Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

A Constituent Institute of Manipal University, Manipal

I SEMESTER B.TECH END SEMESTER MAKEUP EXAMINATIONS,

DECEMBER, 2017

SUBJECT: BASIC MECHANICAL ENGINEERING [MME 1001]

REVISED CREDIT SYSTEM

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer **ALL** the questions.
- Missing data if any may be suitably assumed.
- Use of Steam Tables is permitted

1A. 5kg of water is heated from 40℃ to superheated steam at 150℃ at a constant pressure of 3 bar. Determine the total amount of heat added in the heating process and the amount of superheat. Assume the specific heat of water as 4.187 kJ/Kg°K and that of super-heated steam as 2.25 kJ/Kg°K. **05**

1B. With a neat sketch explain the working of a Pelton Wheel and discuss the propelling force in an impulse turbine. **05**

2A. (i)Draw the general layout of a Thermal Power Plant and name the various components? **03+02**

(ii)Explain the functions of a Evaporator and a Condenser in a vapour compression refrigeration system

2B. The shaft from a motor is connected to gear A which rotates at 2100RPM. Gears B and C are compound gears as well as gears D and E. Gear A meshes with gear B and gear C drives gear D. Gear E meshes with gear F which is fitted on the driven shaft. The number of teeth on gears A, B, C, D, E and F are 20, 30, 40, 50, 60 & 70 respectively. Sketch the arrangement and determine the speed of gear F? Calculate the centre distance between the driver and driven shafts if the module of gears is 2mm. **05**

3A. Draw the neat sketch of an engine lathe, label the parts and explain the functions of the parts of carriage assembly. **05**

3B. Differentiate between open and crossed belt drives and with a neat sketch explain the working of a fast and loose pulley. **05**

4A. A four cylinder two stroke petrol engine with stroke to bore ratio of 1.2 develops 32 kW at 2500 rpm. The mean effective pressure on the piston is 8 bar and mechanical efficiency is 85 %. Determine (i) the diameter and stroke of each cylinder and (ii) the brake thermal **05**

efficiency, if the fuel consumption is 9 kg/hr and the fuel is having calorific value of 44000 kJ/kg

4B. With neat sketches and illustrating the pressure volume changes explain the working of a 4 stroke diesel engine. **05**

5A. Explain any five each pattern making allowances and desirable properties of moulding sand. **05**

5B. With a neat sketch explain the oxy acetylene gas welding process and discuss the different type of flames. **05**

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MANIPAL INSTITUTE OF TECHNOLOGY

A Constituent Institute of Manipal University, Manipal

I SEMESTER B.TECH END SEMESTER EXAMINATIONS,

NOVEMBER, 2017

SUBJECT: BASIC MECHANICAL ENGINEERING [MME 1001]

REVISED CREDIT SYSTEM

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer **ALL** the questions.
- Missing data if any may be suitably assumed.
- Use of Steam Tables is permitted

1A. 2000kg of wet steam at a pressure of 0.009 MPa is generated in a boiler per hour. The temperature of feed water is 15°C and the total amount of heat added in the boiler is 4944MJ/hr. The steam from the boiler enters the super heater after a heat loss of 400kJ/kg, where it is superheated such that the degree of superheat is 200°C. Determine **05**

(i) Dryness fraction of the steam at the entry point of the super heater?

(ii) Heat absorbed per hour in the super heater?

Assume the specific heat of water as 4.187 kJ/Kg°K and that of super-heated steam as 2.25 kJ/Kg°K.

1B. With neat sketches illustrating the propelling forces and pressure velocity changes explain the working of a reaction turbine. **05**

2A. (i)Draw the general layout of a Hydel Power Plant and name the various components? **03+02**

(ii)Define the unit of refrigeration and the parameter used to specify its performance

2B. Design a set of stepped cone pulleys for driving a machine by a belt drive from a counter shaft running at 850 rpm. The machine is to run at 350, 450 and 550 rpm and the smallest step on the countershaft is 300 mm in diameter. The distance between the centers of the two shafts is 3 meters. Sketch the arrangement. **05**

3A. Give the specification of a lathe and with a neat sketch explain the working of a Radial Drilling Machine **05**

3B. Explain the phenomena of slip and creep in a belt drive and differentiate between simple and compound gear trains. **05**

4A. A diesel engine generating power in every revolution of the crank shaft is operating with a compression ratio of 15:1 and at the rate of 750 cycles per 30 seconds. The cylinder has a clearance volume of **05**

200cc and fuel consumption per brake power hour is 0.257kg/kW-hr. The net brake load is 50 kg and the mean circumference of the brake drum is 4m. Determine the indicated thermal efficiency of the engine if the mean effective pressure is 0.9 MPa and the calorific value of diesel is 43900kJ/kg.

