Indra Ganesan

COLLEGE OF ENGINEERING

Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai
Accredited by NAAC with 'B+' Grade, 2(f) & 12B Status Institution by UGC

IG Valley, Madurai Main Road, Manikandam, Tiruchirappalli - 620012

NAAC DOCUMENTS

QUALITY INDICATOR FRAME WORK

CRITERION – 1

CURRICULAR ASPECTS

SUBMITTED BY

IQAC

INTERNAL QUALITY ASSURANCE CELL

INDRA GANESAN COLLEGE OF ENGINEERING

Criteria 1	Curricular Aspects	100

1.1 Curricular Planning and Implementation (20)

1.1.1 The Institution ensures effective curriculum planning and delivery through a well-planned and documented process including Academic calendar and conduct of continuous internal Assessment

Table of Content

INDRA GANESAN COLLEGE OF ENGINEERING

IG Valley, Manikandam, Tiruchirappalli, Tamil Nadu – 620 012, India
(Approved by AICTE, New Delhi, Affiliated to Anna University, Chennai-25)

DEPARTMENT OF MECHANICAL ENGINEERING

PREFACE OF THE COURSE FILE

Batch	: **2017-2021**
Academic Year	: **2018-2019 / EVEN**
Program	: **MECHANICAL ENGINEERING**
Year & Semester	: **2nd Year / 4th Semester**
Course Code	: **ME8493**
Name of the Course	: **Thermal Engineering - I**
Faculty in-charge	: **Mr.P.Venkatesan, AP/Mechanical**

Signature of the Faculty in-charge

HoD / Mechanical

Dr. G. Balakrishnan, M.E., Ph.D.,
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Indra Ganesan College of Engineering

Department of Mehanical Engineering

Master Time Table:: Even Semester 2018-19

I Year LH 202	09.15 - 10.05	10.05 - 10.55		11.10 - 12.00	12.00 - 12.50		01.20 - 02.10	02.10 - 03.00		03.10 - 04.00
Period	1	2	BREAK	3	4	LUNCH	5	6	BREAK	7
Mon	EM	ENG		MAT	ENG		MS	MAT		BEIE
Tue	MS	MAT		EVS	EP.LAB		EP.LAB	EP.LAB		EP.LAB
Wed	ENG	BEIE		EM	MAT		EM	MS		EVS
Thu	BEIE	EVS		EM	BEEI		BEEI	BEEI		BEEI
Fri	MAT	EM		BEIE	MS		EVS	ENG		EM

II Year LH 101	09.15 - 10.05	10.05 - 10.55		11.10 - 12.00	12.00 - 12.50		01.20 - 02.10	02.10 - 03.00		03.10 - 04.00
Period	1	2	BREAK	3	4	LUNCH	5	6	BREAK	7
Mon	SNM	SOM		EM	KOM		TE-I	Adv. R&W		Adv R&W
Tue	MT-II	SOM		KOM	SNM		EM	TE-I		SOM LAB
Wed	KOM	SNM		MT-II	EM		SOM	SNM		TE-I
Thu	TE-I	KOM		SNM	MT-II		SOM LAB	SOM LAB		SOM LAB
Fri	EM	MT-II		SOM	MT LAB-II		MT LAB-II	MT LAB-II		MT LAB-II

III Year LH 102	09.15 - 10.05	10.05 - 10.55		11.10 - 12.00	12.00 - 12.50		01.20 - 02.10	02.10 - 03.00		03.10 - 04.00
Period	1	2	BREAK	3	4	LUNCH	5	6	BREAK	7
Mon	GDJP	FEA		UCMP	DTS		GDJP	AE		POM
Tue	FEA	UCMP		DTS	AE		FEA	POM		AE
Wed	UCMP	POM		FEA	COM.LAB		COM.LAB	COM.LAB		COM.LAB
Thu	AE	GDJP		DTS	UCMP		CAD LAB	CAD LAB		CAD LAB
Fri	POM	DTS		GDJP	DFP		DFP	DFP		DFP

IV Year LH 103	09.15 - 10.05	10.05 - 10.55		11.10 - 12.00	12.00 - 12.50		01.20 - 02.10	02.10 - 03.00		03.10 - 04.00
Period	1	2	BREAK	3	4	LUNCH	5	6	BREAK	7
Mon	AIC	EE		PPC	TATS		PROJECT	PROJECT		PROJECT
Tue	EE	PPC		AIC	TATS		PROJECT	PROJECT		TATS
Wed	PPC	AIC		EE	TATS		TATS	TATS		TATS
Thu	EE	TATS		AIC	PPC		TATS	TATS		TATS
Fri	PROJECT	PROJECT		PROJECT	PROJECT		PROJECT	PROJECT		PROJECT

Dr.S.BHARATHI RAJA
PRINCIPAL

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ME8493 THERMAL ENGINEERING - I

L	T	P	C
3	0	0	3

OBJECTIVES:

To integrate the concepts, laws and methodologies from the first course in thermodynamics into analysis of cyclic processes

To apply the thermodynamic concepts into various thermal application like IC engines, Steam.

Turbines, Compressors and Refrigeration and Air conditioning systems

(Use of standard refrigerant property data book, Steam Tables, Mollier diagram and Psychrometric chart permitted)

UNIT I GAS AND STEAM POWER CYCLES 9

Air Standard Cycles - Otto, Diesel, Dual, Brayton – Cycle Analysis, Performance and Comparison – Rankine, reheat and regenerative cycle.

UNIT II RECIPROCATING AIR COMPRESSOR 9

Classification and comparison, working principle, work of compression - with and without clearance, Volumetric efficiency, Isothermal efficiency and Isentropic efficiency. Multistage air compressor with Intercooling. Working principle and comparison of Rotary compressors with reciprocating air compressors.

UNIT III INTERNAL COMBUSTION ENGINES AND COMBUSTION 9

IC engine – Classification, working, components and their functions. Ideal and actual : Valve and port timing diagrams, p-v diagrams- two stroke & four stroke, and SI & CI engines – comparison. Geometric, operating, and performance comparison of SI and CI engines. Desirable properties and qualities of fuels. Air-fuel ratio calculation – lean and rich mixtures. Combustion in SI & CI Engines – Knocking – phenomena and control

UNIT IV INTERNAL COMBUSTION ENGINE PERFORMANCE AND SYSTEMS 9

Performance parameters and calculations. Morse and Heat Balance tests. Multipoint Fuel Injection system and Common Rail Direct Injection systems. Ignition systems – Magneto, Battery and Electronic. Lubrication and Cooling systems. Concepts of Supercharging and Turbocharging – Emission Norms.

UNIT V GAS TURBINES 9

Gas turbine cycle analysis – open and closed cycle. Performance and its improvement - Regenerative, Intercooled, Reheated cycles and their combinations. Materials for Turbines.

TOTAL:45 PERIODS

OUTCOMES:

Upon the completion of this course the students will be able to

CO1 Apply thermodynamic concepts to different air standard cycles and solve problems

CO2 Solve problems in single stage and multistage air compressors

CO3 Explain the functioning and features of IC engines, components and auxiliaries

CO4 Calculate performance parameters of IC Engines.

CO5 Explain the flow in Gas turbines and solve problems.

CO6 Explain the various Gas turbine cycles.

