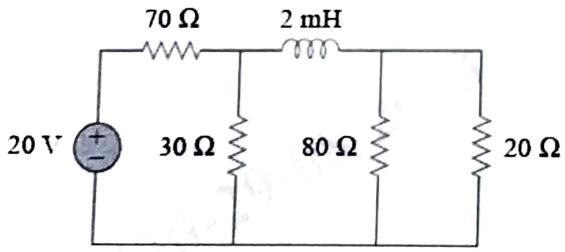
e) Three impedances Z_1 = (10.5 + j20) Ω, Z_2 = (20 + j33.5) Ω and Z_3 = (10 - j15) Ω are delta connected to a 415 V, three phase system. Determine the phase currents, line currents and total power consumed by the load.

f) Determine the rms value of the current waveform shown in figure below.



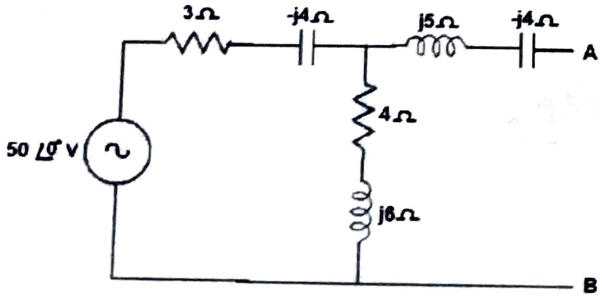
If the current is passed through a 2-Ω resistor, find the average power absorbed by the resistor.

g) Calculate the time constant of the following circuit.



h) Derive the expression for the maximum power transfer from an ac circuit to a load consisting of variable resistor only.

i) Determine the Norton equivalent of the network shown below.

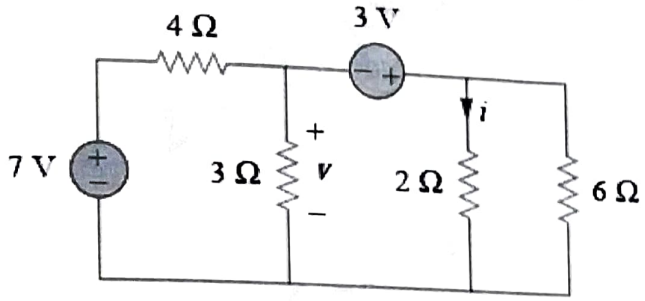


j) Determine the Laplace transform of the following:

$x(t)=5u(t/3)$ and $x(t)=5e^{-1/2}u(t)$

k) The output of a linear system is $y(t) = 10e^{-t}\cos(4t)u(t)$ when the input is $x(t) = e^{-t}u(t)$. Find the transfer function of the system and its impulse response.

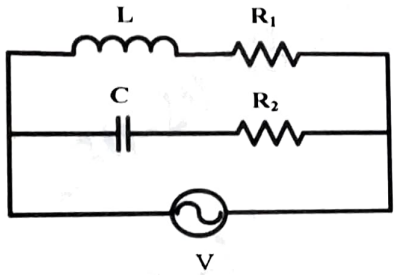
l) Using Nodal analysis calculate the voltage across 3 Ω resistor and current flowing through 2 Ω resistor for the circuit shown below.



Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 a) For the following circuit, obtain the condition for resonance. Also prove that the circuit will resonate at all frequency when $R_1 = R_2 = \sqrt{\frac{L}{C}}$ **(8+8)**



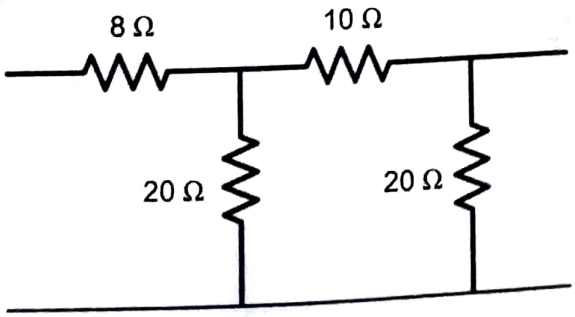
b) Assuming R_1 = 15 Ω, R_2 = 81 Ω, and X_C = 43.2 Ω compute the value of inductor for which the circuit shown in **Q3 (a)** shall resonate for a 100V, 60 Hz supply.

