



06EME14/24

First/Second Semester B.E. Degree Examination, Dec.09/Jan.10 Elements of Mechanical Engineering

Time: 3 hrs.

Max. Marks:100

Note: 1. Answer any FIVE full questions, selecting at least TWO questions from each part.

- 2. Answer all objectives type questions only on the OMR sheet, page 5 of the answer booklet.
- 3. Answer for objective type questions written on pages other than OMR sheet (page 5) will not be valued.
- 4. Use of steam table is not permitted.

PART - A

- 1 a. Choose the correct answer:
 - If the specific volume of superheated steam is v_{sup} , specific volume of dry saturated steam at same constant pressure 'P' is v_g , saturation temperature at same pressure 'P' is v_g , and superheated temperature at 'P' is v_g , then v_{sup} is
 - A) $v_g \frac{T_s}{T_{sup}}$

B) $v_g \cdot \frac{T_{sup}}{T_s}$

C) $v_g(T_{sup}-T_s)$

D) $\upsilon_g (T_{sup} + T_s)$

- ii) Blow off valve is used
 - A) To reduce steam pressure
 - B) To stop steam supply
 - C) To remove sediments collected at the bottom of the boiler
 - D) To remove excess steam from boiler
- iii) Super heater is used
 - A) Inside the boiler drum
 - B) To convert wet steam into dry steam
 - C) In the path of flue gases to increase volume of steam
 - D) To increase temperature of steam above saturation temperature.
- iv) Economisers ared used to:
 - A) Conserve water
 - B) To absorb heat from exit gases by feed water
 - C) To improve combustion of fuel
 - D) To convert water into steam.

(04 Marks)

- b. Name three renewable and nonrenewable energy sources and compare them for merits and demerits.

 (08 Marks)
- c. Find the enthalpy of 1 kg. of steam at 10 bar absolute, when the steam is
 - i) Dry saturated
 - ii) 20% wet
 - iii) Super heated to 220°C. Assume specific heat of superheated steam as 2.25 kJ/kg K. Take the following data for the steam at 10 bar: (04 Marks)

 t_s h_f h_{fg} h_g 180° C 762 2030 2792 kJ/kg.

d. Sketch a Lancashire boiler and name its parts (front view only).

(04 Marks)

2 a.		se the correct					•
	i)	Kaplan turbi	ne is				
		A) Impuls	e water turbine		B) Steam turbine		
		C) Gas tui	rbine		D) Axial flow water	turbine	
	ii)	Pelton turbir	ne is				
		A) A reac	tion turbine		B) Tangential flow 1	turbine	
		C) Mixed	flow turbine		D) A steam turbine		
	iii)	A prime mo	ver, which conv	erts heat energy	of steam into mecha	anical energy dire	tly in
		the form of	f rotary motion	is called			
			engine		B) I.C. engine		
			turbine		D) Generator		
	:\	- <i>f /</i>	nt prime mover	is	s .		
	iv)	A) I.C. en	,		B) Gas turbine		
					D) Steam turbine.	(04 N	Marks)
	<i>~</i> 11	_ ,	engine			(08 P	Viarks)
b.	Sket	ch and explai	n the working o	f a Pelton turbine	iagram and explain	its working. (08 I	Vlarks)
C.	Drav	v a constant p	ressure open cy	cie gas turbnic u	iagram and explan	140 11 0 + O - 1 - 1 - 1	
				•			
3 a.	Cho	ose the correc	t answer:	• 1 1 1			
	i)		e engine, power	1s developed			
-			ry revolution		B) Once in 2 revol	-	
		C) At half	the revolution		D) In every stroke		
	ii)	In diesel en	gine, during suc	tion stroke	is sucked in the cy	nnaer	
			uel mixture		B) Fuel air mixti	are	
		C) Air			D) Diesel	- -	
	iii)	Scavenging	is employed in				
			roke petrol engi		B) 4 – stroke diese	el engine	
			roke petrol or di		D) IN all types of	engines.	
	i37)	Fly wheel i					
	1 1		crease speed		B) To reduce fuel	consumption	
			ake speed unifor		D) To increase tor		Marks)
	T.	lain stranking	and construction	on of 4 – stroke	diesel engine with	the help of the	retical
D.			aild Collada activ			(08	Marks)
	p - '	o diagram.	114 - A - F	om o 1 strol	e single cylinder	oil engine at ful	l load.
C.	Foll	owing data	are conected n	On a tood	= 200 RPM Ind	licated mean ef	fective
	Bor	e = 200 m	m, stroke – 2	ov min, specu	= 300 RPM. Ind $= 250 Nm Oil$	consumed 42 k	g/hour.
	pres	ssure $= 5.6$ t	bar, torque on	the brake drum	= 250 N.m. Oil	eness indicated t	hermal
	Cal	orific value	of oil 41,000 k	J/kg. Determine	mechanical efficie	me	Marks)
	effic	ciency and br	ake thermal effi	ciency.	-	(VO	TATUTE LEGAL
4 a.		ose the corre					
	i)		is used in a refi	·	T)\T1L	ኒ/ ርተነ /ጎን ፣ ቸ	
	•		ompress the refr		B) To expand the		
	•	C) To al	osorb the heat fr	om refrigerant	D) To transform i	·	
	- (ii)	The name	of the refrigerar	it, commonly use	ed in domestic refrig	erator, is	.•
÷		A) Wate		•	B) Freon – 12		
		C) Carb	on		D) Ice		
	iii)			equal tokJ/	sec		
	***	A) 3.5			B) 5.00		
		CN 1.55	-		D) 50		
				-			



