University of Mumbai
Examination 2020

Program: Mechanical Engineering
Curriculum Scheme: Rev2016(CBCGS)
Examination: Second Year Semester III
Course Code: MEC302 and Course Name: Thermodyamics

Time: 1 hour Max. Marks: 50

NOTE: There are total 25 questions. All the Questions are compulsory and carry equal marks

Q1.	Workdone in a free expansion process is
Option A:	zero
Option B:	minimum
Option C:	maximum
Option D:	positive
Q2.	The compression ratio for petrol engines is
Option A:	3 to 6
Option B:	5 to 8
Option C:	15 to 20
Option D:	20 to 30
Q3.	The efficiency of Diesel cycle approaches to Otto cycle efficiency when
Option A:	cut-off is increased
Option B:	cut-off is decreased
Option C:	cut-off is zero
Option D:	cut-off is constant
Q4.	The ratio of specific heat at constant pressure (c_p) and specific heat at constant volume (c_v) is
Option A:	equal to one
Option B:	less than one
Option C:	greater than one
Option D:	none of these
Q5.	If the value of n = 0 in the equation $pv^n = C$, then the process is called
Option A:	constant volume process
Option B:	adiabatic process
Option C:	constant pressure process
Option D:	isothermal process
Q6.	The value of gas constant (R) in S. I. units is
Option A:	0.287 J/kgK
Option B:	2.87 J/kgK
Option C:	28.7 J/kgK
Option D:	287 J/kgK

Q7.	Calculate the final temperature and pressure if the fluid is compressed reversibly from volume of 7m3 to 1 m3 when the initial temperature and pressure of fluid as 20°C and 1 bar respectively. Assume the index of compression as and 1.4, Cp = 1.005 and Cv = 0.718 and R = 0.287 KJ/kg-K.
Option A:	T=400.12K & P=18.68bar
Option B:	T=638.1K & P=15.25bar
Option C:	T=775.9K & P=10.38bar
Option D:	T=599.9K & P=12.28bar
Q8.	Find the correct statement
Option A:	The algebraic sum of net heat and work interactions between a system and the surrounding in the thermodynamic Cycle is zero.
Option B:	The algebraic sum of net heat and work interactions between a system and the surrounding in the thermodynamic Cycle is infinity.
Option C:	The sum of heat and work interactions between systems is zero.
Option D:	Q+W=dU
Q9.	Which is correct statement of Clausius?
Option A:	It is impossible to devise a cyclically operating device, which produces no other effect than the extraction of heat from a single thermal reservoir and delivers an equivalent amount of work.
Option B:	It is impossible to construct a device that operates in a cycle and produces no effect other than the transfer of heat from a lower-temperature body to higher-temperature body.
Option C:	It is impossible to construct a device that operates in a cycle and produces no effect other than the transfer of heat from a lower-temperature body to higher-temperature body without taking aid of any external work.
Option D:	Heat engine with single thermal reservoir is not possible.
Q10.	A cycle consisting of two isothermal and two isentropic processes, is known as
Option A:	Carnot cycle
Option B:	Stirling cycle
Option C:	Ericsson cycle
Option D:	Joule cycle
Q11.	Which is not a P,V,T relation for polytropic process?
Option A:	$P2/P1 = (V1/V2)^n$
Option B:	$T2/T1 = (V2/V1)^{n-1}$

