SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY :: PUTTUR
(AUTONOMOUS)
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QUESTION BANK

Subject with Code: JP&R(16ME8817)	**Course & Branch: M. Tech(TE)**
Sem : II-Sem	**Regulation: R16**

UNIT –I

1 (a). What is gas turbine & Explain working principle of gas turbine   5M

(b). A single gas turbine cycle works with a pressure ratio of 8. The compressor and   5M
turbine inlet temperature are 300^0K and 800^0K respectively. If the volume flow
rate of air is 250 m^3/sec. Compute the power output and thermal efficiency.

2 (a).What is Combustor? Explain with neat sketches   5M

(b).What is Turbo Machine? Types of Turbo Machines   5M

3 (a).What are the forces acting on an air vehicles and explain it?   5M

(b). Explain the following terms: Climbing, Descending, Airflow over an aerofoil   5M

4 (a) Briefly explain open cycle Gas Turbine?   5M

(b).A gas Turbine work between 750^OC and 15^OC Leaves the compressor at 6 bars   5M
and 250^OC. The maximum temperature raised in the combustion chamber is 667^OC.
Calculate the thermal efficiency and Work ratio?

5 (a).Explain types of Launch vehicles? And Explain forces acting on Vehicle   5M

(b).Explain Multi stage Vehicle? Advantages and disadvantages?   5M

6 (a).Explain the about flight Performance ?   5M

(b).Briefly explains closed cycle Gas Turbine?   5M

7 (a).Briefly explain open cycle Gas Turbine?   5M

(b).what is the space craft & Explain the space launch vehicles   5M

8 (a).Explain the following terms: Drag, Thrust, Lift, Blade Aero dynamics   5M

(b).A seaplane of mass 20000 Kg is flying in straight and level flight. The thrust   5M
vector is located 1.2m above the drag vector. If the Lift/Drag ratio is 5:1.
Calculate the position of the lift vector. Consider the forces on the tail plane to be
absent or negligible. Assume g=9.81m/sec^2.

9   A simple single stage rocket for a rescue flare has the following characteristics and   10M

        its flight path nomenclature. Launch weight=18 N, mass of the

        propellent=0.185kN, specific impulse=120sec, launch angle = 80^0,burn

        time=0.1sec,determine the following.

        (i) Initial and final acceleration of powered flight

        (ii) Time to reach maximum height

        (iii) The maximum trajectory height

        (iv) The distance to impact

        (v)the angle at propulsion cutoff and at impact.

        Neglect wind and drag, take g=9.81m/sec^2

10   (a).Explain the Layout of Turbo Jet Engines   5M

        (b). Derive the Air flow over an Aero foil?   5M

UNIT – II

1   (a).What is the Principle of Jet propulsion and Rocketry?   5M

    (b).Classify any two Air Breathing Jet Engines?   5M

2   (a).What is the Rocket propulsion? Explain the liquid propellant rocket engine with   5M
    neat sketches

    (b).Explain any two Classifications of Rocket Engines?   5M

3   (a).Explain the devices in a jet propulsion?   5M

    (b).An air craft flies at a speed of 52 kmph/hr at an altitude of 8000m. the diameter   5M
    propeller of an Air craft is 2.4 m and flight to jet speed ratio is 0.74 Find(i) The rate
    of air flow to through the propeller (ii) Thrust produced (iii) specific Thrust

4   (a)List and De brief the Efficiencies of the components of a Turbo jet Engine to   5M
    Evaluate the Performance?

    (b) A Turbo jet engine inducts 51kg of air per second and propels an air craft with an   5M
    uniform flight speed of 912 km/hr. The isentropic anthology change for the nozzle
    is 200 KJ/kg and its velocity co-efficient is 0.96. The fuel air ratio is 0.0119 the
    combustion efficiency is 0.96 and the lower heating value of the fuel is 42 MJ/kg.
    Calculate (i) Thermal Efficiency of engine (ii) Fuel flow rate in kg/hr and TSFC ?

5   (a).The speed of a turbojet is 800Kmph at an ambient pressure of 1.1 bar. The mass   5M
    flow rate of air is 15Kg/sec. the pressure of the gas entering the nozzle is 4 bar
    and temperature is 300^0C . Determine: Thrust, Thrust power and propulsive
    efficiency. Take gama=1.4, $R=287J/Kg^oK, c_p=1.005$

    (b). Explain the Solid propellant rocket engine with neat sketches   5M

6   (a). Define critical pressure ratio in steam nozzles and Derive the critical pressure   5M
    ratio

    (b).Explain and plot the effect of varying back pressure for a convergent divergent   5M
    nozzle

7   (a). Deduce the expression of mass of discharge through nozzle   5M

    (b) The throat diameter of round sectioned nozzle is 0.6 cm, steam with and initial   5M
    pressure of 10 bar dry and saturated is expanded to 1.5 bar. What is the mass
    flow rate and exit velocity?

8   Air flows through a convergent –divergent nozzle and a shock wave forms in the   10M
    divergence at a point where the diameter is 350 mm. Measurements made on the
    nozzle indicate that the pressure rises in the shock wave from 2 bar to 3 bar. The
    temperature before the shock wave was calculated to be -10^0C.