Q4 a) State and explain compensation theorem with suitable example. **(8+8)**

b) Define RMS value. Derive the expression for RMS value of current when a sinusoidal current source ($i = I_m \sin(\omega t)$) delivers power to a purely resistive load (R).

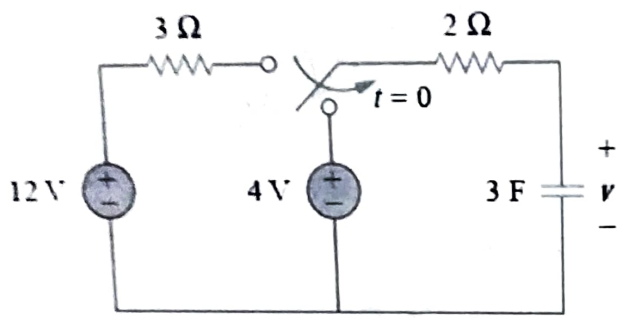
Q5 a) Write short notes on various interconnections of two port networks. **(8+8)**

b) Determine the transmission parameter of the following network.



Q6 a) Derive the expression for voltage across capacitor of a series RC circuit excited by a unit step voltage signal. Also sketch the voltage waveform across the capacitor and the resistor for $t > 0$. **(8+8)**

b) Determine the expression for the voltage across capacitor for $t < 0$ and $t > 0$ for the following network.



Registration No: | | | | | | | | | | |

Total Number of Pages : 02

Course: B.TECH
ROB4E002/ROB3E002/POB4E003

4th Semester Regular / Back Examination: 2022-23
SUBJECT: Organizational Behaviour
BRANCH(S): All
Time : 3 Hour
Max Marks :100
Q. Code : M521

Answer Question No.1 (Part-I) which is compulsory, any eight from Part-II and any two from Part-III.
The figures in the right hand margin indicate marks.

Part-I (2 x 10)

Q1 Answer the following questions :

a) What do you mean by organizational climate?
b) Write a short note on person-job fit.
c) What do you mean by personality?
d) How ethics needed at workplace?
e) What is selective perception?
f) What do you mean by attribution?
g) Write a short note on attitudinal change.
h) How behaviour is reflected in the performance?
i) How individual values are manifested in a group?
j) What are the principles of a learning organization?

Part-II (6 × 8)

Q2 Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)

a) What are the norms and outcomes of group behaviour?
b) Explain the big five personality types.
c) What are the perceptual errors? How to minimize these?
d) How does emotional intelligence improve workplace harmony?
e) Explain the relationship between attitude and behavior.
f) Explain the process of group development.
g) How does job attitude manifested in the performance of employees?
h) Discuss Kert Lewin's three step process of change.
i) What are the salient features of contemporary leadership styles?
j) Why achieving team effectiveness is so challenging?
k) Organizational behaviour is an interdisciplinary concept. Comment.
l) Discuss how to perform a personality test in an organization?

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 Discuss different types of functional teams in the organization. How they work together for a specific objective? **(16)**

Q4 Elucidate the significance and limitations of organizational behaviour. Discuss different models of OB. **(16)**

Q5 Organizational change is inevitable. Analyze. What are the prerequisites for successful management of change? **(16)**

Q6 Discuss different theories of motivation. How intrinsic and extrinsic motivation work in an organization? **(16)**

Registration No : | | | | | | | | | | |

Total Number of Pages : 02

B.Tech
REC4D002/REE4C003/REI4D002/REL4C003

4th Semester Regular / Back Examination: 2022-23
SUBJECT: Power Electronics
BRANCH(S): ECE,ETC, EEE, AEIE,EIE, ELECTRICAL
Time : 3 Hour
Max Marks : 100
Q.Code: M277

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.
The figures in the right hand margin indicate marks.

