Question Paper For Internal Assessment Examination (Theory) - Credit 4 / 29 /

Instructions for Students/FacultyMid Term I (Total 80 Marks, 2 HRS. Syllabus from Unit-1)

- Part A: Total number of questions to be given are ten (5 from CO1 and 5 from CO2), each carrying 2 marks and are compulsory to attend. There is no choice. They are short answer type questions (**Not More Than 25 Words For both Question & Answer)**, no objective type or fill in the blanks. Total 20 marks.
- Part B: Total number of questions to be given are six (3 from CO1 and 3 from CO2), out of which student must answer four (2 from CO1 and 2 from CO2). They are long answer type (**Not More Than 50 Words for Question)**, each carrying 5 marks. Total 20 marks.
- Part C: Total number of questions to be given are six (3 from CO1 and 3 from CO2), out of which student must answer four (2 from CO1 and 2 from CO2). They are numerical answer type / fully elaborative type (**Not More Than 70 Words for Question)** *, each carrying 10 marks. Total 40 marks.

Mid Term II (Total 120 Marks, 2.5 HRS., Syllabus from Unit-2)

- Part A: Total number of questions to be given are ten (5 from CO3 and 5 from CO4), each carrying 4 marks and are compulsory to attend. There is no choice. They are short answer type questions (**Not More Than 25 Words For both Question & Answer)**, no objective type or fill in the blanks. Total 40 marks.
- Part B: Total number of questions to be given are six (3 from CO3 and 3 from CO4), out of which student has to answer four (2 from CO3 and 2 from CO4). They are long answer type (**Not More Than 50 Words for Question)**, each carrying 7 marks. Total 28 marks.
- Part C: Total number of questions to be given are six (3 from CO3 and 3 from CO4), out of which student has to answer four (2 from CO3 and 2 from CO4). They are numerical answer type / fully elaborative type (**Not More Than 70 Words For Question)** *, each carrying 13 marks. Total 52 marks.

Mid Term III (Total 120 Marks, 2.5 HRS., Syllabus from Unit-3)

- Part A: Total number of questions to be given are ten (5 from CO5 and 5 from CO6), each carrying 4 marks and are compulsory to attend. There is no choice. They are short answer type questions (**Not More Than 25 Words For both Question & Answer)**, no objective type or fill in the blanks. Total 40 marks.
- Part B: Total number of questions to be given are six (3 from CO5 and 3 from CO6), out of which student must answer four (2 from CO5 and 2 from CO6). They are long answer type (**Not More Than 50 Words for Question)**, each carrying 7 marks. Total 28 marks.
- Part C: Total number of questions to be given are six (3 from CO5 and 3 from CO6), out of which student must answer four (2 from CO5 and 2 from CO6). They are numerical answer type / fully elaborative type (**Not More Than 70 Words for Question)** *, each carrying 13 marks. Total 52 marks.

*** LIST OF ELABORATIVE THEORY QUESTION SUBJECTS**: NO SUBJECT UNDER CREDIT FOUR

Instructions For Faculties:

There should be total 6 Course Outcomes (COs) for each subject.

- Mid Term Question Papers are to be submitted as per Course Outcomes (COs) which should be divided equally in Part A, Part B and Part C according to Mid Term Examination and Credit Point.
- In Mid Term-1, the questions are to be given from CO1 and CO2. In Mid Term-2, the questions are to be given from CO3 and CO4. Similarly, in Mid Term-3, the questions are to be given from CO5 and CO6.

- **FACULTY MEMBERS, PLEASE ENSURE EXCEPT ABOVE LISTED SUBJECTS, NO THEORITICAL ELABORATIVE QUESTION SHOULD BE GIVEN IN PART 'C' OF QUESTION PAPER**

INSTRUCTION FOR STUDENTS

- **STUDENT IS ALLOWED TO ENTER LATE NOT MORE THAN 15 MIN AFTER STARTING OF EXAM, AND MAY LEAVE THE EXAM HALL ON EXPIRY OF ATLEAST OF 1 Hr FROM THE STARTING TIME OF EXAMINATION.**

