Subject Code: R16ME3102

III B.Tech I Semester Supple Examinations, April-2023
HEAT POWER ENGINEERING
(ME)

Time: 3 hours   **Max Marks: 60**

Question Paper Consists of **Part-A** and **Part-B**.
Answering the question in **Part-A** is Compulsory & Four Questions should be answered from **Part-B**
All questions carry equal marks of 12.

PART-A

1. (a) What is meant by reheating in Rankine cycle and what are its advantages?
   (b) Define boiler accessories and mention any four accessories.
   (c) Discuss the effect of friction in steam nozzles.
   (d) Explain the necessity of compounding of a steam turbine.
   (e) Discuss the effect of presence of air in the condenser.
   (f) Draw the T-s Diagram of a simple gas turbine cycle and mention the processes.

               [2+2+2+2+2+2]

PART-B

            4 X 12 = 48

2. (a) Explain the different processes of a regenerative Rankine cycle and draw T-s diagram.
   (b) A simple Rankine cycle works between the pressure limits of 30 bar and 0.04 bar, the initial condition of steam is dry saturated. Determine, the i) pump work   ii) turbine work and iii) the Rankine efficiency.   **[4+8]**

3. (a) Give the classification of boilers
   (b) Explain the working of Cochran boiler with the help of a neat sketch.   **[4+8]**

4. (a) Derive the expression for exit velocity of steam through a nozzle assuming the expansion as isentropic.
   (b) The steam enters a nozzle with an inlet pressure and temperature of 10 bar and 200^0C respectively. The throat diameter is 12 mm. If the exit pressure is 0.5 bar, calculate the mass flow rate of steam.   **[4+8]**

5. (a) Distinguish between impulse and reaction steam turbines.
   (b) Discuss the various methods of compounding of steam turbines.   **[4+8]**

6. (a) Define condenser efficiency and vacuum efficiency.
   (b) Explain with the help of neat sketches the working of counter flow jet condenser and ejector condenser.   **[4+8]**

7. (a) Explain with a neat sketch the working of a rocket.   **[4+8]**
   (b) A gas-turbine power plant operates on the simple Brayton cycle with a pressure ratio of 6. The maximum and minimum temperatures of the cycle are 1000 K and 288 K respectively. Assuming an ideal cycle, calculate the efficiency and specific work output of the plant.

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Narasaraopeta Engineering College (Autonomous)
Kotappakonda Road, Yellamanda (P.O), Narasaraopet- 522601, Guntur District, AP.

Subject Code: R16ME3104

III B.Tech I Semester Supple Examinations, April-2023
PRINCIPLES OF MACHINE DESIGN
(ME)

Time: 3 hours   Max Marks: 60

Question Paper Consists of **Part-A** and **Part-B.**
Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B
All questions carry equal marks of 12.

PART-A

1. (a) What is fit and Write the various types of it.
   (b) What is fluctuating stress? Draw a stress-time curve for fluctuating stress.
   (c) What are the advantages of welded joints compared with riveted joints?
   (d) When do you consider column factor in design of shafts.
   (e) Write the applications of rigid couplings?
   (f) What is surge in spring?

                                                       [2+2+2+2+2+2]

PART-B

                                                       4 X 12 = 48

2. (a) What is meant by hole basis system and shaft basis system? Which one is preferred and why?
                                                       [4]

   (b) A machine is statically loaded and has an yield point strength of 460 N/mm2 if the principal stresses are 200 N/mm2 and 150 N/mm2 , both tensile, find the factor of safety for the following cases i) Maximum normal stress theory ii) Maximum shear stress theory and iii) Distortion energy theory.   [8]

3. (a) Illustrate how the stress concentration in a component can be reduced.   [4]

   (b) Determine the diameter of a circular rod made of ductile material with a fatigue strength (complete stress reversal), σ_e = 255 MPa and a tensile yield strength of 355 MPa. The member is subjected to a varying axial load from Wmin = $- 300 \times 10^3$ N to Wmax = 700×10^3 N and has a stress concentration factor = 1.7. Use factor of safety as 2.0.   [8]