Part-I

Q1 **Answer the following questions:** (2 x 10)

a) State different types of diode and their applications.
b) What are the advantages of bipolar switching over unipolar switching in SPWM control strategy as applied to inverters?
c) What is the need of driver circuit in power switches?
d) In a dc chopper, the average load current is 30 Amps, chopping frequency is 250 Hz. Supply voltage is 110 volts. Calculate the ON and OFF periods of the chopper if the load resistance is 2ohms.
e) What is a secondary breakdown of BJT?
f) Define latching current and holding current of a thyristor.
g) What is the importance of blanking time in an inverter?
h) What is the purpose of over modulation?
i) What is an IGBT? Describe its basic structure.
j) What are the merits and demerits of transformer gate isolation?

Part-II

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** (6 × 8)

a) Draw and explain the switching behavior of power BJT.
b) Explain gate Protection of Thyrister.
c) The parameters of UJT are V_s = 30 v, η = 0.51, I_P = 10μA, V_V = 3.5V and I_v = 10mA .The frequency of oscillation is f = 60Hz, and the width of triggering pulse is tg = 50μs. Assume V_D = 0.5. Design the triggering circuit.
d) Draw and explain the structure and characteristics power MOSFET and explain how it is different from BJT.
e) Describe the principle of DC-DC buck converter operation. Derive an expression for its average output voltage.

f) A three phase half wave converter is supplying a load with a continuous constant current of 50A over a firing angle from 0° to 60°. What will be the power dissipated by the load at these limiting values of firing angle. The supply voltage is 415V (line).

g) How is SCR protected against dv/dt and di/dt? Explain with relevant circuit diagram.

h) A single phase fully controlled rectifier has 250 sin (314t) as input supply voltage and resistor R as load. What will be the average output voltage for firing angle 40° for this rectifier?

i) Draw the V-I and switching characteristics of thyristor.

j) A single PWM full bridge inverter feeds an RL load with R = 10Ω and L = 10 mH. If the source voltage is 120V, find out the total harmonic distortion in the output voltage and in the load current. The width of each pulse is 120° and the output frequency is 50Hz.

k) A step up chopper has input voltage of 220V and output voltage of 660V. If the conducting time of thyristor-chopper is 100μs, Compute the pulse width of output voltage. In case output voltage pulse width is halved for constant frequency operation, find the average value of new output voltage.

l) Describe the operation of single phase voltage source inverter.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 A single phase bridge inverter has a resistive load of R = 2.5Ω and dc input voltage is 50V. Determine (a) the rms output voltage at the fundamental frequency (b) The output power (c) the average and peak currents of each transistor (d) the peak reverse blocking voltage of each transistor (e) THD (f) The DF (g) The HF and DF of the LOH. **(16)**

Q4 Explain in detailed the unipolar and bipolar switching schemes. **(16)**

Q5 Write short notes on any two **(16)**

(i) Sinusoidal PWM

(ii) Comparison between power MOSFET and BJT

(iii) ZCS resonant Inverter

(iv) Three-phase sinusoidal modulation

Q6 Explain the operation of 3 phase controlled full converter with R-L load with output waveforms. **(1**

Registration No: | | | | | | | | | | |

Total Number of Pages: 02

Course: B.Tech
Sub_Code: RCS4D003

4th Semester Regular/Back Examination: 2022-23
SUBJECT: Principle of Programming Languages
BRANCH(S): CSE
Time: 3 Hour
Max Marks: 100
Q.Code : M107

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.
The figures in the right-hand margin indicate marks.

Part-I **(2 x 10)**

Q1 **Answer the following questions:**

a) Define syntax and semantics.
b) Define Lexeme and Token.
c) With respect to the object-oriented programming, briefly explain virtual functions.
d) What is an overriding method?
e) What is attribute grammar? Explain how attribute grammar is use for evaluation of the expressions.
f) What are advantages and disadvantages of dynamic local variables?
g) What is an alias? What are the problems associated with it?
h) What do you mean by a general-purpose language? Is C a general-purpose language?
i) What constitutes a programming environment?
j) What do you mean by binding? Give examples of some of the bindings and their binding times.