QUESTION PAPER AND STUDENTS DETAILS

Type of Exam	Mid Term 1	**Date of Submission**	12/03/2021
Name of Faculty	Mrs. Sonali Singh	**Date of Examination**	22/03/2021
Course	B.Tech (Aeronautical Engineering)	**Semester**	SEMESTER : 6
Batch	DS - 2018	**Subject**	6 AN4 - 02 Propulsion-II (Cr 4)

COURSE OUTCOMES FOR REFERENCE TO FRAME QUESTION PAPER
(Faculties are required to mention relevant Course Outcome number against the respective question in QP)

Course Outcome	Upon completion of the course, Students will be able to CO 1. Interpret the basic concepts & fundamentals of Jet Engine Intakes and Exhaust Nozzles. CO 2. Apply the fundamental concepts of Jet Engine Combustion Chambers and its functions. CO 3. Explain the Jet Engine Compressors and its impact on aircraft propulsion system. CO 4. Analyze the Jet Engine Turbines and its working and its characteristics. CO 5. Solve the problems related to the concepts of Ramjet and Scram jet Propulsion system. CO 6. Analyze and determine Chemical Rocket Propulsion and Solid and Liquid Propellant Rockets.		
Email I'd	sonali@soaneemrana.org	**Phone No.**	900-324-6157
Student Name		**Student Reg No.**	

Part A

All the questions are compulsory to attend.

1. CHOOSE COURSE OUTCOME (CO) NUMBER ACCORDING TO THE TYPE OF MIDTERM, AS PER INSTRUCTIONS ABOVE.			1
Question : 1	Write basic laws used in steady 1-D gas dynamics flow.		
2	Steady 1-D gas dynamics Flow	Elements of Gas Turbine Propulsion by Jack D. Mattingly	
Question : 2	Define ram effect.		
3	Ram Effect	Aircraft Propulsion and Gas Turbine Engines by Ahmed F.	

Question : 3	1. Define inlet performance.		
4	Inlet Performance.	Elements of Gas Turbine Propulsion by Jack D. Mattingly	
Question : 4	What are the modes of operation in supersonic inlet.		
5	Modes of Operation and supersonic inlets	Aircraft Propulsion and Gas Turbine Engines by Ahmed F. El- Sayed	
Question : 5	Define nozzle efficiency.		
6	Real Flow Through Nozzles and Nozzle Efficiency	Aircraft Propulsion and Gas Turbine Engines by Ahmed F. El- Sayed	
2. CHOOSE COURSE OUTCOME (CO) NUMBER ACCORDING TO THE TYPE OF MIDTERM, AS PER INSTRUCTIONS ABOVE.			2
Question : 6	Write the complete combustion equation.		
8	Combustion Equations	Aircraft Propulsion and Gas Turbine Engines by Ahmed F. El- Sayed	
Question : 7	What are the types of combustion chamber?		
9	Classification of Combustion Chambers	Aircraft Propulsion and Gas Turbine Engines by Ahmed F. El- Sayed	
Question : 8	Define combustion stability.		
10	Combustion Chamber Performance	Aircraft Propulsion and Gas Turbine Engines by Ahmed F. El- Sayed	
Question : 9	Define flame stability.		
12	Flame Stabilization	Aircraft Propulsion and Gas Turbine Engines by Ahmed F. El- Sayed	
Question : 10	Write the names of cooling techniques which are used for combustion chamber.		
13	Cooling process	Aircraft Propulsion and Gas Turbine Engines by Ahmed F. El- Sayed	

Part B

FOR MIDTERM 1 - Part B: Total number of questions to be given are six (3 from CO1 and 3 from CO2), out of which student must answer four (2 from CO1 and 2 from CO2).
FOR MIDTERM 2 - Part B: Total number of questions to be given are six (3 from CO3 and 3 from CO4), out of which student must answer four (2 from CO3 and 2 from CO4).
FOR MIDTERM 3 - Part B: Total number of questions to be given are six (3 from CO5 and 3 from CO6), out of which student has to answer four (2 from CO5 and 2 from CO6).