4. (a) What are the assumptions made in the design of welded joint?   [4]

   (b) Design a double riveted double cover butt joint for the longitudinal seam of a boiler shell 1.0 m in diameter subjected to a steam pressure of 2.7Mpa. Assume joint efficiency as 80 %, allowable tensile stress in the plate 90 MPa; compressive stress 130 MPa; and shear stress in the rivet 60 MPa.   [8]

5. (a) It is required to design a knuckle joint to connect circular shafts subjected to an axial force of 50 kN. The rods are coaxial and a small amount of angular movement between their axes is permissible. Design the joint and specify the dimensions of its components. The allowable tensile, compressive and shear stress in the rod and pin material is limited to 80MPa, 100MPa and 40MPa respectively.   [12]

6. (a) Explain types of couplings. [4]

(b) A mild steel shaft has to transmit 70 kW at 240 rpm. The allowable shear stress in the shaft material is limited to 45MPa. Design a cast iron flange coupling. The shear stress in the coupling bolt is limited to 30MPa. [8]

7. (a) Explain co-axial springs. [4]

(b) A helical compression spring made of oil tempered carbon steel, is subjected to a load which varies from 400 N to 1000 N. The spring index is 6 and the design factor of safety is 1.25. If the yield stress in shear is 770 MPa and endurance stress in shear is 350 MPa, The compression of the spring at the maximum load is 30 mm. The modulus of rigidity for the spring material may be taken as 80 kN/mm2 . Determine : 1. Size of the spring wire, 2. Diameters of the spring, 3. Number of turns of the spring, and 4. Free length of the spring. [8]

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Narasaraopeta Engineering College (Autonomous)
Kotappakonda Road, Yellamanda (P.O), Narasaraopet- 522601, Guntur District, AP.

Subject Code: R16ME3105

III B.Tech I Semester Supple Examinations, April-2023
OPERATIONS RESEARCH
(ME)

Time: 3 hours   **Max Marks: 60**

Question Paper Consists of **Part-A** and **Part-B**.
Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B
All questions carry equal marks of 12.

PART-A

1. (a) Applications of Operations Research
   (b) Degeneracy in transportation problem
   (c) Differentiate Activity and event
   (d) Kendall's notation
   (e) What is Pure Strategy?
   (f) Define Simulation

[2+2+2+2+2+2]

PART-B

4 X 12 = 48

2. Use penalty (or Big M) method to solve the following LPP

Minimize $Z=4x_1+3x_2$

Subject to $2x_1+x_2 \geq 10$

$-3x_1+2x_2 \leq 6$

$x_1+x_2 \geq 6$

and $x_1, x_2 \geq 0$

3. Solve the following transportation problem.

FACTORY	WARE HOUSE				CAPACITY (SUPPLY)
	A	B	C	D	
1	11	20	7	8	50
2	21	16	20	12	40
3	8	12	18	9	70
REQUIREMENT (DEMAND)	30	25	35	40	

4. Tasks A, B, C,.....,H,I constitute a project.

The precedence relationships are A < D; A < E; B < F; D < F; C < G; C < H; F < I; G <I.

Draw a network to represent the project and find the minimum time of completion of the project when time, in days, of each task is as follows:

Task:	A	B	C	D	E	F	G	H	I
Time:	8	10	8	10	16	17	18	14	9

Also, identify the critical path

5. Customers arrive at the first class ticket counter of a theatre at the rate of 12 per hour. There is one clerk serving the customers at the rate of 30 per hour.

(i) What is the probability that there is no customer in the counter (i.e., that the system is idle)?

(ii) What is the probability that there are more than 2 customers in the counter?

(iii) What is the probability that there is no customer waiting to be served?

(iv) What is the probability that a customer is being served and nobody is waiting?

6.   Solve the following game.

	B_1	B_2	B_3	B_4
A_1	5	-10	9	0
A_2	6	7	8	1
A_3	8	7	15	1
A_4	3	4	-1	4

7. A dentist schedules all his patients for a 30 minute appointments. Some of the patients take more or less than 30 minutes depending on the type of dental work to be done. The following summary shows the various categories of work, their probability and time actually needed to complete the work.

