ELEMENTS OF MECHANICAL ENGINEERING

Model question paper No.1

I / II Semester B.E. Degree Examination (Common to all Branches)

Prepared at the VTU Workshop on CAED, EME & Workshop Laboratory

held on 14th September 2006 at the Department of Mechanical Engineering, M.C.E, Hassan

Sub Code : **06 EME 14 / 06 EME 24** Marks: **100**

Examination Hours: **03 hours**

Note:

*1. Answer any **FIVE** full questions choosing at least **two** questions from **part A** & **two** questions from **part B***

2. Use of steam tables is permitted

PART-A

1.	(a) Discuss briefly the different sources of energy.	05 Marks
	(b) Steam at 10 bar and dryness 0.98 receives 140 kJ/kg at the same pressure. What is the final state of the steam?	05 Marks
	(c) Sketch and explain Lancashire Boiler.	10 Marks
2.	(a) What is a Steam turbine? Explain the principle of operation of Impulse turbine?	10 Marks
	(b) Explain the working principle of closed cycle gas turbine.	05 Marks
	(c) Sketch and briefly explain Francis turbine.	05 Marks
3.	(a) Explain with neat sketches and p-v diagram, the working principle of 4-Stroke petrol engine.	10 Marks
	(b) A 4-Stroke petrol engine of 100mm bore and 150mm stroke consumes 1kg of fuel per hour. The mean effective pressure is 7 bar and it's indicated thermal efficiency is 30%. The calorific value of the fuel is 40000 kJ/kg. Find the crankshaft speed.	10 Marks
4.	(a) What is Refrigeration? List the properties of an ideal Refrigerant.	05 Marks
	(b) Explain the principle and working of Vapour Compression Refrigeration with a neat sketch.	10 Marks
	(c) Define Air conditioning and explain the principle of Air conditioning.	05 Marks

PART-B

5.	(a) Explain the principle of working of Centre Lathe and show the major parts of the Lathe with a neat sketch.	10 Marks
	(b) Sketch and explain Radial drilling machine.	10 Marks
6.	(a) List the types of Milling machines. Explain the principle and working of Horizontal milling machine.	10 Marks
	(b) Write the specifications of Universal milling machine.	05 Marks
	(c) Sketch and explain Centreless Grinding.	05 Marks
7.	(a) Explain the differences between Soldering, Brazing and Welding methods.	05 Marks
	(b) What are the mechanical properties of a Lubricant? Explain.	05 Marks
	(c) Sketch and explain Splash Lubricator.	10 Marks
8.	(a) How are belt drives classified? Explain any two types in detail.	05 Marks
	(b) Derive an expression for the length of the belt in an open drive system.	10 Marks
	(c) Two gear wheels having 80 teeth and 30 teeth mesh with each other. If the smaller gear wheel runs at 480 rpm. Find the speed of the larger wheel.	05 Marks

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Sub Code : **06 EME 14 / 06 EME 24** Marks: **100**

Examination Hours: **03 hours**

Note:

*1.Answer any **FIVE** full questions choosing at least **two** questions from **part A** & **two** questions from **part B***

2 .Use of steam tables is permitted

PART A

1.	a)	Discuss the advantages of Non-conventional energy sources over conventional energy sources. .	05 Marks
	b)	Find the enthalpy of 1 kg of steam at 12 bar, when steam is 1) dry saturated 2) 22% wet 3) superheated to 250°C. Assume specific heat of the superheated steam as 2.25KJ/Kg K	05 Marks
	c)	Explain with a neat sketch the construction and working of Babcock and Wilcox boiler	10 Marks
2.	a)	Sketch and explain the working of reaction steam turbine with the help of pressure and velocity profile diagram	05 Marks
	b)	Explain with the working of closed cycle gas turbine with a suitable schematic diagram.	05 Marks
	c)	How are water turbines classified? Explain with sketch the working of Kaplan turbine	10 Marks
3.	a)	Classify IC engines	05 Marks
	b)	Differentiate between four stroke and two stroke IC engines	05 Marks
	c)	Explain the construction and working of a four stroke petrol engine	10 Marks
4.	a)	Explain with a neat sketch the working of vapour compression refrigerator	10 Marks
	b)	) With a neat sketch explain the working of a typical room air conditioner	10 Marks