Part-II

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** **(6 × 8)**

a) Discuss in detail overloaded operators.
b) Discuss precedence and associativity rules of different programming languages.
c) What is the difference between a sentence and a sentential form in a CFG?
d) What are the main features of the programming paradigm with examples?
e) Explain in detail various design issues of character string types.
f) What is meant by type checking? Differentiate between static type checking and dynamic type checking and give their relative advantages.
g) A concise and understandable description of a programming language is essential to the language's success. Comment on this.
h) Write differences between procedural and non-procedural languages.
i) What is a variable and what are the attributes of a variable? Elaborate on address of a variable.
j) Explain different parameter passing methods with an example.
k) Explain associative arrays, their structure and operations.
l) What is exception handling? How exceptions are handled in C++ and JAVA?

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3	Explain features of Object-Oriented Programming Languages.	**(16)**
Q4	List out the desirable features of a good message passing system.	**(16)**
Q5	Explain the working principles of threads. With a neat diagram show the architecture of thread.	**(16)**
Q6	Explain co-routine. Why is Cactus Stack used in co-routine? Distinguish from subroutine.	**(16)**

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Total Number of Pages : 02

Course: BTech
Sub Code: REC4G001

4th Semester Regular / Back Examination: 2022-23
SUBJECT: Probability Theory And Stochastic Process
BRANCH(S): ECE/ETC
Time : 3 Hour
Max Marks : 100
Q.Code : M425

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.
The figures in the right hand margin indicate marks.

Part-I

Q1 **Answer the following questions:** **(2 x 10)**

a) Two cards are drawn at random from an ordinary deck of 52 playing cards. What is the probability of getting two aces if the first card is not replaced before the second card is drawn?

b) If two events A and B are mutually exclusive and $P(B) \neq 0$, then $P(A\backslash B) = ?$

c) An urn contains 40 red balls and 60 white balls. What is the probability of getting exactly k red balls in a sample of size 20 if sampling is done with replacement?

d) Ten independent binary pulses per second arrive at a receiver. The error (that is a zero received as a one or vice versa) probability is 0.001.What is the probability of at least one error per second?

e) A pair of fair dice is thrown in a gambling problem. Person A wins if the sum of numbers showing up is six or less and one of the dice shows four. Person B wins if the sum is five or more and one of the dice shows a four. What is the probability that both A and B win?

f) If X is a random normal variable with mean μ and standard deviation σ. Then find the value of $P(X < \mu)$.

g) If X and Y are independent random variables with variances Var(X) = 2, Var(Y) = 4, Then find the value of the Var(2X + Y).

h) A discrete random variable X has possible values $x_i = i^2$, I = 1,2,3 which occur with probabilities 0.40,0.35, and 0.25 respectively. Find the mean value of X.

i) When a random sequence X[n] is said to be Martingale?

j) When a random process X(t) is said to be ergodic in the mean?

Part-II

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** **(6 × 8)**

a) A switchboard receives on the average 3 calls per second. If the switchboard can handle at most 5 calls per second, what is the probability that in any one second the switchboard will saturate?

b) The density function of a continuous random variable X is $f_X(x) = x/2$ for $0 < x < 2$ and zero otherwise. Then find (i) The expectation of X
(ii) Variance of X.
(iii) $E(3X^2 - 2X)$

c) A random experiment consists of three independent tosses of a fair coin and X denotes the random variables which assigns to each element w of a sample space S the number of heads in w and Y denotes the number of consecutive heads in w. Find
   (i) The probability distribution functions of X.
   (ii) The probability distribution functions of Y.

d) The random variable X has a mean value 3 and variance 2. A new random variable Y is defined as $Y= 3X - 11$. Check whether (i) X and Y are orthogonal to each other. (ii) X and Y are uncorrelated with each other.

e) Find the moment generating function and the r^{th} moment for the distribution whose probability density function is $f(x) = k e^{-x}$, $0 \le x \le \infty$.

f) Let X, Y be two random variables with joint probability density function $f_{XY}(x,y) = A(x + y)$ for $0 < x \le 1$, $0 < y \le 1$, and zero elsewhere. Then
   (i) What is the value of A?
   (ii) What are the marginal pdf's of X and Y?

g) Assume that in the manufacturing of very low grade electrical 1000- ohm resistors the average resistance, as determined by measurements, is indeed 1000 ohms but there is a large variation about this value. If all resistors over 1500 ohms are to be discarded, what is the maximum fraction of resistors to meet such a fate?

