6.3.3 Sample Question Paper:

Exam Seat No.									

17529

MaharashtraState Board of Technical Education

Course Name: **Mechanical Engg.** Course Code: **ME5G**

Semester: **V**

Title of the Subject: **Power Engg.** Subject Code: **17529**

Marks: **100** Time: **03 hrs.**

Instructions:

1. **All questions are compulsory**
2. **Illustrate your answers with neat sketches wherever necessary**
3. **Figures to the right indicate full marks**
4. **Assume suitable data if necessary**
5. **Preferably, write the answers in sequential order**

Q1. A) Attempt any Three **12**

a) Draw PV & TS diagram for Otto cycle. State name of the process.

b) Define the following terms related to air compressor. i) Volumetric efficiency ii) Free air Delivery.

c) Give the detail classification of Air compressors.

d) Draw actual valve timing diagram for 4- stroke petrol engine.

Q1. B) Attempt any One **6**

a) State the purpose of Morse test in petrol engine testing. Write stepwise procedure for conducting Morse test.

b) Write any three pollutants in exhaust gases of petrol & diesel engine with their effects on environment.

Q2. Attempt any Two **16**

a) Explain construction & working of screw compressor with a neat label sketch.

b) Draw the outline of psychrometric chart and show all the properties of moist air on it.(at least 06)

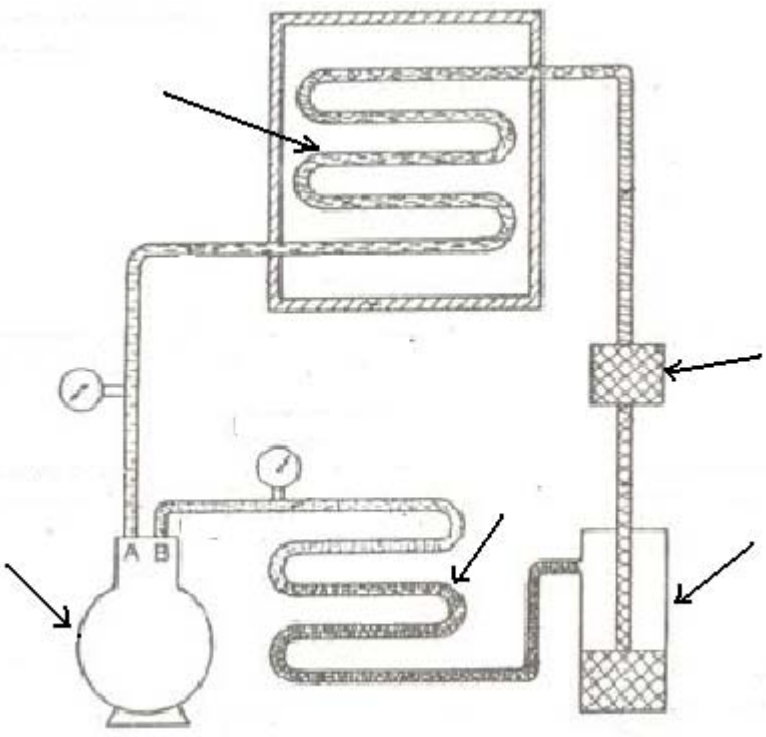
c) An IC Engine uses 5 kg of fuel per hour having calorific value of 42,500 KJ/kg. The brake power developed is 21 kW. The temperature rise of cooling water is 23^{0} c, when the rate of flow is 11 kg/min. The temperature rise of exhaust gases is 260^{0} c, when rate of flow of exhaust gases is 4.6kg/min. Specific heat of water and exhaust gases are 4.187 kJ/kg^{o} K and 1 kJ/kg^{o} K respectively. Prepare heat balance sheet on minute basis.

Q3. Attempt any Four **16**

a) What is catalytic converter? Explain two way catalytic converter with neat sketch.

b) Give four application of gas turbine.

c) State the name of cycle shown in figure below. Label the parts (indicated by arrow) and give function of each part.



d) State the process of scavenging in IC engine? State the types.

e) Describe types of Sensors along with their application.

Q4. A) Attempt any Three **12**

a) Explain MPFI with neat diagram.

b) State the norms of Bharat stage III & IV.

c) Explain detonation in IC engine.

d) Define the terms i) Indicated power ii) Mechanical efficiency
iii) Brake power iv) BSFC.