Option C:	$T2/T1 = (P2/P1)^{(n-1)/n}$
Option D:	$T2/T1 = (V1/V2)^{n-1}$
Q12.	An inventor claims that his engine absorbs 300 kJ of energy from a thermal reservoir at 325 K and delivers 75 kJ of work. The inventor also states that his engine has two heat rejections: 125 kJ to a reservoir at 300 K and 100 kJ to a reservoir at 275 K. Check the validity of his claim.
Option A:	CLAIM IS TRUE
Option B:	ENGINE IS REVERSIBLE
Option C:	ENGINE IS IRREVERSIBLE
Option D:	CLAIM IS INTOLERABLE
Q13.	Cp-Cv=_____ & Cp/Cv=_____
Option A:	R & γ
Option B:	n & γ
Option C:	R & n
Option D:	h & s
Q14.	At inlet to a certain steady flow nozzle, the fluid parameter is Enthalpy = 2850 kJ/kg, velocity = 50 m/s, area = 0.1 m2, specific volume = 0.18 m3/kg at the discharge end enthalpy is 2650 kJ/kg and the specific volume is 0.49 m3/kg. Make calculation for the velocity of fluid. The nozzle is horizontal and there is negligible heat loss from it.
Option A:	552.8m/s
Option B:	634.4m/s
Option C:	366.2m/s
Option D:	100.2m/s
Q15.	A system at 500K receives 7200KJ/min from a source at 1000K. The temperature of atmosphere is 300K. Assuming that the temperature of system and source remain constant during heat transfer find out, a) The entropy produced during heat transfer b) The increase in unavailable energy after heat transfer
Option A:	6.7KJ/min-K b) 2160kJ
Option B:	7.2KJ/min-K b) 4320kJ
Option C:	**7.2KJ/min-K b) 2160kJ**
Option D:	72KJ/min-K b) 132kJ
Q16.	How much heat is required for generating 2 kg of superheated steam at 17 bar and 300 degree celcius from water at 0 degree celcius?
Option A:	2793.4 kJ/kg

Option B:	2793.8 kJ/kg
Option C:	3033.5 kJ/kg
Option D:	6067 kJ/kg
Q17.	Steam at 120 bar has the specific volume of 0.01721 m3/kg. Find the temperature & specific enthalpy.
Option A:	300°C & 2698.2 kJ/kg
Option B:	350°C & 2847.7 kJ/kg
Option C:	420°C & 5.500 kJ/kg
Option D:	102.0°C & 2722.4 kJ/kg
Q18.	In a steam turbine steam at 20 bar and 360 °C is expanded to 0.08bar. At the end of condenser, saturated water is available for pumping to boiler. Assume ideal processes, find rankine efficiency.
Option A:	33.2%
Option B:	32.5%
Option C:	67.5%
Option D:	66.8%
Q19.	In a reheat cycle, the initial steam pressure and the maximum temperature are 150bar and 550°C respectively. If the Condenser pressure is0.1bar and the moisture at the condenser inlet is 5% determine reheat pressure. Assume ideal process
Option A:	10 bar
Option B:	5 bar
Option C:	13.2 bar
Option D:	20 bar
Q20.	When cut-off ratio is _____ the efficiency of Diesel cycle approaches to Otto cycle efficiency
Option A:	zero
Option B:	1/5
Option C:	4/5
Option D:	1
Q21.	A process, in which the temperature of the working substance remains constant during its expansion or compression, is called
Option A:	isothermal process
Option B:	hyperbolic process
Option C:	adiabatic process
Option D:	polytropic process
Q22.	The gas in cooling chamber of a closed cycle gas turbine is cooled at
Option A:	constant volume

Option B:	constant temperature
Option C:	constant pressure
Option D:	none of these
Q23.	Which of the following is the correct statement?
Option A:	For a given compression ratio, both Otto and Diesel cycles have the same efficiency.
Option B:	For a given compression ratio, Otto cycle is more efficient than Diesel cycle.
Option C:	For a given compression ratio, Diesel cycle is more efficient than Otto cycle.
Option D:	The efficiency of Otto or Diessel cycle has nothing to do with compressioin ratio.
Q24.	One reversible heat engine operates between 1600 K and T_2 K and another reversible heat engine operates between T_2 K and 400 K. If both the engines have the same heat input and output, then temperature T_2 is equal to
Option A:	800K
Option B:	1000K
Option C:	1200K
Option D:	1400K
Q25.	In closed cycle gas turbine, the air is compressed
Option A:	isothermally
Option B:	isentropically
Option C:	polytropically
Option D:	none of these