(08 Marks)

B) High saturation point Low saturation point D) Low enthalpy of evaporation. Low thermal conductivity (04 Marks) b. Name the various parts of a vapour compression refrigerator and briefly explain with a flow (08 Marks) diagram their functions. c. Explain the construction and working of a room air conditioner. (08 Marks) PART – B Choose the correct answer: Reaming is the process of B) Finishing a drilled hole Enlarging a drilled hole D) Operation after facing Operation done on lathe is the name of the part to hold a cylindrical work piece in the lathe B) Tool post Tailstock D) Head stock 3 – JAW chuck In radial drilling machine..... is moved for drilling operation iii) B) Table Column D) Handle Arm is the operation of embossing a diamond shaped pattern on the surface of a iv) work piece on lathe B) Knurling Taper turning (04 Marks) D) Engraving. Eccentric turning b. Explain the functions of various important parts of a centre lathe with a neat sketch. (08 Marks) Explain with the help of sketches four machining operations that can be carried out in a (08 Marks) drilling machine. Choose the correct answer: is the abrasive material used in grinding wheels B) Calcium carbonate Aluminium chloride D) Tungsten carbide Silicon carbide Grinding is also known as B) Honing Lapping D) Reaming. Abrasive machining is known as natural abrasive iii) B) Magnetite Granite D) Ferrite Corundum Milling cutter is mounted on iv) B) Spindle Column (04 Marks) D) Shaft. Arbor b. Draw a neat sketch of a horizontal milling machine and explain various milling operations (08 Marks) on the machine.

As a property of a good refrigerant, it should have

Sketch a plain centre type cylindrical grinding machine and explain the working of the

machine.

	•	and the second s	se the correct answe									
- · · · · · · · · · · · · · · · · · · ·		i)	Spelter is used in	er is used in for joining dissimilar metals with the help of heating'								
			A) Arc welding		B) Soldering							
			C) Brazing		D) Forge welding							
	-	ii) is the important property of a lubricant										
			A) Low fire poin		B) High viscosity							
		· · · · · · · · · · · · · · · · · · ·	C) Lightness		D) To be volatile							
	•	iii)	Plummer block is a	name of								
	-		A) Horizontal be	aring	B) Vertical bearing							
÷	· · · ·		C) Roller bearing	g	D) Collar bearing							
•	-	iv) Bearing material is made of										
	-		A) Mild steel		B) Tin							
•			C) Zinc		D) Bronze.	(04 Marks)						
•	b.	Sketc	h a ball bearing, nai	me the parts and expla	in their function.	(04 Marks)						
	c.	_		ator and explain its we		(04 Marks)						
	d.	What	What are antifriction bearings? State advantages and disadvantages of them over other type									
		of bea	(08 Marks)									
						• • • • • • • • • • • • • • • • • • •						
	a.	Choose the correct answer:										
-		i) is used to transmit power between two perpendicular shafts										
• -			A) Spur gear		B) Helical gear							
· · ·			C) Herringbone	gear	D) Bevel gear							
		ii)										
·	• •		A) Spur gear	nvert rotary motion to	B) Rack and pinion							
	•		C) Helical gear		D) Worm and worm gear							
		iii)	To stop the machin	e temporarily in a belt	drive, is used							
			A) Guide pulley		B) Stepped cone pulley							
			C) Jockey pulley		D) Fast and loose pulley							
•		iv)										
	-		A) Inverse of spe	eed ratio	B) Speed ratio							
· .			C) Ratio of tensi	ions	D) None of these.	(04 Marks)						
	b.	Derive an expression for length of belt in open belt drive. (08 Marks										
	c. A gear train consists of four gears A, B, C and D of 20, 25, 50 and 75 teeth resp											
•					vith C. B meshes with D. If A l							
				ed of D? Sketch the go		(08 Marks)						

4 of 4