(i) The Mach number just before the shock wave

(ii) The rate of flow through the nozzle in kg/sec

(iii) the temperature just after the shock wave

9   A air is isentropically expanded from P_0=12 bar, T_0=520^{0}C in a nozzle to an exit   10M
pressure of 7.5 bar. If the rate of flow of the air is 1.4Kg/sec. Calculate:

   (i) Pressure, Temperature and velocity at the nozzle throat and exit

   (ii) Maximum possible velocity

   (iii) Type of nozzle

   (iv)Throat area

10   A Turbo jet engine inducts 51kg of air per second and propels an air craft with an   10M
uniform flight speed of 912 km/hr. The isentropic anthology change for the nozzle
is 200 kJ/Kg and its velocity co-efficient is 0.96. The fuel air ratio is 0.0119 the
combustion efficiency is 0.96 and the lower heating value of the fuel is 42 MJ/Kg.
Calculate

   (i) Thermal Efficiency of engine

   (ii) Fuel flow rate in kg/hr and TSFC?
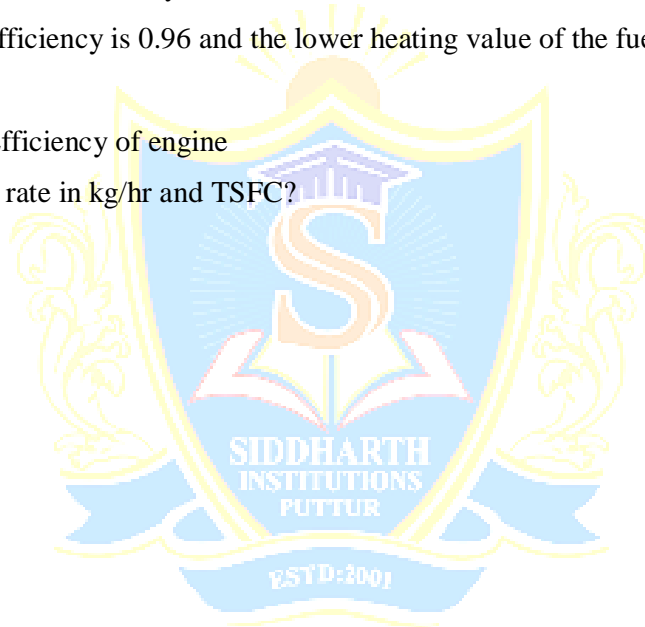
UNIT – III

1	What is the review of properties of mixture of gases and explain gibbs and Dalton laws?	10M
2	(a). Write and Explain heat of formation?	5M
	(b).What is adiabatic flame temperature?	5M
3	(a)What is specific impulse?	5M
	(b).Write the frozen on aerogel?	5M
4	(a) Explain the equivalent ratio with an example?	5M
	(b) Explain the definition and formula for specific impulse?	5M
5	(a)Explain the frozen of aerogel?	5M
	(b)What are the applications of frozen of aerogel?	5M
6		5M
		5M
	(a) Write the gibbs law?	
	(b) Write and explain properties of mixture of gases?	
7	What is specific impulse and explain the units and diagram of specific impulse?	10M
8	(a) what is ment by heat of formation?	5M
	(b) write the adiabatic flame temperature?	5M
9	What is the properties of mixture of gases and explain the laws?	10M
10	(a) Write and explain dalton law?	5M
	(b) what is equivalent ratio and explain?	5M

UNIT – IV

1
    (a) explain the homogeneous propellants?   5M

    (b) Explain the heterogeneous propellants?   5M

2   What is solid propellant and explain its components?   10M

3   (a) Write the propellant characteristics?   5M

    (b) Explain the burning rate?   5M

4   (a) what are the burning rate measurements?   5M

    (b) What are the general characteristics and applications of double base solid   5M
       propellants?

5   (a) State and explain the steady state regimes and un steady state regimes?   10M

    (b) What are the propellant charecteristics?

6   (a) Explain the propellant grain,fuels,oxidizers,blinders,additives?   5M

    (b) Draw the diagram of several grain configurations?   5M

7   (a) explain the steady state regimes and un steady state regimes?   5M

    (b) What is composite propellants?   5M

8   (a) What are the solid rocket moter components and write thermal insulation and   5M
       ignition system?   5M

    (b) Write the propellant grain,fuels,oxidizers,blinders,additives and grain design?

9   What is solid propellant and draw the diagram of basic solid roket moter?   10M

10   (a) explain the homogeneous propellants?

    (b) What is ment by composite propellants?

UNIT – V

1	(a) Explain and draw the diagram of liquid propellant feed system?	5M
	(b) What are properties of liquid propellant?	5M
2	Explain and draw the diagram of turbo pump feed system and liquid propellant feed system?	10M
3	(a) write the classifications of liquid propellants?	10M
	(b) Write the properties of liquid propellant?	
4	(a) Explain the stream types with figures?	5M
	(b) Explain the hypergolic propellants?	
5	(a) Explain the a.monopropellants b.bipropellants?	10M
	(b) What is ment by an turbo pump feed system?	
6	Explain ramjet engine and write the working principle of ramjet engine?	10M
7	Consider the following data for a ramjet engine airfuel ratio=60 ,altitude=6.5km ,c.v=45mj/kg diffusen inlet diameter=0.5m, diffusen efficiency=0.85, nozzle efficiency=0.95, combustion efficiency=0.98,flight mach number=4.0,r=1.4,R=0.287kj/kgk for both air and products of combustion. Take properties of air at 6.5km altitude as 0.44atm,246k and density 0.624kg/m3 determine (a)flight speed (b)air and fuel consumption (c)diffusion pressure ratio (d)maximaum temperature in the engine (e)nozzle pressure ratio and (f)ideal cycle efficiency?	10M
8	Explain the two types of liquid feed system and properties?	10M
9	(a) explain propulsive efficiency, thermal efficiency, overall efficiency?	5M
	(b) What is ment by propeller thrust?	
10	Draw andExplain ramjet engine and write the working principle of ramjet engine?	10M