Category of service	Time required (minutes)	Probability of category
Filling	45	0.40
Crown	60	0.15
Cleaning	15	0.15
Extraction	45	0.10
Check up	15	0.20

Simulate the dentist's clinic for four hours and determine the average waiting time for the patients as well as the idleness of the doctor. Assume that all the patients show up at the clinic at exactly their scheduled arrival time starting at 8.00 AM. Use the following random numbers for handling the above problem. 40, 82, 11, 34, 25, 66, 17, 79.

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Subject Code: R16EC3101
III B.Tech I Semester Supple Examinations, April-2023
LINEAR AND DIGITAL IC APPLICATIONS
(ECE)
Time: 3 hours   Max Marks: 60
Question Paper Consists of **Part-A** and **Part-B.**
Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B
All questions carry equal marks of 12.

PART-A

1. (a) Illustrate the output of Differentiator and Integrator if the input signal is sinusoidal and explain it?

(b) In the monostable multivibrator R = 100 Kilo Ohm and the time delay T =100ms. Calculate the Value of C

(c) Sketch schematic diagram of PLL.

(d) Analyze how to interface the TTL logic gates to the CMOS logic?

(e) Describe the difference between Ring counter and Johnson   counter.

(f) Write the difference between static and dynamic RAMs.

$$[2+2+2+2+2+2]$$

PART-B

4 X 12 = 48

2. (a) With necessary circuit diagram explain the DC characteristics of an OPAMP.   (6M)

(b) Model an Integrator using IC741 and explain its operation.   (6M)

3. (a) Develop Astable Multi Vibrator using IC 555 with necessary equations. (4M)

(b) The LSB of a 10-bit DAC is 20 mV. (3M)

      i.   What is percentage resolution?

      ii.   What is full-scale range?

What is the output voltage for an input, 1011001101?

(c)Draw and describe the operation of successive approximation type A/D converter. (5M)

4. (a) Design a first order high pass filter at a cutoff frequency of 400 Hz and a pass band gain of 1. (6M)

(b) Draw and explain the block diagram of PLL IC 565 and derive its transfer function. (6M)

5. (a) Compare different logic families. (4M)

(b)Explain the CMOS circuit steady state and dynamic electrical behaviour. (8M)

6. (a) Design a priority encoder circuit using and which 74XX series is used for it. (6M)

(b) Using a T flip-flop, design a circuit that counts from 0 to 7 and compare to D and JK flip flop. (6M)

7. (a) With neat schematic describe ROM architecture. (6M)

(b) Design a 1024x8 RAM using 256x8 RAM. (6M)

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Narasaraopeta Engineering College (Autonomous)

Kotappakonda Road, Yellamanda (P.O), Narasaraopet- 522601, Guntur District, AP.

Subject Code: R16EC3102

III B.Tech I Semester Supple Examinations, April-2023
DIGITAL COMMUNICATIONS
(ECE)

Time: 3 hours   **Max Marks: 60**

Question Paper Consists of **Part-A** and **Part-B**.
Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B
All questions carry equal marks of 12.

PART-A

1. (a). State the sampling theorem.

   (b). Draw the DPSK modulator schema.

   (c). What is granular noise and how it can be removed?

   (d). Determine the differential entropy of a random variable X uniformly distributed on [0, a].

   (e). What is the use of Huffman coding.

   (f). Which of these is best convolution of signal and why: Graphical approach-state, tree and trellis diagram.

