

# **BASIC MECHANICAL ENGINEERING**

## **UNIT I - STEAM BOILERS**

### **PART-A**

1. Define steam generator?
2. What is the purpose of boiler?
3. What are the types of boilers used in the industries?
4. Give some primary requirements of boilers?
5. What are the main parts of the boilers?
6. What is meant by "GRATE" in the boiler?
7. What is the main function of the fusible plug?
8. What are the main functions of the steam stop valve and safety valve?
9. What is the maximum working pressure limit of simple vertical boiler?
10. What are the salient features of Cochran boiler?
11. What is meant by mountings? Name few of the mountings used in the boilers?
12. What are major uses of water gauge and pressure gauge?
13. Name few of the safety valves used in the boilers?
14. What are the types of high pressure boilers?
15. Differentiate evaporator and economizer?
16. What is meant by cogeneration?
17. Name two types of cogenerations systems?
18. What are the applications of cogeneration?
19. What is the main scope of cogeneration?
20. Give two importance of energy conservation?
21. Name few pollutants discharged by the thermal power plants?
22. What is meant by prime movers?
23. Give the classification of prime movers?
24. What are the two types of steam turbines?
25. What is meant by nozzle?
26. Differentiate nozzle and diffuser?
27. Differentiate impulse and reaction turbine?
28. Define gas turbine?
29. What are the types of gas turbines?
30. Name few types of cycles used in the gas turbines?
31. What is meant by hydraulic prime movers?
32. Give the classification of hydraulic turbines according to the direction of flow?
33. What is meant by penstock?
34. What is meant by casing?
35. What is draft tube? Give its purpose.
36. What are the advantages of thermal power plant?
37. Define reservoir?
38. Give the functions of the following parts,
  - i. Surge tank
  - ii. Spill way
  - iii. Tail race
39. Name the classifications of hydro power plants?
40. What is meant by chain reaction?
41. What is meant by nuclear fission?

42. Name the main components of nuclear power plant?
43. List out the demerits of diesel engine power plants?
44. List out the main function of a regenerator?
45. Define combustion chamber?
46. Compare intercooler and regenerator?
47. Define compressor?
48. What are the various kinds of non conventional energy sources?
49. Give the applications of solar energy?
50. What is butane boiler?
51. Name the two types of solar collectors?
52. What are the two types of wind mills according to the axis?
53. Describe the main principle of tidal power plant?
54. What is meant by flood tide?
55. Define condenser? Why we are using condenser?
56. Name the few factors considered while installing power plant?
57. Give the functions of steam separator using in a geo thermal power plant?
58. Write two advantages and disadvantages of tidal power plants?
59. Describe the principle of wind mill?
60. What are the materials used to absorb energy from the radiation in the solar collectors?

#### **PART-B**

1. Explain in detail of construction and working principle of simple vertical boiler?
2. Explain the construction and working principles of Cochran and Lancashire boilers with neat sketches?
3. What are the salient features of Cochran and Lancashire boilers?
4. Explain in details about the construction and working principles of Babcock and Wilcox boiler?
5. What are the advantages and disadvantages of water tube boilers over fire tube boilers?
6. Explain with neat diagrams of any four boiler mountings used in the steam boilers?
7. What are the major advantages of high pressure boilers?
8. Explain in detail about the working principle of Benson boiler with neat sketch?
9. Describe the construction and working principle of Lamont boiler?
10. Explain the working principles of Loeffler boiler according to their parts installed in that boiler?
11. What are the two types of co generation systems cycles? Explain in detail with its layout?
12. What are the benefits of cogeneration system? Explain.
13. Draw and explain about the combined cycle cogeneration systems?
14. What are the major importances's of energy conservation systems?
15. What are the environmental constraints of power generations? Explain any three factors in detail.
16. Draw and explain about impulse and reaction turbine?
17. Explain with neat sketch of gas turbines and its cycles.
18. Draw and explain the construction and working principles of Pelton wheel and kaplan turbine?
19. Explain the steam power plant layout according to the various circuits with neat sketch.
20. Explain the hydraulic electric power plant layout with neat sketch.

21. Draw and explain in details about the nuclear power plant. Mention the advantages and disadvantages.
22. Explain the diesel power plant with neat sketch? Give some applications.
23. Explain with neat sketch of gas turbines power plant. Mention the advantages and disadvantages.
24. Explain in detail any three non conventional energy sources systems layout with neat sketch?
25. Explain the construction and working principles of locomotive boiler with neat sketch?

## **UNIT II – INTERNAL COMBUSTION ENGINES**

### **AND** **METAL CASTING**

#### **PART – A**

- 1) Define pattern.
- 2) Name the common pattern materials.
- 3) State the advantages and disadvantages of pattern materials.
- 4) List out the various types of pattern.
- 5) List out the pattern allowances.
- 6) Describe any four molding tools with neat sketch.
- 7) Define various types of molding boxes.
- 8) What are the ingredients of molding sand? List the factors for selecting the pattern material.
- 9) Classify the molding sand.
- 10) State the properties of molding sand.
- 11) How the mould sand is prepared?
- 12) List out various types of molding?
- 13) Define molding
- 14) Define casting
- 15) Briefly explain pressure casting
- 16) What is ladle? List its types.
- 17) What are the methods used for cleaning of casting.
- 18) State all the safety practices to be followed in foundry.
- 19) What are the properties of good molding sand?
- 20) Compare two stroke and Four Stroke petrol engine.
- 21) List out the major parts of an IC engine.
- 22) What is the function of crankshaft?
- 23) What is the function of connecting rod?
- 24) What is the cylinder block?
- 25) What is a crankcase?
- 26) What are the materials used for cylinder block?
- 27) What is oil pan? Where it is?
- 28) Classify the IC engine types.
- 29) What is meant by carburetion?
- 30) What are the functions of carburetor?
- 31) Why a cooling system is necessary in an engine?
- 32) Define Air cooling system.
- 33) Define Water cooling system.