h) Let X_i , I = 1,2.....n be a sequence of independent and identical distributed random variables with $E[X_i] = \mu_X$ and Var $[X_i] = \sigma_X^2$. Let $Y = X_1 + X_2 + \ldots\ldots\ldots + X_n$, use Central Limit Theorem, find P [a ≤ Y ≤ b] .

i) For a random process $X(t) = Y\sin\omega t$,Y is an uniform random variable in the interval –1 to 1. Check whether the process is wide-sense stationary or not.

j) X is a continuous random variable with probability density function $f_X(x) = e^{-x}$, $x \ge 0$ Let the random variable $Y = e^{-X}$. Find the probability density function of Y.

k) Let X be a random variable with parameter a > 0. Compute the Chernoff bound for P[X ≥ k] , where k > a . Also, find the Chernoff bound for P[X ≥ 5] when a = 2.

l) Given the autocorrelation function, for a stationary ergodic process with no periodic components is $R_{XX}(\tau) = 25 + [4/ (1 + 6\tau^2)]$. Find the mean value and variance of the process X(t) .

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 In a communication system a zero or one is transmitted with $P[X = 0] = P_0$, $P[X = 1] = 1 - P_0$, respectively. Due to noise in the channel, a zero can be received as a one with probability β and one can be received as a zero with probability β. A one is observed. What is the probability that a one was transmitted? **(16)**

Q4 Suppose we choose a resistor with resistance R from a batch of resistors with parameters $\mu = 1000$ ohms with $\sigma = 200$ ohms. **(16)**

(i) What is the probability that R will have a value between 900 and 1100 ohms?

(ii) What is the probability that R will have value more than 1080 ohms?

(iii) What is the probability that R will have value less than 800 ohms?

Q5 Two refills for a ballpoint pen are selected at a random from a box that contains 3 blue refills, 2 red refills, and 3 green refills. If X is the number of blue refills and Y is the number of red refills selected, find **(16)**

(i) The joint probability function $f_{XY}(x,y)$.

(ii) $P[(X,Y) \in A]$, where A is the region $\{(x,y) | x+y \leq 1\}$

(iii) Marginal distribution of X alone and of Y alone.

Q6 In order to simulate a zero-mean random sequence with average power $R_{XX}[0] = \sigma^2$ and nearest neighbor correlation $R_{XX}[1] = \rho\sigma^2$, the first order stochastic difference equation is $X[n] = aX[n-1] + b\,W[n]$, where W[n] is a zero mean white noise source with unit power with impulse response $h[n] = ba^n\,u[n]$. Then calculate the covariance of the output X[n] . **(16)**

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Total Number of Pages : 02

B.Tech
REC4D001 / REI4G002

4th Semester Regular/Back Examination: 2022-23
SUBJECT: Semiconductor Devices
BRANCH(S): AEIE,EIE ECE, ETC
Time : 3 Hour
Max Marks : 100
Q.Code : M108

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.
The figures in the right hand margin indicate marks.

Part-I

Q1 **Answer the following questions:** (2 x 10)

a) Why Fermi level is so important in solid-state physics?
b) What is the non-equlibrium properties of carriers?
c) Explain density of states function.
d) What do you mean by freeze out condition?
e) What is the depletion layer of a pn junction?
f) What is pinch-off voltage?
g) What is the relationship between collector current and base current in BJT?
h) What are the limitations of BJTs in high-frequency applications?
i) How is tunneling used in various electronic devices?
j) In which way n-type BJT is different from p-type BJT?