   [2+2+2+2+2+2]

PART-B

4 X 12 = 48

2. (a). i). Compare source encoder and decode. ii) digital modulator and demodulator.   [6M]

   (b). Draw and explain the PCM transmitter with its neat block diagram.   [6M]

3. (a). Compare the average power requirements of binary noncoherent ASK, coherent PSK, DPSK, and noncoherent FSK signalling schemes operating at a data rate of 800 bits/sec over a bandpass channel having a bandwidth of 2400 Hz, $\eta/2 = 10^{-8}$ watt/Hz, and $p_e = 10^{-4}$.   [5M]

   (b). Explain the Binary FSK schemes briefly.   [7M]

4. (a). Give a detailed derivation for probability of error in integrate and dump filter receiver. [6M]

   (b). Compare the error probability of ASK, BPSK, BFSK.   [6M]

5. (a). Let random variable X be the output of a discrete memoryless source that is uniformly distributed with size N. Find the entropy of it.   [5M]

   (b). Show that {01 , 100, 101, 1 1 10, 1 1 1 1 , 001 1 , 0001} cannot be a Huffman code for any source probability distribution.   [7M]

6. (a). The generator matrix for a (6,3) block code is given below. Find all code vectors of this code. [7M]

$$G = \begin{bmatrix} 1 & 0 & 0 & | & 0 & 1 & 1 \\ 0 & 1 & 0 & | & 1 & 0 & 1 \\ 0 & 0 & 1 & | & 1 & 1 & 0 \end{bmatrix}$$

   (b). The generator polynomial of a (7,4) cyclic code is $g(x) = 1 + x + x^3$. Find the 16 codewords of this code in the following ways by forming the code polynomials using $V(x) = D(x)g(x)$, where $D(x)$ is the message polynomial.   [5M]

7. (a). Explain the Viterbi decoding algorithm with a suitable example.   [6M]

   (b). Describe encoding of convolution codes details.   [6M]

Subject Code: R16EC3104

III B.Tech I Semester Supple Examinations, April-2023
COMPUTER ORGANIZATION AND MICROPROCESSORS
(ECE)

Time: 3 hours

Max Marks: 60

Question Paper Consists of **Part-A** and **Part-B.**
Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B
All questions carry equal marks of 12.

PART-A

1. (a) Recall the function of Arithmetic and Logic Unit [2M]
   (b) What is instruction pipelining. [2M]
   (c) What is optical memory. [2M]
   (d) List any eight arithmetic instructions of 8086 Microprocessor. [2M]
   (e) What is the difference between non-maskable interrupt and maskable interrupts. [2M]
   (f) Recall the working principle of stepper motor. [2M]

   [2+2+2+2+2+2]

PART-B

4 X 12 = 48

2. (a) Explain in detail about bus interaction in computer system. [6M]

   (b) Discuss about sign-magnitude representation and 2's complement representation. [6M]

3. (a) Discuss about Instruction formats of instruction length and variable-length instructions [6M]
   (b) Differentiate RISC and CISC Processors. [6M]

4. (a) Explain about functional requirements, control signals in control of the processor. [6M]
   (b) Illustrate the characteristics of memory systems. [6M]

5. (a) Draw the architecture of 8086 microprocessor and explain in detail. [8M]
   (b) Discuss the string manipulation instructions of 8086 with examples. [4M]

6. (a) Write an assembly language program to find the factorial of a given number. [6M]
   (b) Explain in detail about stack structure of 8086 microprocessor. [6M]

7. (a) Draw the block diagram of PIO 8255 and explain in detail. [6M]

   (b) Explain the modes of operation of 8251 USART. [6M]

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Subject Code: R16CS3101

III B.Tech I Semester Supple Examinations, April-2023
DESIGN AND ANALYSIS OF ALGORITHMS
(CSE)

Time: 3 hours **Max Marks: 60**

Question Paper Consists of **Part-A** and **Part-B.**
Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B
All questions carry equal marks of 12.

PART-A

1. (a) Compare the time complexity of Strassen's matrix multiplication and general matrix multiplication.

   (b) Write the control abstraction for divide and conquer method.

   (c) What are the steps involved in greedy approach?

   (d) What are the features of dynamic programming?

   (e) Define Hamiltonian cycle.

   (f) What are the applications of branch and bound?

   [2+2+2+2+2+2]

PART-B

4 X 12 = 48

2. Describe various asymptotic notations used in the analysis of algorithms.

3. (a) Show how following matrix would be multiplied using Strassen's algorithm

$$A = \begin{bmatrix} 7 & 8 \\ 3 & 6 \end{bmatrix} \quad \text{and} \quad B = \begin{bmatrix} 2 & 3 \\ 8 & 6 \end{bmatrix}$$

   (b) Explain Divide and Conquer approach. Design an algorithm for Quick sort and analyse its time complexity in the worst case.