TEXT BOOKS:

1. Kothandaraman.C.P., Domkundwar. S,Domkundwar. A.V., "A course in thermal Engineering", Fifth Edition, "Dhanpat Rai & sons , 2016
2. Rajput. R. K., "Thermal Engineering" S.Chand Publishers, 2017

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REFERENCES:

1. Arora.C.P, "Refrigeration and Air Conditioning ," Tata McGraw-Hill Publishers 2008
2. Ganesan V.." Internal Combustion Engines" , Third Edition, Tata Mcgraw-Hill 2012
3. Ramalingam. K.K., "Thermal Engineering", SCITECH Publications (India) Pvt. Ltd., 2009.
4. Rudramoorthy, R, "Thermal Engineering ",Tata McGraw-Hill, New Delhi,2003
5. Sarkar, B.K,"Thermal Engineering" Tata McGraw-Hill Publishers, 2007

HoD/Mech

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DEPARTMENT OF MECHANICAL ENGINEERING

Lecture Schedule

Degree/Program: **B.E / MECHANICAL**
Duration: **Dec 2018 - Apr 2019**

Course code &Name: ME 8493-Thermal Engineering – I
Semester: **IV** Faculty: **Mr. P. Venkatesan**

AIM:

To expose the students to basics laws of thermodynamics and to apply the concepts into various thermal applications such as IC engines, Gas Turbines, etc.

OBJECTIVES:

To impart knowledge on

(i) To integrate the concepts, laws and methodologies from the first course in thermodynamics into analysis of cyclic processes

(ii) To apply the thermodynamic concepts into various thermal application like IC engines, Steam.

(iii) Turbines, Compressors and Refrigeration and Air conditioning systems

PREREQUISITES: Thermal Engineering – I

COURSE OUTCOMES:

After the course, the student should be able to:

CO	Course Outcomes	POs	PSOs
CO215.1	Apply thermodynamic concepts to different air standard cycles and solve problems.	1,2,3,4,7,9	1,2,3
CO215.2	Solve problems in single stage and multistage air compressors	1,2,3,4,7,9	1,2,3
CO215.3	Explain the functioning and features of IC engines, components and auxiliaries.	1,2,3,4,7,9	1,2,3
CO215.4	Calculate performance parameters of IC Engines.	1,2,3,4,7,9	1,2,3
CO215.5	Explain the flow in Gas turbines and solve problems.	1,2,3,4,7,9	1,2,3
CO215.6	Differentiate Concepts of Supercharging and Turbocharging	1,2,3,4,7,9	1,2,3

S.No	Date	Period	Topics to be Covered	Book & Page. No.
UNIT -I - GAS AND STEAM POWER CYCLES				**Target periods :09**
1	17.12.18	5	Air Standard Cycles	T1
2	18.12.18	6	Otto Cycles , Diesel Cycles	T1
3	19.12.18	7	Dual Cycles , Brayton Cycles	T1
4	20.12.18	1	Cycle Analysis	T1
5	24.12.18	5	Performance and Comparison – Rankine Cycles	T1
6	25.12.18	6	Performance and Comparison – reheat Cycles	R2
7	26.12.18	7	Performance and Comparison – regenerative cycle	R2
8	27.12.18	1	Problems on Rankine cycle	R2
9	31.12.18	5	Problems on Reheat cycle	R2

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10	02.01.19	6	Problems on Rankine cycle and reheat cycle	T1
11	03.01.19	7	Problems on Reheat cycle and Regenerative cycle	T1
12	05.01.19	1	Problems on Regenerative cycle	T1
UNIT II -RECIPROCATING AIR COMPRESSOR				**Target periods :09**
13	07.01.19	5	Classification and comparison of compressor	T1
14	08.01.19	6	working principle, work of compression	T1
15	09.01.19	7	Compression with and without clearance	T1
16	10.01.19	1	Volumetric efficiency, Isothermal efficiency	T1
17	19.01.19	7	Isentropic efficiency	R1
18	21.01.19	5	Multistage air compressor with Intercooling.	R1
19	22.01.19	6	Working principle and comparison of Rotary compressors	R1
20	23.01.19	7	Working principle and comparison of reciprocating compressors.	R1
21	24.01.19	1	Problems on efficiency	T1
22	28.01.19	5	Problems on Rotary compressors	T1
23	29.01.19	6	Problems on Reciprocating air compressors	T1
UNIT III - INTERNAL COMBUSTION ENGINES AND COMBUSTION				**Target Periods :09**
24	30.01.19	7	IC engine – Classification, working, components and their functions	T1
25	02.02.19	5	Ideal and actual : Valve and port timing diagrams	T1
26	04.02.19	5	p-v diagrams- two stroke & four stroke	T1
27	05.02.19	6	SI & CI engines comparison	T1
28	06.02.19	7	Geometric, operating, and performance comparison of SI and CI engines	T1
29	07.02.19	1	Desirable properties and qualities of fuels.	T1
30	09.02.19	6	Air-fuel ratio calculation	T1
31	11.02.19	5	lean and rich mixtures	R3
32	12.02.19	6	Combustion in SI & CI Engines	R3
33	13.02.19	7	Knocking	R3
34	14.02.19	1	phenomena and control	R2
35	16.02.19	5	Problems	R3
UNIT IV - INTERNAL COMBUSTION ENGINE PERFORMANCE AND SYSTEMS				**Target Periods :09**
36	18.02.19	5	Performance parameters and calculations	T2
37	19.02.19	6	Morse and Heat Balance tests	T2
38	20.02.19	7	Multipoint Fuel Injection system	T2
39	21.02.19	1	Common Rail Direct Injection systems	T2
40	23.02.19	6	Ignition systems	T2
41	25.02.19	5	Magneto, Battery and Electronic	T2
42	26.02.19	6	Lubrication and Cooling systems	T2
43	27.02.19	7	Concepts of Supercharging and Turbocharging	R4
44	28.02.19	1	Emission Norms	R4
45	02.03.19	7	Problems	R4
UNIT V – GAS TURBINES				**Target Periods:09**
46	04.03.19	5	Gas turbine cycle analysis	T2
47	05.03.19	6	open and closed cycle	T2
48	06.03.19	7	Performance and its improvement	T2
49	07.03.19	1	Regenerative and their combinations	T2
50	09.03.19	1	Intercooled and their combinations	T2
51	11.03.19	5	Reheated cycles and their combinations	R5
52	12.03.19	6	Materials for Turbines	R4

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53	13.03.19	7	Materials for Turbines	R4
54	14.03.19	1	Problems	T1
Content Beyond the Syllabus				
55	18.03.19	5	Recent Trends in Internal Combustion Engines	Material

Book Reference - Text Books

Sl.	Title of the Book	Author	Publisher	Year
1.	A course in thermal Engineering	Kothandaraman.C.P., Domkundwar. S,Domkundwar. A.V.	Fifth Edition, Dhanpat Rai & sons	2016
2.	Thermal Engineering	Rajput. R. K	S.Chand Publishers	2017

Book Reference – References

Sl	Title of the Book	Author	Publisher	Year
1.	Refrigeration and Air Conditioning	Arora.C.P	Tata McGraw-Hill Publishers	2008
2.	Internal Combustion Engines	Ganesan V	Third Edition, Tata Mcgraw-Hill	2012
3.	Thermal Engineering	Ramalingam. K.K.	SCITECH Publications (India) Pvt. Ltd.	2009
4	Thermal Engineering	Rudramoorthy, R	Tata McGraw-Hill, New Delhi	2003
5	Thermal Engineering	Sarkar, B.K	Tata McGraw-Hill Publishers	2007