Part-II

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** (6 × 8)

a) Compare and contrast the energy band diagrams of conductors, semiconductors and insulators.
b) Define Fermi level. How is the Fermi distribution function used to calculate the electron and hole concentration in semiconductor?
c) What are the different types of carrier scattering mechanisms in semiconductors?
d) Write the expression for drift and diffusion current densities.
e) What is a PN Junction? Explain the biasing concept in PN Junction.
f) Draw and explain the working principle of FET.
g) Discuss the breakdown mechanism in BJT.
h) Write the Eber's-Moll equations for a BJT. Sketch the equivalent circuit which satisfies these equations.
i) Compare between Schottky barrier diode and PN-junction diode.
j) List frequency limitation factors in MOSFET. Obtain relation for cutoff frequency in ideal case.
k) What is meant by probability density function? How it is useful in semiconductors?
l) Write down the difference between Tunneling breakdown and avalanche breakdown.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3	**(a)**	Explain Energy band theory in detail.	**(8)**
	(b)	Why pure crystal is required as a substrate in semiconductor device? List various methods used in growth of semiconductor material. Explain any one in detail.	**(8)**
Q4	**(a)**	Explain the concept of thermally activated carriers in doped semiconductors at different temperatures.	**(8)**
	(b)	How are the diffusion coefficient and mobility related in the Einstein relationship?	**(8)**
Q5	**(a)**	Describe operation of reverse biased PN junction diode.	**(8)**
	(b)	State importance of equivalent circuit models used in BJT analysis. Explain hybrid-pi model for this device.	**(8)**
Q6	**(a)**	Describe the charge flow mechanism in a forward biased Schottky barrier diode.	**(8)**
	(b)	Derive an expression for flat band voltage and threshold voltage for a MOS device.	**(8)**

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Total Number of Pages : 02

Course: B.Tech
Sub_Code: RCI4C003

4th Semester Regular/ Back Examination: 2022-23
SUBJECT: Structural Analysis-I
BRANCH(S): C&EE, CIVIL
Time : 3 Hour
Max Marks : 100
Q.Code : M282

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.
The figures in the right hand margin indicate marks.

Part-I

Q1 **Answer the following questions:** **(2 x 10)**

a) State Maxwell's reciprocal deflection theorem.
b) Write the Equilibrium equations for three dimensional analysis.
c) State the principle of minimum potential energy.
d) State Castigliano's first theorem for determining deflection.
e) Differentiate between simple truss and complex truss.
f) Write advantages of arches over beams.
g) State different elements of a suspension bridge.
h) Define influence line diagram.
i) Show normal thrust and radial shear of a three hinged arch with neat sketch.
j) Define conjugate beam.

Part-II

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** **(6 × 8)**

a) Differentiate between statically determinate structure and redundant structure.
b) A continuous beam of two equal spans L is uniformly loaded over its entire length. Find the magnitude R of the middle reaction by using the Castiglione's theorem.
c) A symmetric three hinged parabolic arch of rise R and span L is supported its ends on pins at the same level. Determine the value of the horizontal thrust when a load W which is uniformly distributed horizontally covers the whole span. Show also that with this loading there is no bending moment at any point in the arch.
d) A three hinged parabolic arch of span 20m and rise 5m is loaded with a uniformly distributed load of 10 kN/m on the left half of the span of the arch. Calculate the horizontal thrust and vertical reactions. Calculate the bending moment at a section 4m from the right hand support.
e) Calculate the support moments of a continuous beam ABC having span lengths AB = BC = 5 m. All the three supports (A, B, C) are simply supported. The span AB carries a point load of 25 kN at a distance 2 m from support A. The span BC carries a uniformly distributed load of intensity 10 kN/m over the whole span BC.
f) A fixed beam of 10 m span carries a uniformly distributed load of 10 kN/m on the whole span. Find the end moments.

g) A cantilever beam of length 10 m carries a uniformly distributed load of 5 kN/m over its entire length. The cantilever is propped at a distance 6 m from its fixed end. Determine the reaction at the prop.

h) Draw neat diagrams of the influence lines for shearing force and bending moment at a section 3 m from one end of a simply supported beam, 12 m long. Use the diagrams to calculate the maximum shearing force and maximum bending moment at this section due to the uniformly distributed rolling load, 5 m long of 2 kN per meter intensity.

i) State and explain theorem of three moments with example.

j) A three hinged parabolic arch has a horizontal span of 10 m with a central rise of 5 m. A point load of 10 kN moves across from left to right. Calculate the maximum positive and negative moment at the section 8 m from the left hinge.

k) Write note on the Williot Mohr diagram.

