Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 31053

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2013.

Jun. 1st - AN

Seventh Semester

Mechanical Engineering

080120055 — DESIGN FOR MANUFACTURING AND ASSEMBLY

(Regulation 2008)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Distinguish between original design, development design and variant design with example.

2. For the component "IC engine piston", list the main material requirements and suggest any one suitable material.

3. Consider the following two processes with design specification 60 ± 0.4. Which process would you prefer to use? Justify your answer.

	PROCESS "A"	PROCESS "B"
Mean (μ)	60	60
Standard deviation (σ)	0.2	0.1
Mean Shift	0.15	0

4. List any four different manufacturing processes and their attainable tolerance grades.

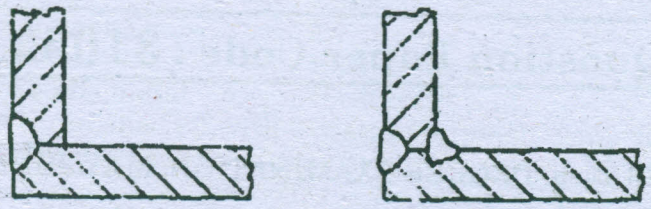
5. Mention any two examples of components and assemblies which call for selective assembly.

6. Differentiate with an example the concept of functional and manufacturing datum.

7. When compared with floating fastener assembly, the fixed fastener assembly is relatively difficult from assembly stand point – Justify.

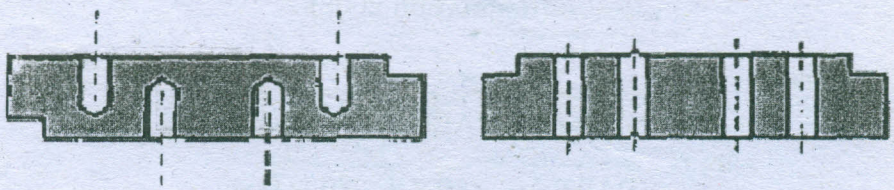
8. Mention the steps involved in paper layout gauging.

9. Which one of the following weld design is preferred and why?



(A) (B)

10. Which one of the following part design is preferred for machining? Justify your answer.



(A) (B)

PART B — (5 × 16 = 80 marks)

11. (a) Develop a process selection strategy for 'forming a fan".

Or

(b) List and explain the product design guidelines for manual and automatic assembly.

12. (a) Analyse the interference of the interference fit $20H_7r_6$ by the methods

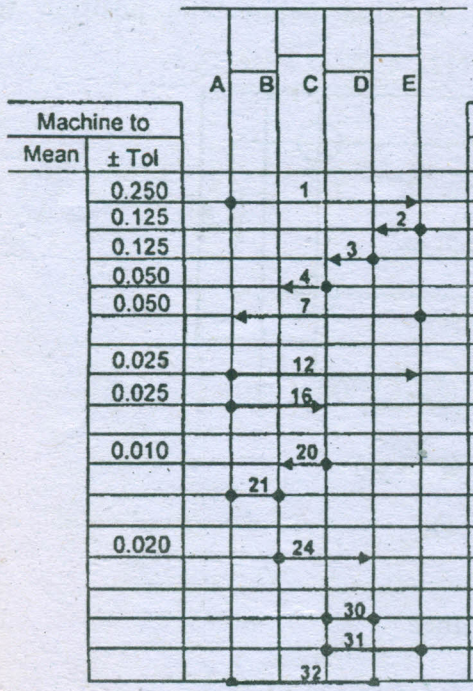
(i) Sure fit law

(ii) Normal law

(iii) 1σ truncated normal law. If the piece part errors are having 1σ runcated normal distributions find the percentage of assemblies that have more than 20 microns interference.

Or

(b) Determine the achievable tolerance for the dimension shown in the line numbers 30, 31 and 32. Compute the stock tolerances in line Nos. 12, 16,20 and 24.



Machine to		Bal. dim		Lines Involved	Stock	
Mean	± Tol	Mean	± Tol		Mean	± Tol
	0.250					
	0.125					
	0.125					
	0.050					
	0.050					
	0.025					
	0.025					
	0.010					
	0.020					

13. (a) State and explain the algorithms for computing the location accuracy of the following datum system: "Grouped datum planes, Grouped spigot and recess, Grouped pin and hole datum system".

Or

(b) The selective assembly chart for the crown wheel bore and expandise collet assembly to be used in spiral bevel gear cutting is as follows :

Group No.	Crown wheel bore size (mm)	Matching expandise outside diameter (mm)
01	ϕ 200.000 to 200.014	ϕ 199.988 to 199.998
02	ϕ 200.014 to 200.028	ϕ 200.002 to 200.012
03	ϕ 200.028 to 200.042	ϕ 200.016 to 200.026
04	ϕ 200.042 to 200.056	ϕ 200.030 to 200.040

Based on the above data, sketch the assembly set up and suggest appropriate secondary production process for the crown wheel bore and expandise outside diameter. Also determine the fit requirement between the mating parts to ensure proper clamping under gear cutting conditions

14. (a) Compare the true position tolerancing system and conventional co-ordinate system of tolerancing with an illustrative example and Re-dimension the following drawing using true position tolerances. (Fig. Q 14 (a))

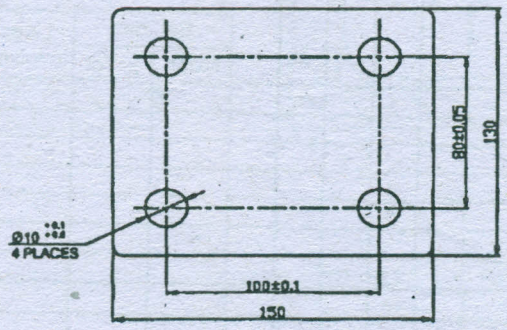


Fig. Q 14 (a)

Or

(b) Write short notes on :

(i) Zero true position tolerance

(ii) Functional gauge.

15. (a) Explain the following with respect to sand casting with suitable examples :

(i) Preferred parting line which minimizes or eliminates core requirements

(ii) Design modifications in the castings to eliminate core requirements.

Or

(b) A cast iron support bracket (Fig. 15(b)) has to be cast. Identify the possible parting lines and the appropriate sand cores. Suggest suitable design modifications to remove the need for sand cores.

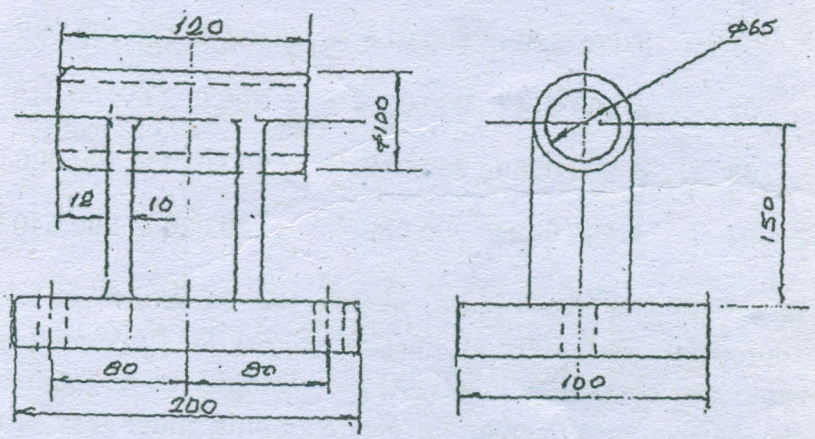


Fig. Q 15 (b)