

MALLA REDDY ENGINEERING COLLEGE (AUTONOMOUS)(Affiliated to JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD)
Gundlapochampally (H), Maisammaguda (V), Medchal (M), Medchal-Malkajgiri (Dist), Hyderabad**M.TECH II SEMESTER SUPPLEMENTARY END EXAMINATIONS, MAY-2019**Subject: Computational Fluid DynamicsBranch: Thermal Engineering

Time: 3 hours

Max. Marks: 60

PART – A

Answer ALL questions of the following

5x4Marks=20 Marks

1. What do you understand by stability while solving Elliptical equations?
2. Explain Burger's equation and what is its application in fluid dynamics?
3. What is staggered grid method? Why is it required for solving flow field? Explain?
4. Why forward and backward difference expressions are not more accurate than central difference expressions?
5. Write the advantages and disadvantages of any two turbulence models.

PART-B

Answer ALL questions of the following

5x8 Marks= 40Marks

1. Derive the finite difference expressions for a first order derivative with forward, backward and central difference approximations using Taylor series expansion.

(OR)

2. A carbon steel bar of 2cm X 2cm cross-section ($\alpha=1 \times 10^{-6} \text{ m}^2/\text{s}$ and $K=35 \text{ W/mK}$) is initially at a uniform temperature of 425°C . Suddenly, all its four surfaces are exposed to a cooling medium of $h=100 \text{ W/m}^2\text{K}$ and an ambient temperature of 25°C . Using explicit finite difference formulation, obtain temperature at the end of 100s.
3. Describe the method to solve 1D wave equation and discuss the applications of 1D wave equation.

(OR)

4. Explain the nature of hyperbolic equations with domain of dependence and domain of influence.
5. Define vorticity? Using vorticity/stream function method derive the expression for momentum equation without pressure term? What are its advantages compared with other methods?

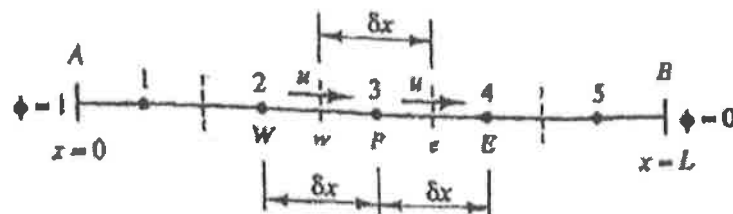
(OR)

6. Explain the SIMPLE algorithm with suitable example. Discuss its limitations.
7. Using FVM, discretise the 1D steady state diffusion (no heat generation) equation as per the below form for interior and exterior control Volume

$$a_p + \phi_p = a_W + \phi_W + a_E + \phi_E + S_u$$

(OR)

8. A property ϕ is transported by means of convection and diffusion through one dimensional domain as shown in figure;



The boundary conditions are $\phi_o=1$ at $x=0$ $\phi_L=0$ at $x=L$. Using five equally spaced cells and the Power-law scheme for convection and diffusion, calculate the distribution of ϕ as a function of x for $u=2.5 \text{ m/s}$. The following data apply $L=2.0 \text{ M}$, $\rho = 1.2 \text{ kg/m}^3$; $\Gamma = 0.1 \text{ kg/m.s}$.

9. Explain the need for turbulence modelling in dealing with CFD problems. What are the various turbulence models used in CFD problems?

(OR)

10. What is Vorticity transport equation and its applications?

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M. Tech. II SEMESTER SUPPLEMENTARY END EXAMINATIONS, MAY-2019Subject: Alternate FuelsBranch: **Thermal Engineering****Time: 3 hours****Max. Marks: 60****PART – A**Answer **ALL** questions of the following**5x4Marks=20 Marks**

1. Differentiate between proven and probable reserves
2. How does the latent heat of vaporization of ethanol affect the engine performance?
3. Compare the fuel properties of GNG and LPG as engine fuel.
4. Write short note on degumming of straight vegetable oil.
5. Discuss about power density batteries

PART-BAnswer **ALL** questions of the following**5x8 Marks= 40Marks**

1. Briefly explain the World energy scenario
(OR)
2. List the various petroleum products and discuss about their availability
3. Write short notes on the following (4+4)
 - (a) Availability of alcohol
 - (b) Fuel flexible vehicle(OR)
4. Discuss the following (4+4)
 - (a) Fuel Additives
 - (b) Effects of exposure of methanol
5. Explain the working of LPG engine with neat sketch. Also state the safety precautions to be taken while using LPG.
(OR)
6. Discuss the performance characteristics of hydrogen in CI engines
7. List the different types of vegetable oil available for IC engines. Discuss about the availability of vegetable oil in India
(OR)
8. Compare the characteristics of vegetable oil and Diesel. Also state the reason for the process of esterification.
9. List the components of the Electronic Control System and explain in detail
(OR)
10. Detail the solar powered vehicle with the aid of neat line sketch. Also list out the merits and demerits

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M. Tech. II SEMESTER SUPPLEMENTARY END EXAMINATIONS, MAY-2019Subject: Energy ManagementBranch: **Thermal Engineering/ Machine Design****Time: 3 hours****Max. Marks: 60****PART – A**Answer **ALL** questions of the following**5x4Marks=20 Marks**

1. Explain the principles of energy management in detail.
2. Write a short note on Energy Conservation Act 2003.
3. Write a short note on Energy Audit Instruments.
4. Explain the concept of depreciation in energy economic analysis.
5. Explain briefly Replacement analysis.

PART-BAnswer **ALL** questions of the following**5x8 Marks= 40Marks**

1. What are the steps you might consider in setting up an energy management program?

(OR)

2. What is the role of energy manager in manufacturing industry? Discuss.
3. Explain Technologies for energy conservation briefly.

(OR)

4. State and explain any four forms of energies with two examples of each.
5. Explain briefly the characteristics of instruments used for Energy Auditing.

(OR)

6. What are the goals of Energy Audit?
7. What do you understand by investment project? Explain.

(OR)

8. Briefly discuss about the budget considerations in economic analysis.
9. Compare internal rate of return with net present value as a method of project evaluation.

(OR)

10. Explain discounted pay back method.