PART B

5.	a)	With a schematic diagram show how a centre lathe is specified	05 Marks
	b)	With a suitable sketch explain taper turning operation by swiveling of compound rest method	05 Marks
	c)	How are counter sinking and counter boring operation done on a drilling machine? Explain with suitable sketches	10 Marks
6.	a)	Explain the principle of milling	05 Marks
	b)	Draw a schematic sketch of horizontal milling machine and label its parts.	10 Marks
	c)	With suitable sketches explain the operation of surface grinding	05 Marks
7.	a)	Distinguish between soldering, brazing and welding	05 Marks
	b)	Describe drop feed lubricator with suitable sketch	05 Marks
	c)	How bearings are classified? Sketch and explain Bushed bearing	10 Marks
8.	a)	Derive an expression for the length of belt for crossed belt drive	05 Marks
	b)	What is stepped pulley? Indicate its use	05 Marks
	c)	Distinguish between (1) Simple and compound gear train (2) Velocity ratio and gear ratio	10 marks

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Sub Code : **06 EME 14 / 06 EME 24** Marks: **100**

Examination Hours: **03 hours**

Note:

*1.Answer any **FIVE** full questions choosing at least **two** questions from **part A** & **two** questions from **part B***

2 .Use of steam tables is permitted

PART-A

1.	(a)	Explain any two non-convention sources of energy	05 Marks
	(b)	Explain briefly the different states of steam with the help of diagram	05 Marks
	(c)	Explain with a neat sketch Lancashire boiler.	10 Marks
2.	(a)	How the steam turbines are classified? Write the differences between them.	05 Marks
	(b)	Explain with sketch the closed cycle gas turbine	05 Marks
	(c)	Write the important points in the selection of water turbines. Explain the working of impulse turbine.	10 Marks
3.	(a)	Name the thermodynamic cycle of diesel engine. Draw the PV diagram of the same indicating various process	05 Marks
	(b)	Explain with sketch four stroke diesel engine	05 Marks
	(c)	Given the following details of 4 stroke of diesel engine, find the indicated power, brake power, friction power. Bore diameter is 200mm, stroke 300mm. mean effective pressure 0.3 MPa, brake drum dia 1.2m, net brake load 300 N, speed 400rpm.	10 Marks
4.	(a)	What is a refrigerant? What are the properties of a refrigerant? Name commonly used refrigerants.	05 Marks
	(b)	Define the following 1) ton of refrigeration, 2) COP, 3) Relative COP	05 Marks
	(c)	with sketch explain the working principle of vapour compression refrigeration system	10 Marks

PART-B

5.	(a)	How a lathe is specified? Write the line diagram indicating the major parts of a lathe.	05 Marks
	(b)	Explain with sketch the taper turning by swiveling the compound rest	05 Marks
	(c)	Explain any five operations on drilling machine	10 Marks
6.	(a)	Write the principle of milling machine. How a universal milling machine is specified	05 Marks
	(b)	Explain end milling and slot milling	05 Marks
	(c)	Write a note on 1) Abrasives & 2) Centerless grinding	10 Marks
7.	(a)	Explain with sketch the Arc welding process	05 Marks
	(b)	Write flame characteristics of oxy-acetylene welding	05 Marks
	(c)	Write a short note on properties of lubricant and antifriction bearings	10 Marks
8.	(a)	What is the function of stepped cone pulley? Explain with simple sketch	05 Marks
	(b)	Two pulleys of 50cm and 25cm are to be coupled by a belt drive, if the distance between their axis is 1.5m, find the length of the belt for open and crossed belt drives.	05 Marks
	(c)	Write the different types of gears and gear trains with their applications.	10 Marks

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Sub Code : **06 EME 14 / 06 EME 24** Marks: **100**

Examination Hours: **03 hours**

Note:

*1.Answer any **FIVE** full questions choosing at least **two** questions from **part A** & **two** questions from **part B***