Website Reference:

https://onlinecourses.nptel.ac.in/noc23_me31/preview

https://vardhaman.org/wp-content/uploads/2021/03/THERMAL-ENGINEERING-II-1.pdf

https://www.thermal-engineering.org/

Signature of the Faculty in-charge

HoD / Mechanical

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DEPARTMENT OF MECHANICAL ENGINEERING

Proof of Conduct of Content Beyond Syllabus(CBS)

Name of the Faculty : Mr.P.Venkatesan **Course Code & Name: ME8493 Thermal Engineering I**

Degree & Program: B.E. /Mechanical **Semester: IV Academic Year: 2018-2019**

TOPIC: RECENT TRENDS IN INTERNAL COMBUSTION ENGINES

INTRODUCTION:
Recent trends in internal combustion engines aim to reduce fuel consumption and also lower exhaust gas emissions. The aim of this special issue is to bring all topics and all the scientific/technological approaches in recent trends in internal combustion engines.
Easy fuel burning: Fuel is burned quicker and at lower temperatures, reducing heat energy loss compared to a conventional spark engine. Throttle less induction: Throttle less induction system eliminates frictional pumping losses incurred in traditional (throttle body) spark engines.

The Future of Internal Combustion Engine Design

1. CO_2 emissions restrictions
2. Engine efficiency for reducing those emissions
3. Diesel vs. traditional gas
4. EVs vs. ICE vehicles

1. Restrictions on CO_2 Emissions
The Global Carbon Project reported that worldwide carbon dioxide emissions were expected to rise by 4.9% in 2021, nearly back to their record 2019 levels. Emissions plummeted from 2019 to 2020 (5.4%) as the COVID pandemic brought travel to a near-standstill.
In August 2021, the U.S. Environmental Protection Agency (EPA) proposed revised Greenhouse Gas Emissions guidelines for passenger cars and trucks in model years 2023-2026. The proposed standards include 10% greater emissions improvement than current standards for MY 2023 vehicles and 5% greater emissions improvement in each of the following 3 years. Current standards only become 1.5% more stringent each year.
At the same time, EPA announced plans to reduce pollutants from heavy-duty trucks through stricter rules. The agency expects the new rules will apply to heavy-duty vehicles beginning in MY 2027.
Regardless of the EPA's plans, the **political and environmental atmosphere** is still pushing internal combustion engine efficiency improvements more than consumer demand is. Whether engineers and executives personally agree or not with the changes in the air, the industry is moving steadily in that direction.
2. How to Increase Efficiency of IC Engine Emissions?
The Office of Energy Efficiency & Renewable Energy reports that manufacturers reduced pollutant emissions by more than 99% over a 30-year span. Creative minds accomplished this **while maintaining or increasing fuel economy.**
In addition to gasoline and diesel, manufacturers are studying other ways to increase fuel economy:

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- Using biodiesel
- Using other alternative or renewable fuels
- Combining IC engines with hybrid electric power trains

3. Diesel Engines vs. Traditional Gasoline Engines

When Europeans switched from diesel to gasoline cars, there was a related increase in carbon dioxide emissions. In an unexpected twist, some of today's auto strategies are based around diesel engines.

Many big diesel trucks actually create less CO_2 emission than some smaller, gas-powered vehicles, reports indicate. Increased technology has produced diesel-powered engines that **can fuel smaller vehicles** and provide:

- Better gas mileage
- Lower carbon emission rates
- Greater torque
- A longer-lasting engine

. Battery Electric Vehicles vs. Internal Combustion Engine Vehicles

You knew this was coming. Although gasoline-powered engines don't appear to be completely disappearing, they do face stiff competition from their electric rivals.

Even BMW, whose board member in charge of development called auto electrification "overhyped" in 2019, is signaling the beginning of the end. In October 2021, BMW announced it would stop making internal combustion engines at one of its plants (in Munich) by 2024. BMW is aiming for 50% of its new-car sales to be electric by 2030,

One thing IC engine supporters could always hang over the heads of the pro-electric crowd was **the battery.** Specifically, its:

- Size
- Cost
- Longevity

Website Referencece:

- https://www.horizontechnology.biz/blog/future-of-internal-combustion-engine-design-trends

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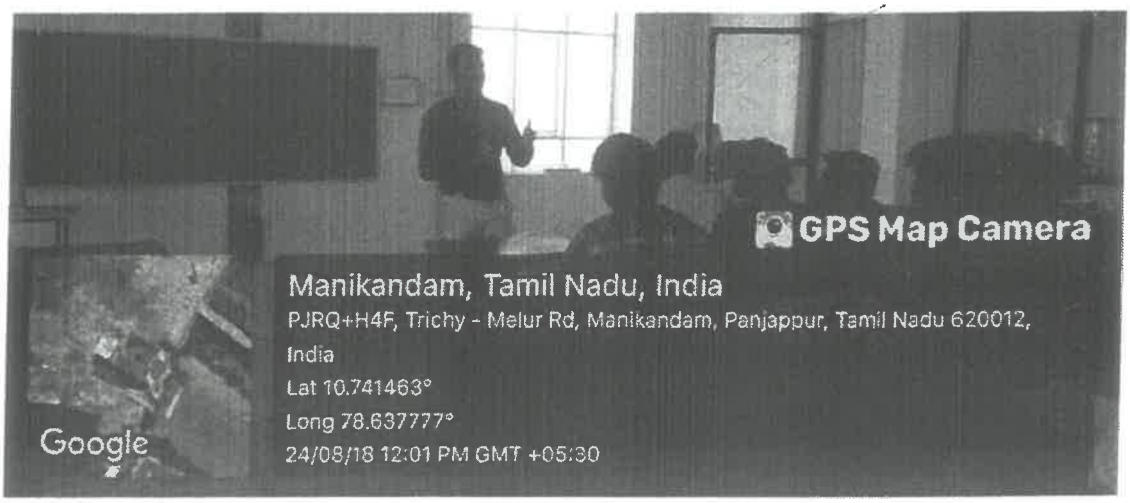

Signature of the Faculty in-charge

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DEPARTMENT OF MECHANICAL ENGINEERING

Identification of Curricular Gap & Content Beyond Syllabus(CBS)

Name of the Faculty : Mr.P.Venkatesan **Course Code & Name: ME 8493 Thermal Engineering I**
Degree & Program: B.E. /Mechanical **Semester: IV** **Academic Year: 2018-2019 /EVEN**

I.Mapping of Course Outcomes with POs & PSOs.(before CBS)

Table.1 Mapping of COs, C, PSOs with POs - before CBS.

