Code No: R1622032   **R16**   SET - 1

II B. Tech II Semester Regular/Supplementary Examinations, April/May - 2019
THERMAL ENGINEERING-I
(Com to ME, AME)

Time: 3 hours   Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answer **ALL** the question in **Part-A**
3. Answer any **FOUR** Questions from **Part-B**
~~~~~~

PART –A

1.	a)	Write a short note on exhaust blowdown.	2M
	b)	Write the qualities of an ideal ignition system.	3M
	c)	Explain about anti knock additives.	2M
	d)	What is heat balance sheet?	2M
	e)	Write the applications of air compressor.	2M
	f)	Draw the velocity diagram of a centrifugal blower.	3M

PART -B

2.	a)	Explain about heat loss factor and time loss factor.	7M
	b)	Compare actual cycle and air standard cycle of SI engine.	7M
3.	a)	Explain the working of a four stroke CI engine and indicate the processes on PV and TS plots.	7M
	b)	Explain the working of fuel injection system of CI engine.	7M
4.	a)	Explain the phenomenon of knock in SI engine. Discuss the effect of engine variables on knock.	7M
	b)	Discuss about direct and indirect injection combustion chambers.	7M
5.	a)	Determine the process of evaluating indicated power of an IC engine.	7M
	b)	The following data was recorded during testing of a 4-stroke cycle gas engine. Diameter= 10 cm, Stroke= 10 cm, Speed= 1200 rpm, Area of the positive loop of the indicator diagram=5.75 cm^2, Area of the negative loop of the indicator diagram=0.25 cm^2, Length of the indicator diagram= 55 mm, Spring constant= 3.5 bar/cm. Find the indicated power of the engine.	7M
6.	a)	Derive the expression for work per kg of air compressed in a single cylinder reciprocating air compressor considering clearance and neglecting clearance.	7M
	b)	A single-stage double-acting air compressor is required to 14 m^3 of air per minute measured at 1.013 bars and 20^0C. The delivery pressure is 6 bar and the speed 300 rpm. Take the clearance volume as 5% of the swept volume with the compression and expansion index of n=1.3. Calculate: (i) Swept volume of the cylinder (ii) The delivery temperature (iii) Indicated power	7M
7.	a)	Explain the working of Root's blower with a neat sketch and derive the expression its efficiency.	7M
	b)	Derive the expression for slip factor and pressure coefficient in case of centrifugal compressor.	7M

|"|'"||"||'"||||

Code No: R1622032 $\boxed{\text{R16}}$ $\boxed{\text{SET - 2}}$

II B. Tech II Semester Regular/Supplementary Examinations, April/May - 2019
THERMAL ENGINEERING-I
(Com to ME, AME)

Time: 3 hours   Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answer **ALL** the question in **Part-A**
3. Answer any **FOUR** Questions from **Part-B**
~~~~~~

PART –A

1. a) Define actual cycle and air standard cycle.   2M

   b) Write a short note on turbo charging.   2M

   c) What is the Need for air movement in CI engine?   3M

   d) List out the methods used to find the friction power.   2M

   e) Classify compressors.   2M

   f) Draw the plot showing pressure and velocity variation of air passing through   3M
   impeller and diffuser.

PART -B

2. a) Discuss about Exhaust Blowdown and Loss due to Gas exchange process.   7M

   b) What is volumetric efficiency? Explain the factors that influence the   7M
   volumetric efficiency of IC engine.

3. a) Explain the working of a four stroke CI engine and indicate the processes on   7M
   PV and TS plots.

   b) With a neat sketch explain the working of Magneto ignition system of SI   7M
   engine.

4. a) Explain the stages of combustion in SI and CI engines.   7M

   b) What is ignition lag? Explain the factors effecting ignition lag.   7M

5. a) Explain how brake power can be evaluated by using Rope brake dynamometer.   7M

   b) A four-stroke, four-cylinder gasoline engine has a bore of 60 mm and a stroke   7M
   of 100 mm. on test it develops a torque of 66.5 Nm when running at 3000 rpm.
   If the clearance volume in each cylinder is 60 cc the relative efficiency with
   respect to brake thermal efficiency is 0.5 and the calorific value of the fuel is
   42 MJ/kg, determine the fuel consumption in kg/h and the brake mean effective
   pressure.

6. a) Derive the expression for minimum work per kg of air delivered by two stage   7M
   compressor with inter cooler.

   b) Determine the cylinder size for a double acting air compressor of 42 KW   7M
   indicated
   power, in which air is drawn at 1 bar and 16^0C and compressed according to
   the law $PV^{1.2}$= constant to 6 bar. The compressor runs at 100 rpm with average
   piston speed of 150 m/min. Neglect clearance.

|''|'''||''||'''||||

Code No: R1622032 $\boxed{\textbf{R16}}$ $\boxed{\text{SET - 2}}$

7. a) Explain the working of centrifugal compressor with a neat sketch.   7M

    b) Free air of 20 m^3/min is compressed from 1 bar to 2.2 bar. Find (i) the I.P   7M
        required if the compression carried out in roots bower, (ii) if the compression is
        carried out in Vane blower. Assume that there is 25% reduction in volume
        before the back flow occurs and (iii) the isentropic efficiency in each case.