- 34) Compare between Air cooling and water cooling system.
- 35) What is a pressure cap?
- 36) What is the necessity of engine lubrication?
- 37) What are the objects of lubricating engine?
- 38) Explain different methods of engine lubrication system
- 39) What are the requirements of lubrication system?
- 40) What is a pressure relief valve?
- 41) Write the properties of lubricants.
- 42) List the demerits of Two Stroke engine.
- 43) Define ignition system.
- 44) Write the functions of control breaker point.
- 45) List the functions of lubrication system.
- 46) Write the types of lubricants.

### PART B

- 1) With neat sketches explain the functions of an IC engine process.
- 2) Explain the working principle of Two Stroke petrol engine with neat sketches.
- 3) Explain the working principle of a "FOUR STROKE" engine with neat sketches.
- 4) Describe the various fuel supply system automotive petrol engines with neat sketches
- 5) Sketch and explain the construction and operations of a simple carburetor.
- 6) Compare between Air Cooling and Water Cooling.
- 7) Explain the pump circulator Water cooling system with the help of neat sketches.
- 8) Describe briefly the various components of Water Cooling system.
- 9) What are the requirements of lubrication system?
- 10) With the simple sketch explain about splash lubrication system.
- 11) With simple sketch explain about pressure lubrication system.
- 12) Explain the construction and working principle of Two Stroke diesel engine with neat sketch.
- 13) Explain the construction and working principle of Four Stroke diesel engine with neat sketch.
- 14) Discuss in detail the function of the fuel supply system in an automotive diesel engine. State also the names of various components to perform these functions.
- 15) Draw diagrams showing the layout of various types of fuel supply system for diesel engine and discuss them extensively.
- 16) Explain construction and working of fuel pump with neat sketches.
- 17) Explain the construction and working of fuel injector.
- 18) Explain the working principle of coil ignition system in SI engine with neat sketch.
- 19) List the various defects in casting.
- 20) With neat sketch describe the uses of different tools used in molding.
- 21) Enumerate the properties of molding sand and explain any five in detail.
- 22) With suitable sketch describe the step-by-step procedure of green sand mould using a spirit pattern.
- 23) Briefly explain the following. A) Core sand b) Core binders.
- 24) Draw a simple cross section view of a cupola and explain briefly the operations of cupola.
- 25) Explain the construction and working principle of any one type of crucible furnace.
- 26) Explain the construction and working of any type of electric furnace.

## **UNIT-III – METAL FORMING PROCESS**

### **PART A**

1. Define forging.
2. What are the applications of the forging process?
3. Name the two classifications of forging.
4. Define the hot working and cold working.
5. Give some examples of hot working process.
6. State some examples of cold working process.
7. Name the hand forging operations used in the hot working process.
8. What is rolling?
9. Name some examples of rolling operations.
10. State the principle of rolling operation.
11. Name the two types of rolling process.
12. Define extrusion.
13. State the applications of the extrusion process.
14. What are the different methods of metal joining process?
15. Define welding.
16. Name some types of welding.
17. What is meant by fusion welding process?
18. Define arc welding.
19. Define gas welding.
20. Name the equipments used in gas welding process.
21. Name the different types of gas flames.
22. Write any two advantages of gas welding process.
23. What are the different arc welding methods?
24. Why slag is formed in arc welding process.
25. Define soldering.
26. Write the different types of welding joints.
27. What are the applications of soldering process?
28. How does a “FLUX” help in soldering process?
29. Define brazing.
30. Give some applications of brazing process.
31. What are the major types of brazing process?
32. Name some important Fluxing agents.
33. Name the various parts of center lathe.
34. What is the purpose of tailstock?
35. What are parts provided in the carriage?
36. List various types of lathe.
37. Write the specification of a central lathe.
38. Name the various operations performed in a lathe.
39. What does drilling mean.
40. Name some types of drilling machine.
41. What are the main parts of a drilling machine?
42. What is the major feature of radial drilling machine over the other?
43. Name the various drilling operations.
44. What is reaming.
45. Define boring operation.
46. List out the different types of work holding devices.
47. Explain the nomenclature of a lathe turning tool
48. What are the principal parts of a lathe?

49. What is the function of tool post?
50. List the types of drilling machine.

**PART-B**

1. Differentiate the process of hot rolling and cold rolling processes with neat diagrams.
2. Draw and explain the working principles of extrusion process.
3. Explain the following processes with the neat sketch
  - a. Drawing
  - b. Rolling
4. Explain arc-welding process with neat sketch.
5. Explain briefly about flame cutting with sketch.
6. Compare arc welding and gas welding process.
7. Write short notes on following with sketch.
  - a. Soldering
  - b. Brazing
8. Draw the neat sketch and explain the construction of center lathe.
9. Describe the various types of lathe in the engineering field.
10. Explain with neat sketches of various kinds of operations to be performed using lathe.
11. Define drilling? What are the various kinds of drilling machines available?
12. Explain any two of the drilling machines with neat sketches.
13. Describe the following terms,
  - a. Carriage,
  - b. Live center
  - c. Dead center with neat sketches
14. Explain the various kinds of drilling machine operation with neat sketches.
15. Explain briefly the nomenclature of single point cutting tool with neat sketch.