2 .Use of steam tables is permitted

PART-A

1.	(a)	Explain briefly ocean thermal energy conversion	05 Marks
	(b)	With a neat sketch explain the working of Babcock and Wilcox boiler	10 Marks
	(c)	Find the enthalpy of heat in one kg of steam at 0.9bar and 85% quality	05 Marks
2.	(a)	With a neat sketch explain the working of a open cycle gas turbine	10 Marks
	(b)	Write a short note (1) Pelton wheel (2) Reaction turbines	10 Marks
3.	(a)	Explain the working of a 4-stroke petrol engine	10 Marks
	(b)	A 4-stroke I C engine has a piston dia of 150mm & the average piston speed is 3.5 m/sec, if the m.e.p is 0.786 mpa, find the Indicated power	10 Marks
4.	(a)	Explain the principle of working of a room air conditioner	10 Marks
	(b)	Write a short on (1) properties of refrigerants (2) refrigerant	10 Marks

PART-B

5.	(a)	Sketch and label the parts of a lathe.	10 Marks
	(b)	Explain the working of radial drilling machine	10 Marks
6.	(a)	With a neat sketch explain the working of a centerless grinding operation	10 Marks
	(b)	Differentiate between (1) Conventional milling & Gang milling (2) End milling and straddle milling	10 Marks
7.	(a)	Explain soldering. What flux is commonly used? Why the flux is necessary?	05 Marks
	(b)	Differentiate between consumable and non-consumable electrodes	05 Marks
	(c)	How the lubricants are classified? Explain splash lubricator	10 Marks
8.	(a)	Differentiate between speed cone, fast and loose pulleys.	05 Marks
	(b)	Write a short note on (1) gear tooth profile (2) bevel gears (3) Gear trains	15 Marks

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Sub Code : **06 EME 14 / 06 EME 24** Marks: **100**

Examination Hours: **03 hours**

Note:

*1.Answer any **FIVE** full questions choosing at least **two** questions from **part A** & **two** questions from **part B***

2 .Use of steam tables is permitted

PART-A

1.	(a)	Classify different sources of energy and give examples.	05 Marks
	(b)	With a neat sketch explain the working of Lancashire boiler	10 Marks
	(c)	Find the enthalpy of 1kg of steam at 12bar, when steam is (1)dry saturated (2) 22% Wet (3) superheated to 250 ºC. assume C_p = 2.25Kj/kg ºK	05 Marks
2.	(a)	Sketch and explain the working of reaction steam turbine with the help of PV diagram	10 Marks
	(b)	How is water turbines classified? Explain Kaplan turbine.	10 Marks
3.	(a)	.Explain the Classification of IC engines	05 Marks
	(b)	Differentiate between four stroke and two stroke IC engines	05 Marks
	(b)	Explain the construction and working principle of four stroke petrol engine	10 Marks
4.	(a)	Explain with a neat sketch the working of vapour compression refrigeration	10 Marks
	(b)	With a neat sketch explain the working of room air conditioners	10 Marks

PART-B

5.	(a)	With the neat sketch explain the construction of a lathe.	10 Marks
	(b)	Give the specifications of a radial drilling machine	05 Marks
	(c)	Explain the following operations 1) Reaming 2) Countersinking	05 Marks
6.	(a)	Draw a schematic sketch of a horizontal milling machine and briefly explain the function of its main parts.	10 Marks
	(b)	Write the different types of bonding materials	05 Marks
	(c)	Explain With a neat sketch the principle of operation of surface grinding	05 Marks
7.	(a)	Bring out the difference between soldering, brazing and welding.	05 Marks
	(b)	With a neat sketch explain process of arc welding	10 Marks
	(c)	State the advantages of pedestal bearing over bushed bearing	05 Marks
8.	(a)	Derive the relation to determine the length of belt in an open belt drive system	10 Marks
	(b)	Explain the slip and creep of belt drive	05 Marks
	(c)	A simple gear train consists of four gears having 40, 50, 60 and 80 teeth in mesh. If the drive is given to 80 teeth gear running at 600rpm, find the speed of the last gear teeth	05 Marks