3. CHOOSE COURSE OUTCOME (CO) NUMBER ACCORDING TO THE TYPE OF MIDTERM, AS PER INSTRUCTIONS ABOVE.			1
Question : 1	Write short notes on a. Podded intakes b. Integrated intake		
3	Types of Subsonic inlet	Aircraft Propulsion and Gas Turbine Engines by Ahmed F. El- Sayed	
Question : 2	Derive the relation between minimum area ratio and external deceleration ratio.		
4	Relation between minimum area ratio and external deceleration ratio	Elements of Gas Turbine Propulsion by Jack D. Mattingly	
Question : 3	Discuss about ejector type nozzle.		
7	Ejector Nozzle	Aircraft Propulsion and Gas Turbine Engines by Ahmed F. El- Sayed	
4. CHOOSE COURSE OUTCOME (CO) NUMBER ACCORDING TO THE TYPE OF MIDTERM, AS PER INSTRUCTIONS ABOVE.			2
Question : 4	Discuss about types of combustion chamber.		
9	Classification of Combustion Chambers	Aircraft Propulsion and Gas Turbine Engines by Ahmed F. El- Sayed	
Question : 5	Discuss about parameters influencing flame stabilization		
12	Flame Stabilization	Aircraft Propulsion and Gas Turbine Engines by Ahmed F. El- Sayed	
Question : 6	Discuss about types of cooling techniques in combustion chamber.		
13	Cooling process	Aircraft Propulsion and Gas Turbine Engines by Ahmed F. El- Sayed	
Question : 7 (Old Pattern)			

Part C

FOR MIDTERM 1 - Part C: Total number of questions to be given are six (3 from CO1 and 3 from CO2), out of which student must answer four (2 from CO1 and 2 from CO2).
FOR MIDTERM 2 - Part C: Total number of questions to be given are six (3 from CO3 and 3 from CO4), out of which student must answer four (2 from CO3 and 2 from CO4).
FOR MIDTERM 3 - Part C: Total number of questions to be given are six (3 from CO5 and 3 from CO6), out of which student has to answer four (2 from CO5 and 2 from CO6).

5. CHOOSE COURSE OUTCOME (CO) NUMBER ACCORDING TO THE TYPE OF MIDTERM, AS PER INSTRUCTIONS ABOVE.			1
Question : 1	Explain in detail about supersonic inlet with their types.		
5	Supersonic Inlet	Aircraft Propulsion and Gas Turbine Engines by Ahmed F. El- Sayed	
Question : 2	A turbojet engine powering an aircraft flying at an altitude of 11,000m where Ta = 216.7 Kand Pa = 24.444 kPa. The flight Mach number is 0.9. The inlet conditions to the nozzle are 1000 K and 60 kPa. The specific heat ratio of air and gases at nozzle are 1.4 and 4/3. The nozzle efficiency is 0.98. Determine the thrust per inlet frontal area in the C-D nozzle.		
6	Nozzle	Aircraft Propulsion and Gas Turbine Engines by Ahmed F. El- Sayed	
Question : 3	Explain in detail about thrust reversal.		
7	Thrust reversal	Aircraft Propulsion and Gas Turbine Engines by Ahmed F. El- Sayed	
6. CHOOSE COURSE OUTCOME (CO) NUMBER ACCORDING TO THE TYPE OF MIDTERM, AS PER INSTRUCTIONS ABOVE.			2
Question : 4	A hydrocarbon fuel of composition 84.1% by mass C and 15.9 percent by mass H has a molecular weight of 114.15. Determine the number of moles of air required for stoichiometric combustion and the number of moles of products produced per mole of fuel. Calculate air-to-fuel ratio (A/F).		
8	Chemistry of Combustion	Aircraft Propulsion and Gas Turbine Engines by Ahmed F. El- Sayed	
Question : 5	Explain in detail about combustion process.		
9	Combustion Process	Aircraft Propulsion and Gas Turbine Engines by Ahmed F. El- Sayed	
Question : 6	The following data apply to a turbojet flying at an altitude where the ambient conditions are 0.458 bar and 248 K, Speed of the aircraft: 805 km/h, compressor pressure ratio: 4:1, Turbine inlet temperature: 1100 K, Nozzle outlet area 0.0935 m2, Heat of reaction of the fuel: 43 MJ/kg Find the thrust and TSFC assuming c_p as 1.005 kJ/kgK and γ as 1.4.		

