

**II B.Tech I Semester Supplementary Examinations, November 2006**  
**MECHANICAL & ELECTRICAL SCIENCE**  
**(Civil Engineering)**

**Time: 3 hours**

**Max Marks: 80**

**Answer any THREE Questions from each part**

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**PART-A**

1. (a) Define 'I.C. engine'? How these engines are classified?  
(b) What are the physical differences between S.I. and C.I. engines?
2. (a) Discuss briefly the factors affecting the choice of refrigerants commonly used in refrigerating plants.  
(b) What are the advantages and disadvantages of using air as refrigerant as compared to F-13 and  $NH_3$ .
3. (a) What are the different kinds of welding rods? Explain them briefly.  
(b) Distinguish between arc welding and gas welding process.
4. (a) What are the important parts of a planer? Explain the importance of each part.  
(b) Discuss the following milling operations:
  - i. Slab milling
  - ii. Face milling
  - iii. Thread milling
  - iv. Gang milling
5. (a) Discuss how "Job conditions" affects the output of power shovel ?  
(b) Suggest applications where Pneumatic Conveyors are used?

**PART-B**

1. Explain the construction of a DC machine with a neat sketch.
2. What are the various Industrial applications of d.c Motors. Why D.C series motor is most suited for traction purposes.
3. Draw the general schematic of a single phase transformer and explain its working principle.
4. (a) Explain the working principle of a three phase induction motor.  
(b) Explain applications of junction motor.
5. (a) Explain the advantages and disadvantages of Moving Iron instruments.

(b) Explain the working of moving iron attraction type instruments.

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**PART-A**

1. (a) Define specific fuel consumption of an I.C. engine and explain its importance.  
(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.
2. (a) What is the difference between air-cooling and air-conditioning?  
(b) Explain in detail the important factors on which the comfort feeling of people in an air-conditioned space depends.
3. (a) Briefly discuss the following welding equipment:
  - i. Welding transformer
  - ii. Electrode holder
  - iii. Head shield
  - iv. Leather gloves.  
(b) How are the neutral, oxidizing and reducing flames obtained in a welding torch? Briefly discuss.
4. (a) What are the different lathe accessories and attachments? Give their uses.  
(b) Draw the line diagram of a vertical drilling machine and label the important parts and explain the function of each part.
5. (a) When do you prefer Hydraulic Concrete Mixers?  
(b) What are the different types of Roller Conveyors? Discuss.

**PART-B**

1. Explain the characteristics of separately excited DC generator.
2. From the fundamental, derive the expression for the Torque.
3. (a) Explain Why does primary current of a transformer increase when secondary current increases.  
(b) A 200/400 V, 50 Hz, 4 kVA single phase transformer on test gave the following readings.  
OC(LV) 200 V 0.7A 70watts  
SC(HV) 15 V 10A 80watts  
Find the efficiency of transformer when the load power factor is 0.8 lag.

4. (a) Explain the working principle of a three phase induction motor.  
(b) Explain applications of junction motor.
5. A moving coil instrument gives full-scale deflection with 20 mA. The resistance of the coil is  $4\Omega$ . It is desired to convert this instrument into an ammeter to read up to 2 A. Find the resistance of the shunt to be connected in parallel with the instrument. Also determine the value of series resistance for the above instrument to read up to a voltage of 30 V.

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**PART-A**

1. (a) Define:
  - i. Compression ratio
  - ii. TDC and BDC of an I.C. engine.(b) Explain clearly how the I.C. Engines are classified on the basis of cylinder arrangement, cycle of operation, method of charging and engine cylinder, type or ignition and type of cooling.
2. (a) What is the difference between air-cooling and air-conditioning?  
(b) Explain in detail the important factors on which the comfort feeling of people in an air-conditioned space depends.
3. (a) Explain the advantages of the following equipment used in welding process:
  - i. Head shield
  - ii. Chrome ? leather spats
  - iii. Scratch brush
  - iv. Chrome ? leather apron(b) Describe the working principle and operation of gas welding process.
4. (a) Name the different types of lathes and discuss their applications.  
(b) Describe with the help of neat sketches the following work holding devices used in planer:
  - i. Holding strap
  - ii. End stop pin.
5. (a) Discuss how “ Size of hauling units” affects the output of power shovel?  
(b) Suggest the suitable Conveyors for the following applications with reasons?
  - i. Bulk Materials
  - ii. Hazardous Materials
  - iii. Packages
  - iv. Loose Materials

**PART-B**

1. 11. A 6-pole d.c shunt generator with wave wound armature has 960 conductors. It runs at a speed of 500 rpm. A load of  $12\ \Omega$  is connected to the generator at a terminal voltage of 240V. The armature and the field resistances are  $0.3\ \Omega$  and  $240\ \Omega$  respectively. Find the armature current, the induced emf and the flux per pole.
2. Discuss the losses in a dc machine.
3. Draw the general schematic of a single phase transformer and explain its working principle.
4. (a) Explain the working principle of a three phase induction motor.  
(b) Explain applications of junction motor.
5. (a) Explain the advantages and disadvantages of Moving Iron instruments.  
(b) Explain the working of moving iron attraction type instruments.

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**PART-A**

1. (a) Distinguish clearly between a petrol engine and a diesel engine.  
(b) Explain the working of two stroke cycle I.C. engine.
2. (a) What are the disadvantages of wet compression?  
(b) Explain the desirable properties of refrigerants.
3. (a) Explain the advantages of the following equipment used in welding process:
  - i. Head shield
  - ii. Chrome ? leather spats
  - iii. Scratch brush
  - iv. Chrome ? leather apron  
(b) Describe the working principle and operation of gas welding process.
4. (a) What are the important parts of a planer? Explain the importance of each part.  
(b) Discuss the following milling operations:
  - i. Slab milling
  - ii. Face milling
  - iii. Thread milling
  - iv. Gang milling
5. (a) How the optimum depth of cut is determined for the power shovel ?  
(b) What types of materials can be handled by Screw Conveyors?

**PART-B**

1. The resistance of the field circuit of a shunt wound DC generator is  $200\ \Omega$ . When the output of the generator is 100 kW, the terminal voltage is 500 V and the generated emf is 525 V. Calculate
  - (a) The armature resistance and
  - (b) The value of the generated emf when the output is 60 kW, with a terminal voltage of 520 V.

2. A 250V, dc shunt motor on no-load runs at a speed of 1000 rpm and takes a current of 5A. The armature and shunt field resistance are  $0.2\Omega$  and  $250\Omega$  respectively. Calculate the speed when the motor is on-load and is taking a current of 50A.
3. What is an ideal transformer and derive an expression for induced emf in a single phase transformer.
4. (a) Explain the working principle of a three phase induction motor.  
(b) Explain applications of junction motor.
5. (a) Explain the advantages and disadvantages of Moving Iron instruments.  
(b) Explain the working of moving iron attraction type instruments.

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