Reg.No. _____

Karunya UNIVERSITY

(Karunya Institute of Technology & Sciences)
(Declared as Deemed-to-be University under Sec.3 of the UGC Act, 1956)

End Semester Examination – Nov/Dec – 2016

Code : 14ME2018
Sub. Name : POWER PLANT ENGINEERING

Semester : 2016-17 ODD
Duration : 3hrs
Max. marks : 100

ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)

Use of Steam Table and Mollier Chart permitted

Q. No.	Sub Div.	Questions	Course Outcome	Marks
1.	a.	What is the purpose of employing binary vapour cycles?	CO 1	**4**
	b.	Explain the operation of any one binary vapour cycle with the help of a T-s plot.	CO 1	**10**
	c.	How is a Rankine cycle modified? Explain with T-s plots how the efficiency of power plants is enhanced using reheating, regeneration and superheating.	CO 1	**6**
		(OR)		
2.	a.	Explain with a neat sketch the construction and operation of a high pressure boiler used in a thermal power plant.	CO 1	**10**
	b.	A turbine is supplied with steam at a pressure of 32 bar and a temperature of 410° C. The steam then expands isentropically to a pressure of 0.08 bar. Find the dryness fraction at the end of expansion and thermal efficiency of the cycle. If the steam is reheated at 5.5 bar to a temperature of 395° C and then expanded isentropically to a pressure of 0.08 bar, what will be the dryness fraction and thermal efficiency of the cycle ?	CO 2	**10**
3.	a.	Name the various boiler accessories.	CO 1	**2**
	b.	Illustrate with a neat lay-out sketch the location of boiler accessories in a coal based thermal power plant; also, write briefly on the function of each.	CO 1	**8**
	c.	How are condensers classified?	CO 1	**2**
	d.	With a neat sketch explain the construction and operation of any one type.	CO 1	**8**
		(OR)		
4.	a.	Draw neat lay-outs of open and closed cycle gas turbine power plants and explain their operation.	CO 1	**10**
	b.	A gas turbine unit has a pressure ratio of 6:1 and maximum cycle temperature of 610° C. The isentropic efficiencies of the compressor and turbine are 0.80 and 0.82 respectively. Calculate the power output in kW of an electric generator geared to the turbine when the air enters the compressor at 15° C at the rate of 16 kg/s. Take Cp = 1.005 kJ/kg.K and γ = 1.4 for the compression process and take Cp = 1.11 kJ/kg.K and γ = 1.33 for the expansion process.	CO 2	**10**
5.	a.	Differntiate between a boiling water reactor and pressurized water reactor. Illustrate with neat sketches.	CO 1	**10**
	b.	Elaborate on the choice of materials used in the construction of nuclear power plants.	CO 1	**10**
		(OR)		
6.	a.	With a neat lay-out explain the construction and operation of a diesel power plant.	CO 1	**10**
	b.	Enumerate the advantages of hydroelectric power plants.	CO 1	**3**
	c.	How does a pumped storage hydroelectric power plant function ?	CO 1	**7**
7.	a.	List the major pollutants from a coal based thermal power plant.	CO 4	**2**
	b.	Describe with sketches the processs of particulate matter removal from flue gases.	CO 4	**8**
	c.	How would you control the emission of SOx from flue gases ?	CO 4	**10**

		(OR)			
8.	a.	How does a load duration curve differ from a load curve ?	CO 3	**2**
	b.	Define i) Load factor and ii) Capacity factor as applied to power plants.	CO 3	**4**
	c.	The loads on a power plant with respect to time for 24 hours are tabled below. Time, Hrs: 0 - 6 | 6 - 8 | 8 - 12 | 12 - 14 | 14 - 18 | 18 - 22 | 22 - 24 Load, MW: 40 | 50 | 60 | 50 | 70 | 80 | 40 Construct the load curve and find load factor of the power station. If the loads above 60 MW are taken by a stand-by unit of 20 MW capacity, find the load factor of the stand-by unit.	CO 3	**14**
		<u>Compulsory:</u>		
9.	a.	Explain with a neat sketch a magnetohydrodynamic power plant.	CO 1	**14**
	b.	How is electricity generation possible with geothermal energy ? Draw a neat sketch.	CO 1	**6**

ALL THE BEST