

Code No: RR 210105

II B.Tech. I Semester Regular Examinations, November-2005

MECHANICAL SCIENCE AND ELECTRICAL SCIENCE

(Civil Engineering)

Set No.

1

Time: 3 hours

Max Marks: 80

Answer any Three questions from each part

All Questions carry equal marks

PART-A

- 1.a) What is the function of a carburettor in an I.C. engine? [4]
b) Explain with the help of a neat sketch, the working of a two stroke petrol engine. [12]
2. Explain the important components of a simple vapour compression refrigeration system. Also discuss the function of each component. [16]
- 3.a) Define welding and discuss the classification of welding. [6]
b) Discuss the advantages and disadvantages of gas cutting and arc cutting. [10]
- 4.a) What are the different lathe accessories and attachments? Give their uses. [8]
b) Draw the line diagram of a vertical drilling machine and label the important parts and explain the function of each part. [8]
- 5.a) Discuss how the size of a power shovel is determined. [10]
b) Give Two advantages of Conveyor Installations? [6]

PART-B

1. Explain the construction of a DC machine with a neat sketch. [16]
2. From the fundamental, derive the expression for the Torque. [16]
- 3.a) What is a transformer? Differentiate between step up and step down transformer. [8]
b) Derive an emf equation of a single phase transformer. [8]

(Contd..2)

4. Derive from first principles the emf equation of an alternator. [16]
5. What are the essential devices in indicating instruments? Explain each of them briefly [16]

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2

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Answer any Three questions from each part

All Questions carry equal marks

PART-A

- 1.a) Discuss the various applications of an I.C. Engine. [6]
- b) What is FP? Define mechanical efficiency and explain its importance. [10]
- 2.a) What are the disadvantages of wet compression? [4]
- b) Explain the desirable properties of refrigerants. [12]
- 3.a) What are the different types of welding? Discuss their applications. [6]
- b) Describe working principle and operation of oxygen cutting. [10]
- 4.a) Explain the various operations which may be performed on a lathe. [8]
- b) Draw the line diagram of a planer, label all the components and explain their functions. [8]
- 5.a) Discuss how the power shovels are mounted? [10]
- b) What is the principal advantage of a Conveyor Installation? [6]

PART-B

1. Derive an expression for generated emf, and also explain various types of excitations. [16]
2. Draw the speed-torque characteristics of dc shunt and series motor. [16]

(Contd..2)

3. Draw the general schematic of a single phase transformer and explain its working principle. [16]
4. Explain the OC and SC tests of an alternator. How regulation can be calculated by the use of their results. [16]
- 5.a) Explain the types of indicating instruments. [8]
- b) Calculate the constants of a shunt to extend the range of 0-5 A, moving iron ammeter to 0-10A. The instrument constant are $R = 0.09 \Omega$ and $L = 90 \mu\text{H}$. If the shunt is made non-inductive and the combination is correct on d.c., find the full scale error at 50 Hz. [8]

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3

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Answer any Three questions from each part

All Questions carry equal marks

PART-A

- 1.a) Define specific fuel consumption of an I.C. engine and explain its importance. [6]
- b) The brake thermal efficiency of an I.C. engine is 30%. The fuel used has a calorific value of 40 MJ/kg. Find the specific fuel consumption. [10]
- 2.a) Define a refrigerant. Can water be used as a refrigerant? [4]
- b) Discuss the importance of boiling point and freezing point of the following refrigerants with reference to their application: R-11, R-12, R-22, R-717 and R-13. [12]
- 3.a) Name the different types of welding methods used for joining metals and alloys by fusion process. [8]
- b) Describe with the help of neat sketch the working principle and operation of arc cutting. [8]
- 4.a) Discuss with a neat sketch the nomenclature and function of the different elements of a drill. [10]
- b) Distinguish between drilling and milling. [6]
- 5.a) What are the basic parts and their operations of a power shovel? [10]
- b) Why is preventive maintenance of conveyors so important? [6]

PART-B

1. Discuss the types of DC generators and explain various parts of DC generator. [16]
2. Why do we need a starter? Explain the operation of 3-point starter with a neat sketch. [16]

(Contd..2)

3. Derive the emf equation of a single phase transformer and explain voltage transformation ratio. [16]
4. What is synchronous impedance and explain the tests to be conducted to measure the same. [16]
- 5.a) Explain the operating principle of Permanent Magnet Moving Coil instruments. [12]
- b) Explain the advantages and disadvantages of PMMC instruments. [4]

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4

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Answer any Three questions from each part

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PART-A

- 1.a) Distinguish clearly between a petrol engine and a diesel engine. [6]
- b) Explain the working of two stroke cycle I.C. engine. [10]
- 2.a) How the refrigerants are classified? [6]
- b) What are the essential properties of a good refrigerant? [10]
- 3.a) Explain the basic principle of arc welding with the help of neat sketch. [8]
- b) Discuss the different types of flames in gas welding. [8]
- 4.a) Enumerate difference between shaper and planer. [6]
- b) What are different operations than can be performed on shape and planer. [10]
- 5.a) How do you select the size of a power shovel? [8]
- b) Where and why Conveyors are used? [8]

PART-B

1. Explain the characteristics of separately excited DC generator. [16]
2. Derive the expression for the speed in terms of back emf (E_b), and flux (ϕ). [16]
3. Explain the applications of a transformer and derive an equation for induced emf in a single phase transformer. [16]

(Contd..2)

4. Sketch and explain the open circuit and short circuit characteristics of a synchronous machine and also discuss the tests to be conducted to obtain those characteristics. [16]
- 5.a) Explain the general constructional features of Permanent Magnet Moving Coil instruments. [8]
- b) Explain the operating principle of moving iron instruments. [8]

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