10	Chamber Performance	Aircraft Propulsion and Gas Turbine Engines by Ahmed F. El- Sayed	

Upload Scanned Document In Case of Numerical or Diagram For Any of The Above Questions. *(Mention question number with relevant fig / numerical / equations. Max 150 KB)*	
I have scrutinized the question paper. There is no spelling mistake or any type of irrelevant question.	

Question Paper For Internal Assessment Examination (Theory) - Credit 4 / 31 / SET 1

Instructions for Students/FacultyMid Term I (Total 80 Marks, 2 HRS. Syllabus from Unit-1)

- Part A: Total number of questions to be given are ten (5 from CO1 and 5 from CO2), each carrying 2 marks and are compulsory to attend. There is no choice. They are short answer type questions (**Not More Than 25 Words For both Question & Answer)**, no objective type or fill in the blanks. Total 20 marks.
- Part B: Total number of questions to be given are six (3 from CO1 and 3 from CO2), out of which student must answer four (2 from CO1 and 2 from CO2). They are long answer type (**Not More Than 50 Words for Question)**, each carrying 5 marks. Total 20 marks.
- Part C: Total number of questions to be given are six (3 from CO1 and 3 from CO2), out of which student must answer four (2 from CO1 and 2 from CO2). They are numerical answer type / fully elaborative type (**Not More Than 70 Words for Question)** *, each carrying 10 marks. Total 40 marks.

Mid Term II (Total 120 Marks, 2.5 HRS., Syllabus from Unit-2)

- Part A: Total number of questions to be given are ten (5 from CO3 and 5 from CO4), each carrying 4 marks and are compulsory to attend. There is no choice. They are short answer type questions (**Not More Than 25 Words For both Question & Answer)**, no objective type or fill in the blanks. Total 40 marks.
- Part B: Total number of questions to be given are six (3 from CO3 and 3 from CO4), out of which student has to answer four (2 from CO3 and 2 from CO4). They are long answer type (**Not More Than 50 Words for Question)**, each carrying 7 marks. Total 28 marks.
- Part C: Total number of questions to be given are six (3 from CO3 and 3 from CO4), out of which student has to answer four (2 from CO3 and 2 from CO4). They are numerical answer type / fully elaborative type (**Not More Than 70 Words For Question)** *, each carrying 13 marks. Total 52 marks.

Mid Term III (Total 120 Marks, 2.5 HRS., Syllabus from Unit-3)

- Part A: Total number of questions to be given are ten (5 from CO5 and 5 from CO6), each carrying 4 marks and are compulsory to attend. There is no choice. They are short answer type questions (**Not More Than 25 Words For both Question & Answer)**, no objective type or fill in the blanks. Total 40 marks.
- Part B: Total number of questions to be given are six (3 from CO5 and 3 from CO6), out of which student must answer four (2 from CO5 and 2 from CO6). They are long answer type (**Not More Than 50 Words for Question)**, each carrying 7 marks. Total 28 marks.
- Part C: Total number of questions to be given are six (3 from CO5 and 3 from CO6), out of which student must answer four (2 from CO5 and 2 from CO6). They are numerical answer type / fully elaborative type (**Not More Than 70 Words for Question)** *, each carrying 13 marks. Total 52 marks.

*** LIST OF ELABORATIVE THEORY QUESTION SUBJECTS**: NO SUBJECT UNDER CREDIT FOUR

Instructions For Faculties:

There should be total 6 Course Outcomes (COs) for each subject.

- Mid Term Question Papers are to be submitted as per Course Outcomes (COs) which should be divided equally in Part A, Part B and Part C according to Mid Term Examination and Credit Point.
- In Mid Term-1, the questions are to be given from CO1 and CO2. In Mid Term-2, the questions are to be given from CO3 and CO4. Similarly, in Mid Term-3, the questions are to be given from CO5 and CO6.