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO215.1	3	3	2	1	-	-	1	-	1	-	-	-	3	2	2
CO215.2	3	3	2	1	-	-	1	-	1	-	-	-	3	2	2
CO215.3	3	3	2	1	-	-	1	-	1	-	-	-	3	2	2
CO215.4	3	3	2	1	-	-	1	-	1	-	-	-	3	2	2
CO215.5	3	3	2	1	-	-	1	-	1	-	-	-	3	2	2
CO215.6	3	3	2	1	-	-	1	-	1	-	-	-	3	2	2
CO215	3	3	2	1	-	-	1	-	1	-	-	-	3	2	2

II. Identification of content beyond syllabus.

Table.2 Identification of content beyond syllabus

Details of Content Beyond Syllabus(CBS) added	POs strengthened/ vacant filled	CO/Unit
Recent Trends in Internal Combustion Engines	PO7 strengthened	CO215.3 & CO215.4 III & IV

III. Mapping of Course Outcomes with POs & PSOs. (After CBS)

Table.3 Mapping of COs, C, PSOs with POs- after CBS.

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO215.1	3	3	2	1	-	-	1	-	1	-	-	-	3	2	2
CO215.2	3	3	2	1	-	-	1	-	1	-	-	-	3	2	2
CO215.3	3	3	2	1	-	-	*2	-	1	-	-	-	3	2	2
CO215.4	3	3	2	1	-	-	*2	-	1	-	-	-	3	2	2
CO215.5	3	3	2	1	-	-	1	-	1	-	-	-	3	2	2
CO215.6	3	3	2	1	-	-	1	-	1	-	-	-	3	2	2
CO215	3	3	2	1	-	-	1	-	1	-	-	-	3	2	2

Signature of the Faculty **HoD/MECHANICAL**

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DEPARTMENT OF MECHANICAL ENGINEERING

Assignment Question Paper

Assignment – 01				**Date of Issue:**	13.03.2019	**Marks**	10
Course code	ME8493	**Course Title**	Thermal Engineering - I				
Year	II	**Semester/Section**	IV/A	**Date of Submission:**	**Year**		

Q.No	Questions	CO
1	A diesel engine operating an air standard diesel cycle has 20cm bore and 30cmstroke.the clearance volume is 420cm3.if the fuel is injected at 5% of the stroke,find the air standard efficiency.	C215.1
2	In an air standard dual cycle, the pressure and temperature at the beginning of the compression are 1 bar and 57oC respectively. The heat supplied in the cycle is 1250 kilo Joule/kg, two-third of this being added at constant volume and rest a constant pressure. If the compression ratio is 16, determine the maximum pressure and temperature in the cycle thermal efficiency and MEP.	C215.1

Name and Signature of the Faculty Incharge

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DEPARTMENT OF MECHANICAL ENGINEERING

Assignment Answer Sheet

Name of the Student : P. Ponnar

AU Register Number: 811217114022

Assignment – 01			Date of Issue:	13.03.2019		Marks	10
Course code	ME8493	Course Title	Thermal Engineering - I				
Year	II	Semester/Section	IV/A	Date of Submission:	18.3.2019		

Q.No	Questions	CO
1	A diesel engine operating an air standard diesel cycle has 20cm bore and 30cmstroke.the clearance volume is 420cm3.if the fuel is injected at 5% of the stroke,find the air standard efficiency.	C215.1
2	In an air standard dual cycle, the pressure and temperature at the beginning of the compression are 1 bar and 57oC respectively. The heat supplied in the cycle is 1250 kilo Joule/kg, two-third of this being added at constant volume and rest a constant pressure. If the compression ratio is 16, determine the maximum pressure and temperature in the cycle thermal efficiency and MEP.	C215.1

Mark Allocation

Rubrics	Marks Allocated	Marks obtained
Content Quality	6	5
Presentation Quality	2	2
Timely submission	2	2
Total marks	10	9

P. VENKATESAN

Name and Signature of the Faculty Incharge

HoD/Mech

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IGCE/EXAMCELL/IA/MECH/2018-19/Even/UT/001

INTERNAL ASSESSMENT TEST – I

Test Time: (FN) 11.30 am to 1.00 pm - (AN) 3.30 pm to 5.00 pm

DATE	YEAR / SESSION	31.12.2018		02.01.2019		03.01.2019	
BRANCH		FN	AN	FN	AN	FN	AN
MECH	II	MA8452	ME8492	ME8451	ME8491	CE8395	ME8493
	III	ME6601	MG6851	ME6602	ME6603	ME6604	ME6004
	IV	MG6863	IE6605	ME6016			

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INDRA GANESAN COLLEGE OF ENGINEERING

IG Valley, Manikandam, Tiruchirappalli, Tamil Nadu – 622 012, India
(Approved by AICTE, New Delhi and affiliated to Anna University, Chennai)

Internal Assessment Test Answer Book

Name	P.Bennan			Year/ Semester	II/III
Reg. No.	8112 17114 027	Date/Session	03/09/2019-FN	Department	Mechanical
Course code	ME8493	Course Title	Thermal Engineering -1		
Internal Assessment Test	IAT 1 ☑	IAT 2 ☐	IAT 3 ☐	Model ☐	
Name and Signature of the Invigilator with date	C. [signature] 03/09/2019				

Instruction to the Student: Put tick mark to the question attended in the column against question.

Part A			Part B / Part C					
Q. No.	✓	Marks	Q. NO.	✓	a Marks	✓	b Marks	Total Marks
1		2	11				10	10
2		2	12		06			06
3		1	13		08			08
4		1	14					
5		2	15					
6		1	16					
7		1					Total	24
8		1	Grand Total			Name and Signature of the Examiner with date		
9		1	38/50	76/100		[signature] 5/1/2019 (P. Venkatesan)		
10		2						
Total		14						

To be filled by the examiner

Course Outcomes	1	2	3	4	5	6	Total
Marks allotted	50						50
Marks Obtained	38						38

IQAC Audit - Remarks	Name and Signature of the IQAC member

[signature]

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INDRA GANESAN COLLEGE OF ENGINEERING

IG VALLEY, MANIDANDAM, TIRUCHIRAPPALLI – 620 012

DEPARTMENT OF MECHANICAL ENGINEERING

ACADEMIC YEAR 2018 – 2019 (EVEN SEMESTER)