l) Write note on Virtual work method with the help of an example.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 A cantilever beam ABC is fixed at A and propped at C. The portion AB of length 5 m from the fixed end and is loaded with uniformly distributed load of intensity 20 kN/m. The portion BC is of length 3 m is unloaded. Calculate the reaction at prop and draw shear force and bending moment diagram. **(16)**

Q4 Draw the shear force, bending moment diagram of a simply supported continuous beam ABC having span length lengths AB = 10 m and BC = 12 m. The span AB carries a point load of 50 kN at a distance of 4 m from support A and span BC carries a uniformly distributed load of intensity 25 kN/m throughout the span (BC). Use three moment theorem. All supports are simply supported. **(16)**

Q5 A three hinged parabolic arch has a span 60 m and a rise of 15 m. Draw the influence line diagram for horizontal thrust. Further, draw the influence line diagram for the bending moment, normal thrust and radial shear for a section at a distance 8m from the left support. **(16)**

Q6 The three hinged stiffening girder of a suspension bridge of 100 m span is subjected to two point loads of 10 kN each placed at 20 m and 40 m respectively from the left hand hinge. Determine the bending moment and shear force in the girder at section 30 m from each end. Also determine the maximum tension in the cable which has a central dip of 10 m. **(16)**

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Total Number of Pages : 02

Course: B.Tech
Sub_Code: RCI4C001

4th Semester Regular/ Back Examination: 2022-23
SUBJECT: Surveying
BRANCH(S): C&EE,CIVIL
Time : 3 Hour
Max Marks : 100
Q.Code : M226

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.
The figures in the right hand margin indicate marks.

Part-I

Q1 **Answer the following questions:** **(2 x 10)**

a) Explain the term normal tension in chain surveying.
b) What is the fundamental difference between surveying and levelling?
c) Define the terms intermediate sight and back sight in levelling.
d) What is the difference between a level surface and a horizontal surface?
e) Define the term sensitiveness of a level tube.
f) What is the horizontal equivalent in contouring?
g) Write the function of the tangent screws of a theodolite.
h) Define remote sensing.
i) What is radar, and how it works?
j) What is Electronic Distance Measurement (EDM), and how does it differ from traditional distance measurement methods in surveying?

Part-II

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** **(6 × 8)**

a) Two stations A and B are not intervisible due to rising ground between them. Explain with a sketch how the line AB can be ranged if both the stations are visible from intermediate points.
b) Explain how to apply the corrections in measured length in chain survey for the change temperature, sag, and incorrect alignment.
c) What are the obstacles which may be encountered during a chain survey?
d) What is the closing error? Describe a method to eliminate this error.
e) Explain how the reciprocal levelling eliminates the error due to curvature and refraction.
f) Explain the temporary adjustments of a dumpy level.
g) Explain the differences between the height of collimation method and the rise and fall method of reduction of levels.
h) Describe the indirect method of locating contour using cross-sections.
i) List the fundamental lines of a theodolite and explain the desired relationships between these lines.
j) Describe the reiteration method of measuring horizontal angles using a theodolite.

k) What are the different elements of a remote sensing system? Explain with a neat sketch.

l) Write a brief note on GIS.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 The following bearings were observed at the stations for a closed traverse. **(16)**

Line	Fore Bearing	Back Bearing
AB	80°10'	259°0'
BC	120°20'	301°50'
CD	170°50'	350°50'
DE	230°10'	49°30'
EA	310°20'	130°15'

Determine the corrected included angles and corrected bearings of the lines. Use the method of included angles.

Q4 The following consecutive staff readings (in m) were taken with a level: **(16)**

1.324, 2.605, 1.385, 0.638, 1.655, 1.085, 2.125, and 1.555.

The instrument was shifted after the 3rd and 6th readings. The 3rd reading was taken on a benchmark of elevation 100.5 m. Calculate reduced levels of all the staff locations using the Rise and Fall method. Apply all usual checks.

Q5 (a) Derive the expression for curvature correction in levelling. **(8x2)**

(b) Stations A and B are 1600 m apart. A level was set up between A and B such that the distance from A is 80 m. The readings taken on A and B were 0.785 m and 2.735 m, respectively. Find the true difference in elevation between A and B by applying the combined correction for curvature and refraction.