4. (a) Consider the following instance of Knapsack problem: n = 3, m= 17, (p1, p2, p3) = (22,21,12), (w1, w2, w3) = (15,12,7). Find feasible solutions?

   (b) Write Dijkstra's Single Source Shortest path algorithm. Analyze the complexity.

5. Find optimal binary search tree for the given problem instance: n=4, (a1, a2, a3, a4) = (do, if, int, while), (p1, p2, p3, p4) = (3, 3, 1, 1) and (q0, q1, q2, q3, q4)= (2, 3, 1, 1, 1)

6. Using Backtracking enumerate how can you solve the following problems.
   (i) 8-queens problem (ii) Hamiltonian circuit problem

7. (a) Find optimal solution for the given 0/1 knapsack problem using branch and bound method. n=4, (p1, p2, p3, p4) = (10,10,12,18) and (w1, w2, w3, w4) = (2. 4. 6. 9) and m=15.

   (b) Apply LCBB approach to solve the 0/1 knapsack problem .explain with help of an example?

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Subject Code: R16CS3103

III B.Tech I Semester Supple Examinations, April-2023
COMPILER DESIGN
(CSE)

Time: 3 hours

Max Marks: 60

Question Paper Consists of **Part-A** and **Part-B**.

Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B

All questions carry equal marks of 12.

PART-A

1. (a) What is the role of compiler in bootstrapping operation?

   (b) Construct parse tree and syntax tree for 4-6/3*5+7.

   (c) Compare SLR, CLR and LACR.

   (d) What is common sub-expression elimination? Explain.

   (e) How to find evaluation order for SDD's?

   (f) Define linker and loader and explain briefly.

   [2+2+2+2+2+2]

PART-B

4 X 12 = 48

2. (a) Explain various phases in the construction of compiler with a neat sketch.

   (b) Explain with one example how LEX program perform lexical analysis for the following patterns in 'C': identifier, comments, numerical constants, arithmetic operators.

3. (a) Compute FIRST and FOLLOW for the grammar: S -> S S + \ S S * \ a

   (b) Present the formal definition and notational conventions of CFG.

4. (a) Difne and difference between LR and LL Parsers

   (b) Construct LALR(1) Parse table from the grammar S-> Aa|bAc|dc|bda.

5. (a) Explain the role of type checking in error detection and recovery.

   (b) Write various semantic routines used to construct abstract syntax tree with an example.

6. (a) What is the use of symbol table in compiler design and explain different types.

   (b) What is code generation with example?

7. (a) Explain loop optimization technique with example.

   (b) Explain constant propagation with example.

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Narasaraopeta Engineering College (Autonomous)
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Subject Code: R16CS3108

III B.Tech I Semester Supple Examinations, April-2023
NETWORK MANAGEMENT SYSTEMS
(CSE)

Time: 3 hours   **Max Marks: 60**

Question Paper Consists of **Part-A** and **Part-B**.
Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B
All questions carry equal marks of 12.

PART-A

S No		Question	Marks
1	a	List different Network Operations	2
	b	Define the get-request of SNMP Protocol message.	2
	c	Write briefly about Get and Set PDUs.	2
	d	List some of SNMPv2 Keywords.	2
	e	Describe two methods of measuring collisions on Ethernet LAN?	2
	f	Write Bit Error Rate Tester.	2

[2+2+2+2+2+2]

PART-B

4 X 12 = 48

S. No		Question	Marks
2	a	Analyse the basic communication Architecture with OSI 7 Layers.	12
3	a	Analyse SNMP Organization Model (Two-tier & Three-Tier).	12
4	a	Explain SNMPv1 Network Management Architecture with all Messages and Traps.	12
5	a	Analyse SNMPv2 Management Information Base.	12
6	a	Compare RMON1MIB with RMON2 MIB and how they are arranged into groups.	12
7	a	Write about Enterprise management Solutions.	12

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