STUDENTS MARK STATEMENT- CO BASED

INTERNAL ASSESSMENT TEST – I

SUBJECT CODE &TITLE: ME 8493-THERMAL ENGINEERING – I

YEAR/SEM: II/IV **MONTH & YEAR: JAN & 2019**

S.NO	REG NO	STUDENT NAME	Marks Alloted COX						Marks Obtained COY						Total (100)
			CO 1	CO 2	CO 3	CO 4	CO 5	CO 6	CO 1	CO 2	CO 3	CO 4	CO 5	CO 6	
1	811217114001	S.Abdul Yasin	50	-	-	-	-	-	31	-	-	-	-	-	62
2	811217114002	R.Ajithkumar	50	-	-	-	-	-	28	-	-	-	-	-	56
3	811217114003	S.Anandha Kumar	50	-	-	-	-	-	34	-	-	-	-	-	68
4	811217114004	M.Ananth	50	-	-	-	-	-	18	-	-	-	-	-	36
5	811217114005	R.Chellaiah	50	-	-	-	-	-	41	-	-	-	-	-	82
6	811217114006	C.Devarajan	50	-	-	-	-	-	26	-	-	-	-	-	52
7	811217114007	S.Dhamotharan	50	-	-	-	-	-	42	-	-	-	-	-	84
8	811217114008	A.Dhanussh	50	-	-	-	-	-	38	-	-	-	-	-	76
9	811217114009	C.Dharanidharan	50	-	-	-	-	-	33	-	-	-	-	-	66
10	811217114010	N.Dharman	50	-	-	-	-	-	14	-	-	-	-	-	28
11	811217114013	M.Hariharasudhan	50	-	-	-	-	-	29	-	-	-	-	-	58
12	811217114014	A.Jawagar	50	-	-	-	-	-	33	-	-	-	-	-	66
13	811217114015	Karthick S	50	-	-	-	-	-	12	-	-	-	-	-	24
14	811217114016	D.Madhan	50	-	-	-	-	-	29	-	-	-	-	-	58
15	811217114018	M.Mohammed Faizal	50	-	-	-	-	-	46	-	-	-	-	-	92
16	811217114019	S.Mohanraj	50	-	-	-	-	-	37	-	-	-	-	-	74
17	811217114020	R.Munishwaran	50	-	-	-	-	-	31	-	-	-	-	-	62
18	811217114021	P.Murugan	50	-	-	-	-	-	A	-	-	-	-	-	A
19	811217114022	P.Ponnar	50	-	-	-	-	-	38	-	-	-	-	-	76
20	811217114023	M.Prakash	50	-	-	-	-	-	42	-	-	-	-	-	84
21	811217114025	M.Rajamuni	50	-	-	-	-	-	17	-	-	-	-	-	34
22	811217114026	La.Ramanathan	50	-	-	-	-	-	22	-	-	-	-	-	44
23	811217114027	G.Sairam	50	-	-	-	-	-	37	-	-	-	-	-	74
24	811217114028	R.Sankaralingam	50	-	-	-	-	-	33	-	-	-	-	-	66

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25	811217114030	M.Selvakumar	50	-	-	-	-	-	16	-	-	-	-	-	38
26	811217114031	A.Shameer	50	-	-	-	-	-	40	-	-	-	-	-	80
27	811217114032	D.Sivakumar	50	-	-	-	-	-	33	-	-	-	-	-	66
28	811217114033	A.Sriram	50	-	-	-	-	-	41	-	-	-	-	-	82
29	811217114034	S.Thirumurugan	50	-	-	-	-	-	29	-	-	-	-	-	58
30	811217114035	A.Vengatesh	50	-	-	-	-	-	45	-	-	-	-	-	90
31	811217114036	M.Venkatesh	50	-	-	-	-	-	12	-	-	-	-	-	24
32	811217114037	P.Vinayagamoorthy	50	-	-	-	-	-	39	-	-	-	-	-	78
33	811217114038	B.Vinothraja	50	-	-	-	-	-	33	-	-	-	-	-	66
34	811217114039	D.Yugesh	50	-	-	-	-	-	37	-	-	-	-	-	74
35	811217114301	K.Arun	50	-	-	-	-	-	19	-	-	-	-	-	38
36	811217114302	K.Santhosh Kumar	50	-	-	-	-	-	35	-	-	-	-	-	70
37	811217114303	R.Thirumoorthi	50	-	-	-	-	-	44	-	-	-	-	-	88
38	811217114012	R.Hariharan	50	-	-	-	-	-	31	-	-	-	-	-	62
39	811217114029	C.Sarathkumar	50	-	-	-	-	-	A	-	-	-	-	-	A

MARKS RANGE:

<20	20-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100
0	3	4	1	5	10	7	6	1

Total No.of Candidates Present	37
Total No.of Candidates Absent	02
Total No.of Students Pass	29
Total No. of Students Fail	8
Percentage of Pass	78.4%

STAFF INCHARGE **HoD/MECH** **PRINCIPAL**

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IGCE/EXAMCELL/IA/MECH/2018-19/Even/UT/002

INTERNAL ASSESSMENT RE TEST – I

Test Time: (FN) 11.30 am to 1.00 pm - (AN) 3.30 pm to 5.00 pm

DATE / BRANCH	YEAR / SESSION	07.01.2019 FN	07.01.2019 AN	08.01.2019 FN	08.01.2019 AN	09.01.2019 FN	09.01.2019 AN
MECH	II	MA8452	ME8492	ME8451	ME8491	CE8395	ME8493
	III	ME6601	MG6851	ME6602	ME6603	ME6604	ME6004
	IV	MG6863	IE6605	ME6016			

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IGCE/EXAMCELL/IA/MECH/2019-20/Even/UT/005

MODEL TEST – I

Test Time: (AN) 2.00 pm to 5.00 pm

DATE / BRANCH	YEAR / SESSION	11.03.19	12.03.19	13.03.19	14.03.19	15.03.19	16.03.19
		AN	AN	AN	AN	AN	AN
MECH	II	MA8353	ME8391	CE8394	ME8351	EE8353	-
	III	ME8595	ME8593	ME8501	ME8594	ME8691	-
	IV	ME6701	ME6702	ME6703	GE6757	ME6005	ME6012

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IGCE/EXAMCELL/IA/MECH/2018-19/Even/UT/002

INTERNAL ASSESSMENT TEST – II

Test Time: (FN) 11.30 am to 1.00 pm - (AN) 3.30 pm to 5.00 pm

DATE	YEAR / SESSION	20.02.2019		21.02.2019		22.02.2019	
BRANCH		FN	AN	FN	AN	FN	AN
MECH	II	MA8452	ME8492	ME8451	ME8491	CE8395	ME8493
	III	ME6601	MG6851	ME6602	ME6603	ME6604	ME6004
	IV	MG6863	IE6605	ME6016			

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IGCE/EXAMCELL/IA/MECH/2018-19/Even/UT/004

INTERNAL ASSESSMENT RE TEST – II

Test Time: (FN) 11.30 am to 1.00 pm - (AN) 3.30 pm to 5.00 pm

DATE / BRANCH	YEAR / SESSION	27.02.2019		28.02.2019		01.03.2019	
		FN	AN	FN	AN	FN	AN
MECH	II	MA8452	ME8492	ME8451	ME8491	CE8395	ME8493
	III	ME6601	MG6851	ME6602	ME6603	ME6604	ME6004
	IV	MG6863	IE6605	ME6016			

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IGCE/EXAMCELL/IA/MECH/2019-20/Even/UT/006

MODEL RE TEST – I

Test Time: (AN) 2.00 pm to 5.00 pm

DATE / BRANCH	YEAR / SESSION	18.03.19	19.03.19	20.03.19	21.03.19	22.03.19	23.03.19
		AN	AN	AN	AN	AN	AN
MECH	II	MA8353	ME8391	CE8394	ME8351	EE8353	-
	III	ME8595	ME8593	ME8501	ME8594	ME8691	-
	IV	ME6701	ME6702	ME6703	GE6757	ME6005	ME6012

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Register Number:											

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Internal Assessment Exam – 1			Date	03/01/2019	Marks	50
Course code	**ME 8493**	**Course Title**	**Thermal Engineering I**			
Regulation	**2017**	**Duration**	**90 minutes**	**Academic Year**	**2018-19**	
Year	**II**	**Semester**	**IV**	**Department**	**Mechanical Engg**	

COURSE OUTCOMES

CO1:	Apply thermodynamic concepts to different air standard cycles and solve problems.
CO2:	Solve problems in single stage and multistage air compressors
CO3:	Explain the functioning and features of IC engines, components and auxiliaries.
CO4:	Calculate performance parameters of IC Engines.
CO5:	Explain the flow in Gas turbines and solve problems
CO6:	Acknowledged the enriched knowledge about the advanced technologies which adopt in real-time in Industry, applying artificial Intelligence to this systems.