- **FACULTY MEMBERS, PLEASE ENSURE EXCEPT ABOVE LISTED SUBJECTS, NO THEORITICAL ELABORATIVE QUESTION SHOULD BE GIVEN IN PART 'C' OF QUESTION PAPER**

INSTRUCTION FOR STUDENTS

- **STUDENT IS ALLOWED TO ENTER LATE NOT MORE THAN 15 MIN AFTER STARTING OF EXAM, AND MAY LEAVE THE EXAM HALL ON EXPIRY OF ATLEAST OF 1 Hr FROM THE STARTING TIME OF EXAMINATION.**

QUESTION PAPER AND STUDENTS DETAILS

Type of Exam	Mid Term 1	**Date of Submission**	19/03/2021
Name of Faculty	Mr. Korapati Akhil	**Date of Examination**	22/03/2021
Course	B.Tech (Aeronautical Engineering)	**Semester**	SEMESTER : 6
Batch	Combined Batches 15, 16, 17, SF 1	**Subject**	6 AN4 - 02 Propulsion-II (Cr 4)

COURSE OUTCOMES FOR REFERENCE TO FRAME QUESTION PAPER

(Faculties are required to mention relevant Course Outcome number against the respective question in QP)

Course Outcome	CO 1. the basic concepts & fundamentals of Jet Engine Intakes and Exhaust Nozzles. CO 2. Apply the fundamental concepts of Jet Engine Combustion Chambers and its functions.		
Email I'd	korapatiakhil@soaneemrana.org	**Phone No.**	701-345-8080
Student Name		**Student Reg No.**	

Part A

All the questions are compulsory to attend.

1. CHOOSE COURSE OUTCOME (CO) NUMBER ACCORDING TO THE TYPE OF MIDTERM, AS PER INSTRUCTIONS ABOVE.			1
Question : 1	What are streamline and stream tube? Explain with neat sketch.		
2	1D gas dynamics	GAS TURBINES v ganesan	
Question : 2	Explain difference between laminar flow and turbulent flow?		
2	1D gas dynamics	GAS TURBINES v ganesan	
Question : 3	Explain about normal shock wave and oblique shock wave?		
5	Normal shock wave and oblique shock wave	GAS TURBINES v ganesan	
Question : 4	Explain about subsonic, sonic and supersonic flow		

2	1D Gas dynamics	GAS TURBINES v ganesan	
Question : 5	What is the difference between Air breathing and Non Air breathing engines		
1	Introduction	GAS TURBINES v ganesan	
2. CHOOSE COURSE OUTCOME (CO) NUMBER ACCORDING TO THE TYPE OF MIDTERM, AS PER INSTRUCTIONS ABOVE.			2
Question : 6	What are the various forms of combustion system?		
9	Combustion process	GAS TURBINES v ganesan	
Question : 7	Write short notes of air fuel ratio in gas turbine engine?		
14	Aircraft fuels	GAS TURBINES v ganesan	
Question : 8	Write short notes of fuel injection?		
9	Combustion process	GAS TURBINES v ganesan	
Question : 9	Write short notes of LHV and HHV fuels?		
14	Aircraft fuels	GAS TURBINES v ganesan	
Question : 10	write down about jet engine combustion chamber efficiency?		
12	combustion chamber efficiency	GAS TURBINES v ganesan	

Part B

FOR MIDTERM 1 - Part B: Total number of questions to be given are six (3 from CO1 and 3 from CO2), out of which student must answer four (2 from CO1 and 2 from CO2).
FOR MIDTERM 2 - Part B: Total number of questions to be given are six (3 from CO3 and 3 from CO4), out of which student must answer four (2 from CO3 and 2 from CO4).
FOR MIDTERM 3 - Part B: Total number of questions to be given are six (3 from CO5 and 3 from CO6), out of which student has to answer four (2 from CO5 and 2 from CO6).

