CODE: 19MTE1004   **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
I M.Tech. I Semester Regular Examinations, Jan/February, 2020
TURBO MACHINERY
(Thermal Engineering)

Time: 3 Hours   **Max Marks:60**

Answer any FIVE questions
All questions carry EQUAL marks

1.	a)	Differentiate turbo machine and positive displacement machines.	4
	b)	Define Clausius and Kelvin Plank statement of second law of thermodynamics? Explain the significance of second law of thermodynamics applied to a turbo machine by deducing an expression.	8
2.	a)	Define reheat factor and preheat factor?	4
	b)	Derive alternate form of Euler's turbine equation and explain the significance of each energy component.	8
3.	a)	Explain why slip very important for pump or compressor compared to a turbine?	4
	b)	A turbine model of 1:10 develops 2.0 kW under a head of 6 m at 500 rpm. Find the power developed by the prototype under a head of 40 m. Also find the speed of the prototype and its specific speed. Assume the turbine efficiencies to remain same.	8
4.	a)	Give three formulas to calculate the slip factor. Derive Stodola's relation for the slip factor.	8
	b)	How do stalling and surging take place in centrifugal compressor stages?	4
5.	a)	Draw the velocity triangles at the entry and exit of the impeller of an axial fan stage.	6
	b)	Discuss the factors governing the volumetric efficiency of fans and blowers.	6
6.		A centrifugal compressor running at 1500rpm takes in air at 15degrees centrigrade and compress through a pressure ratio of 4 with an iscentropic efficiency of 80% .The blades are radially inclined and the slip factor is 0.85 guide vanes at inlet give the air an angle of prewhirl of 20 degrees to the axial direction .The mean diameter of impeller eye is 200mm and R = 0.287 kJ/kgK & γ =1.4 .	12
7.		A Single row impulse turbine receives 3 kg/s steam with a velocity of 425 m/s. The ratio of blade speed to jet speed is 0.4 and the stage output is 170 KW. Determine the blade efficiency and the blade velocity coefficient if the nozzle angle is 16 degrees and the blade exit angle is 17degrees.	12
8.		A fifty percent reaction stage of a gas turbine has the following data: Entry pressure and temperature = 10 bar, 1500 K Speed = 12,000 rpm Mass flow rate of the gas = 70 kg/s Stage pressure ratio and efficiency = 2.0 and 87% Fixed and moving blade exit air angles = 60° Assume optimum blade to gas speed ratio. Take γ = 1.4 and c_p = 1.005 kJ/kgK for the gas. Determine (a) flow coefficient (b) mean diameter of the stage and (c) power developed.	12

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CODE: 19MPE1003   **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
I M.Tech. I Semester Regular Examinations, Jan/February, 2020

ANALYSIS OF POWER ELECTRONICS CONVERTERS
(Power Electronics and Drives)

Time: 3 Hours   **Max Marks: 60**

Answer any FIVE questions
All questions carry EQUAL marks

1.	a)	Describe the operation of single phase AC voltage controller with the help of voltage and current waveform for RL Load.	6M
	b)	The three-phase full wave ac voltage controller supplies a Y-connected resistive load of R = 15Ω and the line-to-line input voltage is Vs = 208 V at 50 Hz. The delay angle is α = π/6. Determine i) The input PF ii) The expression for the instantaneous output voltage of phase A. Draw the waveforms.	6M
2.	a)	A single phase semi converter is connected to RLE load. The source voltage is 230 V, 50 Hz. The average load current of 10 A is continuous over the working range. For R = 0.5 Ω and L = 2 mH, compute firing angle delay for E = 120 V.	6M
	b)	Describe the operation of sinusoidal PWM control based single phase full converter?	6M
3.	a)	Explain the operation of a Three-Phase 12 Pulse converter along the necessary circuit diagrams and wave forms?	6M
	b)	Evaluate the input power factor and harmonic factors for a Three-Phase half controlled converters?	6M
4.		Deduce the steady state analysis of single stage boost power factor corrected single phase rectifier?	12M
5.		Explain single phase bridge inverter control by a) 60 Degree PWM b) Third Harmonic injection PWM?	12M
6.	a)	Briefly explain the operation of modified diode-clamped multilevel inverter?	6M
	b)	b) Compare various merits and demerits of multilevel inverters?	6M
7.	a)	Explain the operation of 3-Φ AC voltage controller with delta connected resistive load with the help of circuit diagram and waveforms?	6M
	b)	What is Synchronous tap changer? Obtain expressions of output voltage and current with Resistive load?	6M
8.	a)	Explain the operation of Dual converter with and without circulating current?	6M
	b)	Explain the advanced modulation techniques?	6M