Q4.B) Attempt any One **6**

a) State the different methods to improve thermal efficiency of gas turbine and explain Regeneration method along with P-V & T-S diagram.

b) List the additives of lubricant used in SI engine & states their advantages.

Q 5. Attempt any Two **16**

a) Ammonia refrigerator produces 1 ton of ice at -10 ^{0}c from water at 20 ^{0}c in 24 hrs. when 1 KWh energy is supplied. Find COP of refrigerator take latent heat of ice as 335 KJ/Kg & specific heat of ice 2 KJ/Kg ^{0}k.

b) A two stage single acting reciprocating compressor takes in air at ratio of 0.3 m^3/sec. Intake pressure & temperature 1 bar & 16 ^{0}c. The air is compressed to final pressure of 7 bar. Intermediate pressure is ideal and intercooling is perfect. Compression ratio is 1.25; Compressor runs at 600 rpm. Find

i) Intermediate pressure ii) Power required to drive the compressor

c) Explain construction and working of turbo propeller with a neat labeled diagram.

Q 6. Attempt any Four **16**

a) Define 1) Dew point temp. , 2) Relative humidity, 3) WBT, 4)Degree of saturation.

b) Write four uses of compressed air.

c) An engine working on Otto cycle has diameter of 150mm & stroke of 225mm. Clearance volume is 1.25 X10^{-3} m^3. Find air standard efficiency.

d) Explain the working of split air conditioner with a neat sketch.

e) Differentiate between open cycle & closed cycle gas turbine. (minimum 4 points)

MARKING SCHEME FOR MSBTE SAMPLE PAPER
(Please refer MSBTE sample paper of Power Engg.)

Year/course :-ME-5-G **Subject: POWER ENGG.(17529)**

Sr. No.	Q.No.	Sub Q. No.	Basis of Marking	Total Marks	Remarks
1	1A	a	P-V & T-S Diagram ------ 02 Marks Name of process ------- 02 Marks	04	
		b.	Definition ------02 Marks each	04	
		c	Detail classification------04 Marks	04	
		d	Correct diagram -----02Marks Correct labeling ---- 02Marks	04	
	1B	a	Purpose of Morse test ----02 Marks Stepwise procedure -----04 Marks	06	
		b	Pollutants and their effects --- 02 Marks each	06	
	2	a	Correct diagram------- 02 Marks Labeling ------- 02 Marks Construction ---- 02 Marks Working ------ 02 Marks	08	
		b	Psychometric chart outline---02 Marks Properties of moist air(at least 06) --- 01Mark each	08	Student must show properties on psychometric outline chart
		c	Correct formulae and calculation ---- 06 Mark Table formation-------02 Marks	08	
	3	a	What is catalytic converter----01 Mark Diagram ----01 mark Explanation ---- 02 Marks	04	
		b	Application of gas turbine---- 01 Marks each	04	
		c	Names of cycle ---- 1 Marks Correct Labeling----- 1 Marks Function of each part ----- 02 Marks	04	
		d	Process of Scavenging = 02 Marks Types of Scavenging -----= 02 Marks	04	

		e	Types of sensors ----02 Marks Application -----02 Marks	04	
	4A	a	Diagram ------ 02 Marks Explanation ---- 02 Marks	04	
		b	Norms of each stage----02 Marks each	04	
		c	Diagram------ 01 Marks Explanation ---- 03 Marks	04	
		d	Definition --- 01 Mark each	04	
	4B	a	Name of methods ----- 02 Marks P-V & T-S Diagram of regeneration --- 02 Marks Explanation ---- 02 Marks	06	
		b	List of additives---- 03 Marks Advantages ----- 03 Marks	06	
	5	a	Correct formulae & calculation----06 Marks Correct answer----- 02 Marks	08	
		b	Intermediate pressure calculation=02 Marks Power calculation --------06 Mark	08	
		c	Correct diagram & Labeling-------02 Marks Construction ---- 03 Marks Working ------ 03 Marks	08	
	6	a	Definition ------ 01 Mark each	04	
		b	Uses of compressed air ----- 01 Mark each	04	
		c	Correct calculation and formula ---04 Marks	04	
		d	Correct diagram & Labeling-------02 Marks Working ------ 02 Marks	04	
		e	Difference ------ 01 mark each	04	

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