Q6 What are the characteristics of contour lines? Describe in detail with sketches. **(16)**

Registration No :

Total Number of Pages : 02

B. Tech
RCI4C002

4th Semester Regular/Back Examination: 2022-23
SUBJECT: Transportation Engineering
BRANCH(S): C&EE, Civil
Time : 3 Hour
Max Marks : 100
Q.Code : M172

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.

Design codes IRC:37 and IRC:58 are not allowed inside exam hall .The figures in the right hand margin indicate marks.

Part-I

(2 x 10)

Q1 **Answer the following questions:**

a) What is map study?
b) What are the objectives of providing extra widening?
c) Write any two functions of IRC.
d) Define camber. Why it is provided?
e) Differentiate between prime coat and seal coat.
f) As per IRC: 37-2012, What is SAMI layer?
g) Define angularity number.
h) What are the factors on which PCU values depend?
i) Differentiate between Dowel bar and Tie bars.
j) What is meant by WBM?

Part-II

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** (6 × 8)

a) What are the significant recommendations of Jayakar Committee report?
b) Explain how the final location and detailed survey of a highway are carried out.
c) Briefly explain the factors controlling the highway alignment?
d) Explain briefly the modified classification of road system in India as per third twenty year road development plan.
e) Calculate the stopping sight distance for a two way single lane road at a descending gradient of 1 in 30 for design speed of 65 kmph. Assume coefficient of longitudinal friction is 0.35.
f) Briefly explain the impact test of aggregate.
g) Differentiate between flexible pavement and rigid pavement.
h) Briefly explain the floating car method for speed and delay study.
i) What are the various factors to be considered in pavement design?
j) Explain how the filter material is designed for use in sub-surface drainage system.
k) What are the various causes of formation of wave and corrugations in flexible pavements? Suggest remedial measures.
l) Briefly explain the stresses develop in rigid pavement.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 Derive an expression for super elevation required for highway at horizontal curve. Calculate the super elevation required for the design speed of 90 kmph for a Nation highway. There is horizontal curve of radius 270m on a certain locality. Assume any other data. **(16)**

Q4 Briefly explain the step by step procedure for design of flexible pavement as per IRC:37-2012. **(16)**

Q5 Specify the materials required for construction of Bituminous Macadam roads. Write down the construction steps for Bituminous Macadam road. **(16)**

Q6 Explain the various types of failures in rigid pavement and their causes. **(16)**

Registration No : | | | | | | | | | | |

Total Number of Pages : 02

B.Tech
PCS4D001

4th Semester Back Examination: 2022-23
SUBJECT: Data Analytics
BRANCH(S): CSE
Time : 3 Hour
Max Marks : 100
Q.Code : M263

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.
The figures in the right hand margin indicate marks.

Part-I

Q1 **Answer the following questions:** **(2 x 10)**

a) What are the differences between supervised and unsupervised learning?
b) Explain the difference between classification and regression.
c) What is perceptron?
d) What do you mean by training and testing of the model?
e) How can we find K in KNN algorithm?
f) Describe the concept of back propagation.
g) What is dimensionality reduction?
h) How can we use SVM for regression?
i) What is the use of cross validation in machine learning?
j) Describe the role of optimization in neural network.

Part-II

Q2 **Only Focused-Short Answer Type Questions-(Answer Any Eight out of Twelve)** **(6 × 8)**

a) Explain SVM (Support Vector Machine) in detail.
b) What is lasso regression?
c) What are the issues while training the neural network?
d) Explain various associations rules.
e) Explain PCA with an example.
f) Describe ANOVA (Analysis of Variance) in detail.
g) What is LDA (Linear discriminant analysis)?
h) What do you mean by parametric and non-parametric test?
i) What is the difference between linear and logistic regression?
j) What is the use of gradients in neural network?
k) What do you mean by fitting model in machine learning?
l) Explain the concepts of random forests with example.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3	Explain various types of Neural Networks in detail.	**(16)**
Q4	How can we access performance of classification algorithm? Explain.	**(16)**
Q5	Explain the difference between KNN and K Means clustering.	**(16)**
Q6	What is Big data? Explain various challenges in Big Data Analytics.	**(16)**