Q.No.	Question	CO	BTS
	PART A **(Answer all the Questions 10 x 2 = 20 Marks)**		
1	For a given compression ratio Otto cycle is more efficient than Diesel cycle. Justify (Nov 2013)	CO1	K4
2	What is mean by mean effective pressure? (Nov 2013,14,16,17)	CO1	
3	Mention the ranges of compression ratio for SI and CI engine. (May 2013)	CO1	
4	What is meant by Air standard efficiency? (Apr/May 2014,17)	CO1	
5	Define compression ratio and cut off ratio. (May 2014)	CO1	
6	Draw the actual PV diagram of two stroke engine. (Nov 2014)	CO1	
7	Draw the Brayton cycle on p-v and T-s diagram. (May 2015,17)	CO1	
8	Differentiate any three major differences between Otto and diesel cycle. (Nov 2015,16)	CO1	K4
9	What are the assumption made in the air standard cycle? (May 2015,16/Nov 2016)	CO1	
10	What are the effects of Introducing regeneration in the basic gas turbine cycle?	CO1	
	PART B **(Answer all the Questions 2 x 10 = 20 Marks)**		
11a	Derive an expression for air standard efficiency and mean effective pressure of Otto cycle. (May/June 2013)	CO1	K4
	OR		
11b	A six cylinder petrol engine has a compression ratio 5%. The clearance volume of each cylinder is 110 cc. it operates on a four stroke constant volume cycle and the indicated efficiency ratio referred to air std. efficiency is 0.56 at the speed of 2400 rpm. It consumes 10 kg of fuel per hour. The calorific value of fuel is 44000 kJ/kg. Determine the average indicated mean effective pressure.	CO1	
12a	Derive an expression for air standard efficiency and mean effective pressure of Diesel cycle. (May/June 2013)	CO1	K4
	OR		
12b	Air enters a Brayton cycle at 100 kPa, 300K. The compressive ratio is 8:1. The maximum temperature in the cycle is 1300K. Find, 1.Air standard efficiency, 2.Compressor and turbine work and 3. Work ratio. (Nov 2014)	CO1	
	PART C **(Answer all the Questions 1 x 10 = 10 Marks)**		
13a	Derive an expression for air standard efficiency and mean effective pressure of Dual cycle. (May/June 2014)	CO1	K4
	OR		
13b	An air std. DUAL cycle has a compression ratio of 16 and compression begins at 1 bar and 50°C. The maximum pressure is 70 bar. The heat transferred to air at constant pressure is equal to heat transferred at constant volume. Find the temperature at a cardinal point, cycle efficiency and mean effective pressure. Take C_p = 1.005 kJ/kgK and C_v = 0.718 kJ/kgK. (Nov/Dec – 2011,12 , May/June 2013)	CO1	

Mr.P.Venkatesan :
Course Faculty
(Name /Sign /Date)

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IG Valley, Madurai Main Road
Manikandam, Trichy-620 012.

HoD
(Name /Sign / Date)

	Register Number:												

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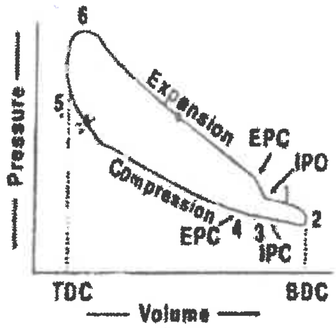
Internal Assessment Exam – 1 Key Notes		Date		Marks	50
Course code	**ME 8493**	**Course Title**	**Thermal Engineering I**		
Regulation	**2017**	**Duration**	**90 minutes**	**Academic Year**	**2018-19**
Year	**II**	**Semester**	**IV**	**Department**	**Mechanical Engg**

COURSE OUTCOMES	
CO1:	Apply thermodynamic concepts to different air standard cycles and solve problems.
CO2:	Solve problems in single stage and multistage air compressors
CO3:	Explain the functioning and features of IC engines, components and auxiliaries.
CO4:	Calculate performance parameters of IC Engines.
CO5:	Explain the flow in Gas turbines and solve problems
CO6:	Acknowledged the enriched knowledge about the advanced technologies which adopt in real-time in Industry, applying artificial Intelligence to this systems.

Q.No.	Question	CO	BTS
	PART A **(Answer all the Questions 10 x 2 = 20 Marks)**		
1	For a given compression ratio Otto cycle is more efficient than Diesel cycle. Justify (Nov 2013) Ans: Area under P-V diagram is more that the diesel cycle. When the area is more, workdone for that cycle is more. So, the efficiency for otto cycle will be higher than diesel cycle.	CO1	K4
2	What is mean by mean effective pressure? (Nov 2013,14,16,17) Ans: It is hypothetical pressure which is acting on the piston during the power stroke. Mean effective pressure = workdone /stroke volume	CO1	
3	Mention the ranges of compression ratio for SI and CI engine. (May 2013) Ans: SI engine 6-10 CI engine 16-20	CO1	
4	What is meant by Air standard efficiency? (Apr/May 2014,17) Ans: It is defined as the ratio of work done by the cycle to the heat supplied to the cycle.	CO1	
5	Define compression ratio and cut off ratio. (May 2014) Ans: It is defined as the ratio between total cylinder volumes to the clearance volume. **Cut off ratio:** It is defined as the ratio of volume after the heat addition to volume before the heat addition.	CO1	
6	Draw the actual PV diagram of two stroke engine. (Nov 2014) Ans:	CO1	



Indicator Diagram for a Two Stroke Cycle Petrol Engine.

Q.No.	Question	CO	BTS
7	Draw the Brayton cycle on p-v and T-s diagram. (May 2015,17)	CO1	

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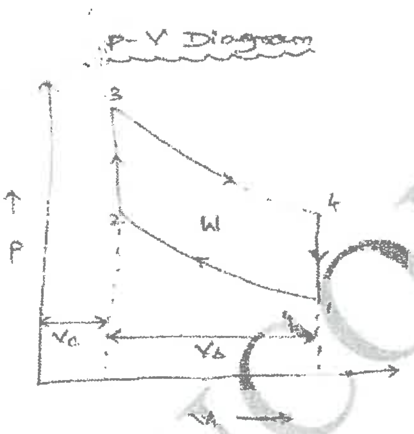
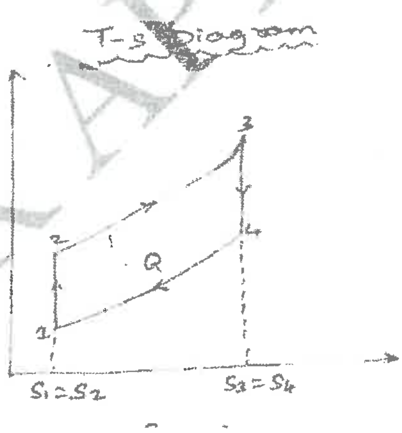
This cycle consist of the following four processes.

1. Two reversible adiabatic process or isentropic process.
2. Two constant volume process.





Process 1-2:

1. Process 1-2 is the isentropic compression process.
2. Pressure increases from P_1 to P_2 and temperature increases from T_1 to T_2.
3. Volume decreases from V_1 to V_2.
4. Entropy remains constant.