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
I M.Tech. I Semester Regular Examinations, Jan/February, 2020

DSP PROCESSORS AND ARCHITECTURES
(VLSI System Design)

Time: 3 Hours   Max Marks:60

Answer any FIVE questions
All questions carry EQUAL marks

1. a) The filter coefficients of FIR filter are represented by $b_0, b_1, b_2 ...., b_{N-1}$. Then what is the relation between input sequence x(n) and output sequence y(n). (2M)

   b) The sequence is $x(n) = [0,2,4,6,8]$ is interpolated using the interpolation filter $b_k = [0.5,1,0.5]$ and the interpolation factor is 2. Determine the interpolated sequence y(m). (10M)

2. a) Determine the range of numbers for 32 bit floating point format given as (6M)

   $$\underline{s \quad eee...e \quad fff...f}$$

   1   8   23   (*bits*)

   s   exp   *frac*

   Where the value of the number is computed as $1.frac \times 2^{\exp}$ if $s = 0$, and $-1.frac \times 2^{\exp}$ if $s = 1$.

   b) The following 12-bit binary fractions are to be stored in an 8-bit memory. Show how they can be represented in block floating-point format so as to improve accuracy. (6M)
   000001110011
   000011110000
   000000111111
   000010101010

3. a) What are the different cases that are encountered during the updating process of the pointer in circular addressing mode. (6M)
   1 of 2

   b) A DSO has a circular buffer with the start and end addresses as 0200h and 020Fh respectively. What would be the new values of the address pointer of the buffer if, in the course of address computation , it gets updated to (6M)
   0212h
   01FCh

4. Explain the Architecture of TMS320C54XX DSP Processor (12M)

5.   Assuming the current contents of AR3 to be 200h, what will be its contents   (12M)
after each of the following TMS320C54XX addressing modes is used?
Assume that the contents of AR0 are 20h.
*AR3+0
*AR3-0
*AR3+
*AR3-
*AR3
*+AR3(40h)

6. a) Why data must be properly scaled down before computing the butterfly in   (2M)
      DIT FFT implementation.
  b) Draw a general DIT FFT butterfly computation structure.   (4M)
  c) Explain 8-point DIT FFT implementation structure based on the butterfly.   (6M)

7. a) How does DMA help in increasing the processing speed of a DSP processor   (6M)
  b) Explain Register sub-addressing technique used for configuring the DMA   (6M)
      register.

8.   Explain On-chip peripherals that facilitate interfacing with external devices.   (12M)

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SET-1

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
I M.Tech. I Semester Regular Examinations, Jan/February, 2020

DATA SCIENCE
(Computer Science and Engineering)

Time: 3 Hours   Max Marks:60

Answer any FIVE questions
All questions carry EQUAL marks

1.	a)	With an Explain the central tendencies and distribution	6M
	b)	Explain the Applications of Data Science	6M
2.	a)	Explain the K-Means clustering Algorithm in detail?	6M
	b)	Examine the usage of multiple data sources?	6M
3.	a)	Write the difference between Bayesian model and hidden Markov model	6M
	b)	Calculate the covariance of following data	6M

