Reg. No.										

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**