OR

11b A six cylinder petrol engine has a compression ratio 5%. The clearance volume of each cylinder is 110 cc. it operates on a four stroke constant volume cycle and the indicated efficiency ratio referred to air std. efficiency is 0.56 at the speed of 2400 rpm. It consumes 10 kg of fuel per hour. The calorific value of fuel is 44000 kJ/kg. Determine the average indicated mean effective pressure.

Diagram – 5 marks
Description & formulae – 5 marks

Ans:

Compression ratio,

$$r = \frac{V_s + V_c}{V_c}$$

Air standard efficiency,

$$\eta = 1 - \frac{1}{r^{\gamma-1}}$$

$$\text{Actual efficiency} = \frac{\textit{Work done}}{\textit{Heat input}}$$

Net work output,

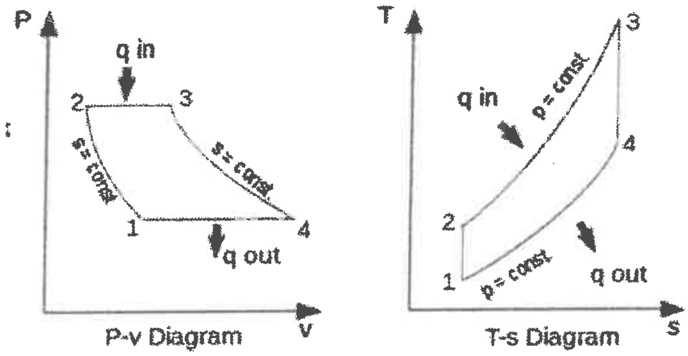
$$W = \frac{p_m V_s N Z}{60}$$

12a Derive an expression for air standard efficiency and mean effective pressure of Diesel cycle. (May/June 2013) K4

Diagram – 5 marks
Description & formulae – 5 marks

Ans:

Ans:



8 Differentiate any three major differences between Otto and diesel cycle. (Nov 2015,16) — CO1 — K4

Ans:

S.No	Otto cycle	Diesel cycle
1	Efficiency is less due to low compression ratio	Efficiency is more due to low compression ratio
2	Fuel is admitted into the cylinder during suction stroke	Air alone is admitted in to the cylinder during suction stroke
3	Spark ignition system is used for ignition.	Compression ignition system is used for ignition.

9 What are the assumption made in the air standard cycle? (May 2015,16/Nov 2016) — CO1

Ans:

- The work medium is a perfect gas throughout.
- The working medium does not undergo chemical change through the cycle.
- Kinetic and potential energies of the working fluid are neglected.
- The operation of the engine is frictionless

10 What are the effects of Introducing regeneration in the basic gas turbine cycle? — CO1

Ans:

- The fuel economy is improved the quantity of the fuel required per unit mass of air is less.
- The work output from the turbine, work required to the compressor will not change.
- Pressure drop will occur during regeneration.
- It increases the thermal efficiency when the low pressure ratio reduces.

PART B

(Answer all the Questions 2 x 10 = 20 Marks)

11a Derive an expression for air standard efficiency and mean effective pressure of Otto cycle. (May/June 2013) — K4

Diagram – 5 marks

Description & formulae – 5 marks

Ans:

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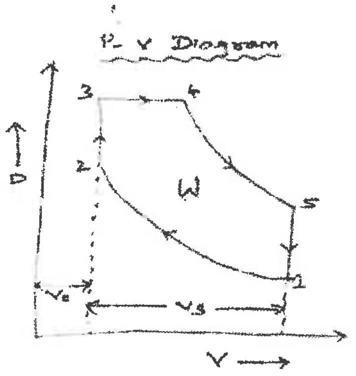

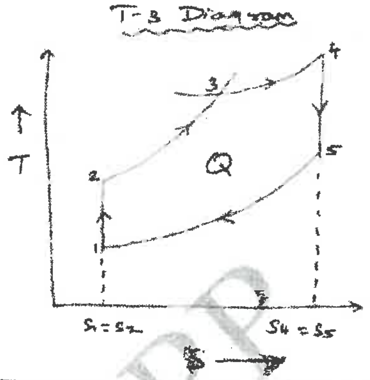

OR

13b An air std. DUAL cycle has a compression ratio of 16 and compression begins at 1 bar and 50°C. The maximum pressure is 70 bar. The heat transferred to air at constant pressure is equal to heat transferred at constant volume. Find the temperature at a cardinal point, cycle efficiency and mean effective pressure. Take Cp = 1.005 kJ/kgK and Cv = 0.718 kJ/kgK. (Nov/Dec – 2011,12 , May/June 2013)

Diagram – 5 marks
Description & formulae – 5 marks

Specific volume, $v_1 = \frac{RT_1}{p_1}$

Specific volume, $v_2 = \frac{RT_2}{p_2}$

W.K.T,

$\frac{V_4}{V_3} = \frac{T_4}{T_3}$

Expansion ratio,

$r_e = \frac{V_4}{V_1}$

Cut off ratio,

$\rho = \frac{V_4}{V_3}$

pressure ratio,

$k = \frac{p_3}{p_2}$

Cycle efficiency

$\eta_{Dual} = 1 - \frac{1}{(r)^{\gamma-1}}\left[\frac{k\rho^{\gamma}-1}{(k-1)+\gamma k(\rho-1)}\right]$

The mean effective pressure,

$p_m = \frac{W}{V_1 - V_2}$

Net work done of the cycle,

$W = Q_s \times \eta$

Mr. P. Venkatesan :
Course Faculty
(Name /Sign / Date)

HoD
(Name /Sign / Date)

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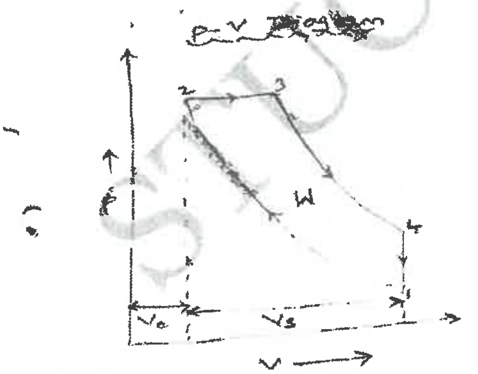
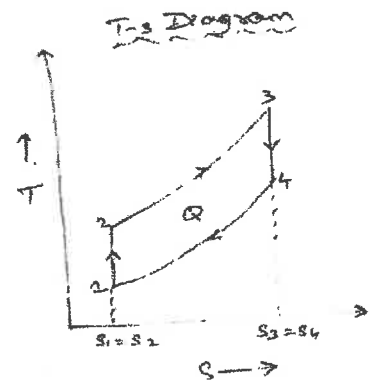
Manikandam, Trichy-620 012.

This cycle consist of the following four processes.

1. Two reversible adiabatic process or isentropic process.
2. One constant volume process.
3. One constant pressure process.