3. CHOOSE COURSE OUTCOME (CO) NUMBER ACCORDING TO THE TYPE OF MIDTERM, AS PER INSTRUCTIONS ABOVE.			1
Question : 1	Explain flow through (i) open systemin (Flow process), and closed system (Non flow process).		
2	1D gas dynamics	GAS TURBINES V Ganesan	
Question : 2	Explain the terms “stagnation pressure” and stagnation temperature?		
2	1D gas dynamics	GAS TURBINES V Ganesan	

Question : 3	What is the aircraft engine system thrust reversing?		
7	Thrust reversing	GAS TURBINES V Ganesan	
4. CHOOSE COURSE OUTCOME (CO) NUMBER ACCORDING TO THE TYPE OF MIDTERM, AS PER INSTRUCTIONS ABOVE.			2
Question : 4	Classify the types of combustion chambers?		
10	Classify the types of combustion chambers	GAS TURBINES V Ganesan	
Question : 5	Explain about flame stabilizing zone in combustion chamber?		
13	flame stabilizing	GAS TURBINES V Ganesan	
Question : 6	Explain about flame tube cooling process?		
13	flame tube cooling process	GAS TURBINES V Ganesan	
Question : 7 (Old Pattern)			

Part C

FOR MIDTERM 1 - Part C: Total number of questions to be given are six (3 from CO1 and 3 from CO2), out of which student must answer four (2 from CO1 and 2 from CO2).
FOR MIDTERM 2 - Part C: Total number of questions to be given are six (3 from CO3 and 3 from CO4), out of which student must answer four (2 from CO3 and 2 from CO4).
FOR MIDTERM 3 - Part C: Total number of questions to be given are six (3 from CO5 and 3 from CO6), out of which student has to answer four (2 from CO5 and 2 from CO6).

5. CHOOSE COURSE OUTCOME (CO) NUMBER ACCORDING TO THE TYPE OF MIDTERM, AS PER INSTRUCTIONS ABOVE.			1
Question : 1	supersonic wind tunnel the air temperature & pressure in the reservoir of the wind tunnel are To =1000K & Po =10atm. The static temperatures at the throat & exit are T* = 833 K & Te =300 K,. The mass flow through the nozzle is 0.5 kg/s. For air, Cp = 1008J/(kg) (K). find i)velocity at throat V*, ii) velocity at the exitVe, iii)Area of throat A* iv) Ae.		
5	Flow through nozzle	INTRODUCTION TO FLIGHT JD ANDER SON	
Question : 2	Combustion chamber of a rocket engine fuel is burned, resulting with the following conditions : T0 = 3144 K, Po = 20 atm , R = 378 J/(kg) (K), & specific heat gas constant = 1.26 , Pe at the Ae is 1 atm . and the At is 0.1 m^2. flow through the nozzle, find (a) the velocity at the exit & (b) the mass flow through the nozzle		
5	Flow through the nozzle.	INTRODUCTION TO FLIGHT JD ANDER SON	

Question : 3	Derive the equation of area velocity relation.		
5	Flow through the nozzle	INTRODUCTION TO FLIGHT JD ANDER SON	
6. CHOOSE COURSE OUTCOME (CO) NUMBER ACCORDING TO THE TYPE OF MIDTERM, AS PER INSTRUCTIONS ABOVE.			2
Question : 4	The ratio of net work to turbine of an ideal gas turbine plant is 0.563. Take the inlet temperature to the compressor as 300 k calculate the temperature drop across the turbine if the thermal efficiency of the unit is 35%. Assume a mass flow rate of 10 kg/s, Cp = 1KJ/Kg K and specific heat constant = 1.4.		
8	Combustion equations	GAS TURBINES v ganesan	
Question : 5	A gas turbine plant works between temperature limits of 300 K and 900 K the pressure limits are 1 bar and 4 bar. Estimate the thermal efficiency of the plant and shaft power available for external load in KW. Assume mass rate of flow of air to the compressor as 1600 kg/min		
11	Combustion performance	GAS TURBINES v ganesan	
Question : 6	Compute the indicated mean effective pressure and efficiency of a joule cycle if the temperature at the end of combustion is 350 K and 1 bar. The pressure ratio is assume Cp = 1.005 KJ/(Kg) (K).		
12	Effect of operating variable performance	GAS TURBINES v ganesan	
Upload Scanned Document In Case of Numerical or Diagram For Any of The Above Questions. *(Mention question number with relevant fig / numerical / equations. Max 150 KB)*			
I have scrutinized the question paper. There is no spelling mistake or any type of irrelevant question.			