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MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL (*A constituent unit of MAHE, Manipal*)

II SEMESTER M.TECH. (CAAD & MET) END SEMESTER EXAMINATIONS - APRIL 2018 SUBJECT: PROGRAM ELECTIVE - II (DESIGN FOR MANUFACTURING, MME 5264) REVISED CREDIT SYSTEM

Time: 3 Hour

Max. Marks: 50

- **Note:** (i) Answer all the questions
 - (ii) Additional data/detail required, if any, may be appropriately assumed
 - (iii) Assumptions made must be clearly mentioned
- 1A Why manufacturing is considered as an important factor at the design phase. 03 Justify with two examples.
- 1B How DFM reduces product cost by focusing on raw materials and at what 03 stage of product development process, DFM is implemented.
- 1C A steel shaft of diameter 60 mm and length 250 mm, has reduced diameter of 40 mm for a length of 16 mm, to facilitate bearing mounting, on both ends of the shaft. A rectangular key of 12 x 8 mm and 30 mm length is used to mount a gear at the midspan of shaft. What are the design challenges if shaft is to be subjected to total hardening? Prepare the manufacturing drawing of the shaft and discuss DFM guidelines applied.
- 2A Discuss how compatibility matrix for metal removal process would help 03 designers in selecting the materials.
- 2B Discuss the DFM guidelines w.r.t. wall thickness, ribs and holes in case of 03 components manufactured by injection moulding process.
- 2C L shaped bracket having two ribs, is used to support a shaft end. The bracket 04 is mounted on a horizontal surface with the help of 4 screws. Prepare the machining drawing of bracket if the initial manufacturing process is welding and highlight DFM guidelines implemented.
- 3A Prepare the manufacturing drawing of connecting rod produced by forging 03 and followed by machining.
- 3B How DFM is applied for a gear if it is manufactured by 03
 i) Powder metallurgy ii) Machining

- 3C Explain with examples, DFM guidelines for i) drilling and ii) grinding 04 operations.
- ^{4A} Justify the following statements:
 - Sharp corners and edges are avoided in sand cast components.
 - To achieve good flatness in surface grinding, component is to be properly supported and ground surface to be continuous.
 - Heat treatment of threads is not recommended.
- 4B Mention and explain the sequence of operations followed for the 07 manufacturing of machine tool spindle. How stability of the spindle is ensured.
- 5A. Explain cumulative tolerance (tolerance stack up) considering the example of 03 Jig bush and Liner bush with Slip bush combination used in jig plates.
- Lathe slide rest: The lathe slide rest is fitted on the lathe carriage and the 07 5B. cutting tool is held in it. Fig. shows one type of lathe slide rest. It is assembled from the parts shown in Fig. The compound slide base will be mounted on the carriage of the lathe. The slide block will be mounted on the slide base so that it can be moved over its guideways. An adjustable wear strip is connected to the underside of the slide block by two hexagonal head screws. Two other screws which are screwed to the side of the slide block enable the adjustment of the wear strip. The screw spindle passes through the sliding nut which is fitted to the underside of the slide block. The screw spindle is held to the compound slide base by the clamp plate fixed to the compound slide base by two counter screws. The tool holder is slipped into the T-slot provided on the slide block. The washer provides a large bearing area for the tool. The square head screw helps to hold the tool in the tool holder. Prepare the manufacturing drawing of: i)Compound slide base ii) Screw spindle

Part	Description	Material	No.	Part	Description	Material	No.
No.			off	No.			off
1	Compound slide base	Cast iron	1	7	Tool holder	Steel	1
2	Screw spindle	Steel	1	8	Sq. head screw	Steel	1
3	Sliding nut	Cast iron	1	9	Clamp plate	Steel	1
4	Slide block	Cast iron	1	10	CSK screw	Steel	2
5	Wear strip	Cast iron	1	11	Hex. screw	Steel	4
6	Washer	Steel	1				