OR

12b Air enters a Brayton cycle at 100 kPa, 300K. The compressive ratio is 8:1. The maximum temperature in the cycle is 1300K. Find, 1.Air standard efficiency, 2.Compressor and turbine work and 3. Work ratio. (Nov 2014)

Diagram – 5 marks
Description & formulae – 5 marks

Ans:

Process 1-2:

$$\frac{T_2}{T_1} = \left(\frac{V_1}{V_2}\right)^{\gamma-1}$$

Process 3-4:

$$\frac{T_3}{T_4} = \left(\frac{V_4}{V_3}\right)^{\gamma-1}$$

Compressor work, $W_C = C_P [T_2 - T_1]$

$= 1.005[689.2-300]$

$= 391.145$ KJ/Kg

Air standard efficiency,

$$\eta = 1 - \frac{1}{(r)^{\gamma-1}}$$

$= 1-1/(8)^{1.4-1}$

$= 56.47\%$

Turbine work, $W_T = C_P [T_3 - T_4]$

$= 1.005[1300-565.85]$

$= 734.82$ KJ/Kg

PART C

(Answer all the Questions 1 x 10 = 10 Marks)

13a Derive an expression for air standard efficiency and mean effective pressure of Dual cycle. (May/June 2014) K4

Diagram – 5 marks
Description & formulae – 5 marks

Ans:

This cycle consist of the following process.

1. Two reversible adiabatic process or isentropic process.
2. Two constant volume process.
3. Two constant pressure process.

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DEPARTMENT OF MECHANICAL ENGINEERING

ROOT CAUSE ANALYSIS

Name of the Faculty : Mr. P. Venkatesan
Degree & Program : B.E / Mechanical
IA Test : IA Test - I
Target : 95%

Course Code & Name : ME 8493 - Thermal EngineeringT
Semester : IV
University Exam/Month & Year: May / June 2019
Achieved : 78.4%

S.NO	ROLL NO	NAME OF THE STUDENT	CAUSES FOR FAILURE	CORRECTIVE ACTION TAKEN	PREVENTIVE ACTION TAKEN
1.	811217114004	M. Ananth	Attended family function	Re Test conducted	Advised to avoid function
2.	10	N. Dharman	Health issue	Retest conducted	Advised to take care of health
3.	15	Karthick. S	Health issue	”	Advised to take care of health issue
4.	25	M. Rajamani	Attended family function	”	advised to avoid family function during exams
5.	26	La. Ramanathan	Health issue	”	advised to take care of health
6.	30	M. Selvakumar	Health issue	”	advised to take care of health
7	36	M. Venkatesh	Gone to other city	”	advised to avoid travel
8.	4301	K. Arun	Attended family function	”	advised to avoid family function.
9.	-	-	-	-	-
10					

Signature of the Faculty Member

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Principal
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Signature of the HoD/Mechanical

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IQAC Academic Audit Form

ACADEMIC YEAR:2018-2019 EVEN SEMESTER

Name of Department :	MECH	Year / Sem:	2 / IV	No. of Students Registered :	39
Details of Examination :	IA Test -1				

S.No.	Course Code	List of Reg.No Verified	Course Log Book Verified (Y / N)	Course File Verified (Y / N)	No of students Attended	No of Absentees	No of Failures	Pass %	Remarks
1	ME 8493	811217114001	Y	Y	39	2	8	78	–
2		811217114002	Y	Y					
3		811217114003	Y	Y					
4		811217114004	Y	Y					
5		811217114005	Y	Y					
6		811217114006	Y	Y					
7		811217114007	Y	Y					
8		811217114008	Y	Y					
9		811217114009	Y	Y					
10		811217114010	Y	Y					
11		811217114013	Y	Y					

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12		811217114014	Y	Y					
13		811217114015	Y	Y					
14		811217114016	Y	Y					
15		811217114018	Y	Y					
16		811217114019	Y	Y					
17		811217114020	Y	Y					
18		811217114021	Y	Y					
19		811217114022	Y	Y					
20		811217114023	Y	Y					
21		81127114025	Y	Y					
22		81127114026	Y	Y					
23		81127114027	Y	Y					
24		8127114028	Y	Y					
25		81127114030	Y	Y					
26		81127114031	Y	Y					
27		81127114032	Y	Y					

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28		811217114033	Y	Y					
29		811217114034	Y	Y					
30		811217114035	Y	Y					
31		81217114036	Y	Y					
32		81217114037	Y	Y					
33		81217114038	Y	Y					
34		81217114039	Y	Y					
35		81127114301	Y	Y					
36		81127114302	Y	Y					
37		81127114303	Y	Y					
38		81127114012	Y	Y					
39		81127114029	Y	Y					

Verified by

External Member Name and Signature:	Dr. G. Balakrishnan, M.E., Ph.D. Principal Indra Ganesan College of Engineering IG Valley, Madurai Main Road Manikandam, Trichy-620 012
Internal Member Name and Signature:	

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STUDENT FEEDBACK ON FACULTY
THEORY COURSE

ACADEMIC YEAR: 2018 - 2019 SEMESTER IV

Name of Department: MECH | Year / Sem: III / IV | Faculty Name: Mr. P. Venkatesan

Subject Code & Name: ME 8493 – Thermal Engineering - I

S.No.	QUESTIONS	Excellent 5	Very Good 4	Good 3	Satisfactory 2	Somewhat Satisfactory 1	Not Satisfactory 0	Total Weight age	Percentage
1	Delivery of Lectures by Interactive Communication	✓✓✓	✓✓						
2	Use of Teaching Aids and ICT	✓✓	✓✓✓						
3	Level of Preparedness & Knowledge Level	✓✓✓	✓✓						
4	Involvement in mentoring and guiding	✓✓	✓✓✓	✓					
5	Effective Time management	✓✓	✓	✓	✓				
6	Is the teacher completing syllabus as per lecture schedule?	✓✓✓	✓✓	✓					
7	Is the teacher distributing answer scripts of students as per schedule?	✓✓	✓	✓✓					
8	Is the teacher addressing grievances on answer scripts of IA while distributing?	✓✓	✓✓	✓					
9	Is the teacher covering content beyond syllabus (CBS)?	✓	✓✓	✓✓					
10	Is the teacher punctual in class?	✓✓	✓	✓✓✓					

HoD/MECHANICAL IQAC Co-ordinator Principal

Dr. G. Balakrishnan, M.E., Ph.D
Principal
Indra Ganesan College of Engineering
IG Valley, Madurai Main Road
Manikandam, Trichy-620 012.

Overall Remarks:

HoD/ MECHANICAL	IQAC Co-ordinator	Principal

Dr. G. Balakrishnan, M.E., Ph.D.,
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STUDENT FEEDBACK ON FACULTY
THEORY COURSE

ACADEMIC YEAR: 2018 - 19 SEMESTER IV

Name of Department	MECH	Year / Sem:	III / IV	Faculty Name	Mr. P. Venkatesan
Subject Code & Name	ME 8493. Thermal Engineering			Student Name	A. Karthick

S.No.	QUESTIONS	Excellent 5	Very Good 4	good 3	Satisfactory 2	Somewhat Satisfactory 1	Not Satisfactory 0
1	Delivery of Lecture by Interactive Communication	✓					
2	Use of Teaching Aids and ICT	✓					
3	Level of Preparedness & Knowledge Level	✓					
4	Involvement in mentoring and guiding		✓				
5	Effective Time management		✓				
6	Is the teacher completing syllabus as per lecture schedule?	✓					
7	Is the teacher distributing answer scripts of students as per schedule?		✓				
8	Is the teacher addressing grievances on answer scripts of IA while distributing?	✓					
9	Is the teacher covering content beyond syllabus (CBS)?		✓				
10.	Is the teacher punctual to class?		✓				

HoD/ MECHANICAL IQAC Co-ordinator Principal

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