X	2.1	2.5	3.6	4.0
y	8	10	12	14

4.	a)	List out and explain all data science toolkits.	6M
	b)	How to explore and fixing the data into the Phython environments? Explain with examples.	6M
5.	a)	Explain recent trends in various data collection techniques.	6M
	b)	With an example analyze the technologies used for Visualization.	6M
6.	a)	What is Data Analysis? List out various Techniques of data analysis.	6M
	b)	What is data visualization? List out various techniques in data visualization?	6M
7.	a)	Apply the commands to show the Linear SVM and confusion Matrix for iris Dataset?	6M
	b)	Draw the diagram and Explain the architecture of Data Science	6M
8.	a)	Explain CLT in Machine Learning.	6M
	b)	Elaborate and explain how clustering of large data bases take place?	6M

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
I M.Tech. I Semester Regular Examinations, Jan/February, 2020

THEORY OF THIN PLATES AND SHELLS
(Structural Engineering)

Time: 3 Hours   Max Marks:60

Answer any FIVE questions
All questions carry EQUAL marks

1.	a)	What is a plate and explain the types of plates?	6M
	b)	Determine the maximum deflection in 'mm', for a square plate of side 3 m, thickness 12 cm under uniform load of 3 KN/m^2 .	6M
2.	a)	Determine the central deflection of circular (radius 'R') plate subjected to pure bending couple "M".	6M
	b)	Determine the central deflection of square plate subjected to pure bending couple "M".	6M
3.	a)	List the Indian standard recommendations for the design of cylindrical shell and fix up the overall dimensions for a shell.	6M
	b)	What is gauss curvature? How do you classify shells based on gauss curvature values?	6M
4.	a)	Find the membrane stresses in a circular cylindrical shell subject to snow load.	6M
	b)	What are the advantages of beam theory for analysis of a shell?	6M
5.	a)	Calculate total shear force strain energy in pure bending of plates.	6M
	b)	State the assumptions of classical thin plate bending theory.	6M
6.	a)	Describe the stepwise procedure in the levy's method for thin plate bending analysis.	6M
	b)	Discuss Levy's solution of simply supported rectangular plate subjected to point load q. Hence find the expressions for transverse deflection $w(x, y)$.	6M
7.	a)	Develop from first principles, governing differential equation for circular plate under axisymmetric loading.	6M
	b)	A circular plate of radius a is clamped at edges. The plate carries a load of intensity q uniformly distributed over the entire surface of the plate. The thickness of the plate is h Analyze the plate from the basic principles and obtain the expressions for the maximum deflection.	6M
8.	a)	Derive the governing differential equation of thin rectangular plate subjected to transverse load $q(x, y)$ per unit area, according to Kirchhoff`s theory. Hence explain how Kirchhoff`s reduces three boundary conditions to two per edge. Discuss boundary condition of cantilever plate.	6M
	b)	Derive the deflection of Anticlastic surface of the plate.	6M

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ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
I M.Tech. I Semester Supplementary Examinations, Jan / February 2020

THEORY OF PLATES AND SHELLS

(Structural Engineering)

Time: 3 Hours   Max Marks:60

Answer any FIVE questions
All questions carry EQUAL marks

1. Derive the expression for slope and deflection for circular plate with concentric   12 M
    load at its center.

2. Deduce the expressions for the bending moment and support reactions of a square   12 M
    simply supported plate subjected to uniformly distributed load of intensity q/unit
    area using Navier's solution.

3. Explain the membrane theory for axis-symmetric shells.   12 M

4. List out the differences between the Navier's and Levy's solution in the analysis of   12 M
    thin plates.

5. Explain the need of bending theory of cylindrical shells and steps should be   12 M
    followed in stress analysis of cylindrical shells.

6. Differentiate between long shells and short shells and also classify shells as per   12 M
    ASCE.

7. Explain the analysis and design of shells using ASCE coefficients.   12 M

8. Derive the expressions for the membrane stress resultants for elliptical paraboloid   12 M
    due to live load.

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