Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

A Constituent Institute of Manipal University, Manipal

VII SEMESTER B. TECH (I & P ENGG.)

END SEMESTER MAKE UP EXAMINATIONS DEC 2016/JAN 2017

SUBJECT: PRODUCT DESIGN & MANUFACTURING [MME 411]

REVISED CREDIT SYSTEM

(04/01/2017)

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer **ANY FIVE FULL** questions.
- Missing data may be suitably assumed.
- Use of design data hand book is permitted

1A. Explain what do you mean by 'design by evolution' and 'design by innovation' **5 M**

1B. Explain the five steps in concept generation process referring to a hand held nailer. **5 M**

2A. Explain the cost-vs-performance indices method for selection of material referring to the example of 'yielding of a bar in uniaxial tension'. **5 M**

2B. What is morphology of design? Explain the sequential steps involved in preliminary design phase of morphology of design. **5 M**

3A. List and explain with neat sketches the different methods for material saving in design. **5 M**

3B. What is FMEA? Explain the Ten steps to conduct FMEA. **5 M**

4A. Explain with neat sketches the important considerations in design of parts for 'casting. **5 M**

4B. Explain in detail about statistical process control. **5 M**

5A. Explain the factors to consider in the designing of parts for closed die forging operation. **5 M**

5B. Recommend the optimum material and dimensions for a machine shaft subjected to twisting moment of 3 kN-m and desiring a torsional stiffness of 100 N-m/degree, so as to have a minimum weight of the shaft. Following materials are available- **5 M**

Sl. No	Material	Mass Density, ρ (kg/m^3)	Yield strength, σ_y (MPa)	Modulus of Rigidity (GPa)
1	Mg-Alloy	1760	225	16
2	Plastic	1200	55	2
3	Ti-Alloy	3600	910	42
4	Steel	7650	1380	84

6. A gearbox is required to transmit 30 kW. The driving shaft runs at 1500 rpm and driven shaft is to have two speeds of 375 rpm and 500 rpm. Design the gears and counter shaft in neutral position of gear box unit assuming the same material and module for all gears. Use spur gears only and take the centre distance as equal to 400 mm. **(5+5)M**

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