4B. With neat sketches and illustrating the pressure volume changes explain the working of a four stroke petrol engine. **05**

5A. With neat sketches explain in detail how arc welding is carried out using a DC power source. **05**

5B. (i) Explain the positive pattern making allowances and highlight the importance of cores in sand casting. **03+02**

(ii)Differentiate between Annealing and Normalizing

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MANIPAL INSTITUTE OF TECHNOLOGY

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(A constituent unit of MAHE, Manipal)

I SEMESTER B.TECH END SEMESTER MAKEUP EXAMINATIONS, DECEMBER 2018

SUBJECT: **BASIC MECHANICAL ENGINEERING [MME 1051]**

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer **ALL** the questions.
- Missing data if any may be suitably assumed.
- Use of Steam Tables is permitted

1A.	Determine the enthalpy required to convert 4 kg of water at 20ºC into steam at 8 bar and 200ºC. Assume specific heat of superheated steam as 2.25 kJ/kgºK and that of water as 4.187 kJ/kgºK	**05**
1B.	Differentiate between water tube and fire tube boilers	**03**
1C	Briefly explain the function of a Safety Valve and a Fusible Plug	**02**
2A.	Power transmitted between two shafts, 3.5m apart by a crossed belt drive using two pulleys of 0.6m and 0.3m diameters is 6KW. The speed of the larger pulley is 220 rpm. The permissible load on the belt is 25N per mm width of the belt. The coefficient of friction between the pulley surface and the belt is 0.35 Determine a) The necessary length of the belt b) The width of the belt c) The necessary initial tension in the belt	**05**
2B.	With a neat sketch explain the working of a Fast & Loose pulley.	**03**
2C	Differentiate between open and crossed belt drives.	**02**
3A.	From a test on a four stroke petrol engine, the	**05**

	following data is available: engine speed 1000 rpm, net brake torque 70 N-m, mean effective pressure 10 bar, stroke 150 mm, bore 100 mm, rate of fuel consumption 2.57 kg/hr., calorific value of petrol 41000 kJ/kg. Calculate the indicated thermal efficiency and brake thermal efficiency.	
3B	With a neat sketch explain the splash lubrication system.	**03**
3C	Differentiate between a four stroke engine and a two stroke engine (minimum 4 points).	**02**
4A.	With a neat sketch explain the working of a Pelton Wheel and discuss the propelling force in an impulse turbine.	**05**
4B.	Draw the general layout of a Thermal Power Plant and name the various components?	**03**
4C	Briefly explain the thermodynamic properties of an ideal refrigerant.	**02**
5A.	Draw the neat sketch of an engine lathe, label the parts and explain the functions of the parts of carriage assembly	**05**
5B.	With a neat sketch explain the electric resistance spot welding process.	**03**
5C	Explain the positive pattern making allowances and highlight the importance of cores in sand casting.	**02**

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MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent unit of MAHE, Manipal)

I SEMESTER B.TECH END SEMESTER EXAMINATIONS, NOVEMBER 2018

SUBJECT: **BASIC MECHANICAL ENGINEERING [MME 1051]**

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer **ALL** the questions.
- Missing data if any may be suitably assumed.
- Use of Steam Tables is permitted

1A. Determine the mass of 23.33% wet steam that can be produced by supplying 10031.8 MJ of heat at a pressure of 0.036MPa. The water is fed to the boiler at temperature of 20℃. Also calculate the total enthalpy required by this steam in MJ to reach the dry state. Assume specific heat of water as 4.187kJ/Kg ℃K. **05**

1B. Draw the neat sketch of a Babcock Wilcox boiler and label the parts. **03**

1C Briefly explain the function of a Economizer and a Blow Off Valve **02**

2A. The following gears are available to form a gear train **05**

Gear	Type	Module (mm)	No.of Teeth	Numbers available
A	Helical	3	28	3
B	Bevel	4	38	2
C	Bevel	2	36	2
D	Helical	2	24	1
E	Spur	3	36	1
F	Spur	2	96	1
G	Spur	3	90	2
H	Bevel	2	40	1

	I	Helical	2	32	2	
	J	Bevel	4	22	1	
	K	Spur	3	38	2	
	L	Helical	3	30	2	
	Design a compound gear train for the maximum possible speed reduction ratio using five shafts and by having helical gear on the driving shaft and bevel gear on the driven shaft. Sketch the arrangement.					
2B.	With a neat sketch (two views) explain the working of a stepped cone pulley.					**03**
2C	Explain the phenomena of slip and creep in a belt drive.					**02**
3A.	With neat sketches and illustrating the pressure volume changes explain the working of a four stroke diesel engine					**05**
3B	A diesel engine having a cam shaft and operating with a compression ratio of 15:1 has a clearance volume of 200cc. The fuel is being injected at the rate of 24,000 injections per hour. Calculate the indicated power of the engine if the mean effective pressure is $1.6N/mm^2$.					**03**
3C	Briefly explain the properties of an ideal lubricant.					**02**
4A.	Explain the need for compounding an impulse turbine and with a neat sketch illustrating the pressure velocity changes explain the working of a pressure velocity compounded impulse turbine.					**05**
4B.	Draw the general layout of a Hydel Power Plant and name the various components?					**03**
4C	Briefly explain the functions of an Evaporator and a condenser used in a vapor compression refrigeration system.					**02**

5A.	With neat sketches explain taper turning by swiveling the compound rest, counter boring and countersinking operations.	**05**
5B.	Explain any three each properties of moulding sand and pattern making allowances.	**03**
5C	With a neat sketch explain how arc welding can be carried out using a D.C. power source for thicker workpieces.	**02**