|"|"'||"||"'|||

Code No: R1622032 $\boxed{\textbf{R16}}$ $\boxed{\text{SET - 3}}$

II B. Tech II Semester Regular/Supplementary Examinations, April / May - 2019
THERMAL ENGINEERING-I
(Com to ME, AME)

Time: 3 hours   Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **FOUR** Questions from **Part-B**
~~~~~~

PART –A

1.	a)	Write a short note on Loss due to Rubbing Friction.	2M
	b)	Write the qualities of an ideal lubrication system.	2M
	c)	Define pre-ignition and knocking.	2M
	d)	Draw the Sankey diagram of an IC engine.	3M
	e)	What is the basic difference between fan, blower and compressor?	2M
	f)	Define static pressure and temperature, stagnation temperature and temperature.	3M

PART -B

2.		Explain in detail various losses and their effects that occur in actual IC engine.	14M
3.	a)	Explain the principle of supercharging and turbo charging processes.	7M
	b)	With a neat sketch explain the working of Battery ignition system of SI engine.	7M
4.	a)	Bring out clearly the process of combustion in CI engines and also explain various stages of Combustion.	7M
	b)	What are the ideal requirements of SI engine fuel? Discuss how SI engine fuel rating is done.	7M
5.	a)	Explain Mores test to find friction power of a multi cylinder IC engine.	7M
	b)	A four stroke gas engine having a cylinder of 250mm diameter and stroke 450 mm has a volumetric efficiency of 80%, ratio of air to gas is 8: 1, and calorific value of gas is 20MJ/m^3 at NTP. Find the heat supplied to the engine per working cycle. If the compression ratio is 6, what is the heating value of the mixture per working stroke per m^3 of total cylinder volume?	7M
6.	a)	Compare rotary compressors and reciprocating compressors.	7M
	b)	A single cylinder, single acting air compressor has a cylinder diameter of 15.25 cm and a stroke of 22.8 cm. Air is drawn into the cylinder at a pressure of 1.013 bar and a temperature of 15^0C. It is compressed adiabatically to 6.1 bar. Calculate the theoretical power required to drive the compressor if it runs at 100 rpm and the mass of air compressed per minute.	7M
7.	a)	Explain the working of Vane sealed compressor with a neat sketch.	7M
	b)	Discuss about surging and choking.	7M

Code No: R1622032 $\boxed{\textbf{R16}}$ $\boxed{\text{SET - 4}}$

II B. Tech II Semester Regular/Supplementary Examinations, April / May - 2019
THERMAL ENGINEERING-I
(Com to ME, AME)

Time: 3 hours   Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **FOUR** Questions from **Part-B**
~~~~~~

PART –A

1.	a)	Explain the affect of valve overlap period on volumetric efficiency.	2M
	b)	Write a short note on supercharging.	2M
	c)	What is abnormal combustion?	2M
	d)	Write a short note on heat balance sheet.	3M
	e)	List out the advantages of multistage compression.	2M
	f)	Explain surging.	3M

PART -B

2.	a)	Compare Actual and Fuel-Air Cycles of CI Engines.	7M
	b)	Discuss about Loss due to Rubbing Friction and Loss due to Gas exchange process.	7M
3.	a)	Explain the working principle of wankle engine.	7M
	b)	What is carburetion? Explain the working of a simple carburetor with a neat sketch.	7M
4.	a)	What is the importance of flame speed? Explain in detail various factors that influence the flame speed.	7M
	b)	What are the ideal requirements of CI engine fuel? Discuss how CI engine fuel rating is done.	7M
5.	a)	Explain Willan's line method to find friction power of an IC engine.	7M
	b)	Find the air –fuel ratio of a four strokes, single cylinder, air cooled engine with fuel consumption time for 0.1 m^3 is 16 sec. The load is 17 kg at a speed of 2500 rpm. Find also brake specific fuel consumption in kg/kWh and brake thermal efficiency. Assume the density of air as 1.2 kg/m^3 and specific gravity of fuel as 0.73. The lower heating value of fuel is 40MJ/kg and dynamometer constant is 5000.	7M

1 of 2

|''|'''||''||''''||||

6. a) Explain the working of reciprocating compressor and derive the expression for work neglecting the clearance.   7M

    b) A single stage single acting compressor delivered $14m^3$ of free air per minute from 1 bar to 7 bar. The speed of compressor is 320 rpm. Assuming that compression and expansion follow the law $PV^{1.35}$=constant and clearance is 5% of the swept volume, find the diameter and stroke of the compressor. Take L= 1.4 D. The temperature and pressure of air at the suction are same as atmospheric air.   7M

7. a) Explain the working of axial flow compressor with a neat sketch.   7M

    b) Compare the work inputs for a Root – blower and Vane type compressor when inducted volume of $0.03~m^3$/revoluation is same and pressure is increased from 1.0 to 1.5 bar in both cases. Assume, for vane type, the internal compression takes place through half the pressure range.   7M

|"|'''||''||'''||||