SEAL

AEN (M) 2013-19

FOR EVALUATOR'S USE ONLY

Sub. Code : 55

Optional Paper

Mechanical Engineering : Paper-I

Time : 3 Hours / Maximum Marks : 200 / Total Pages : 32

Evaluation Table (For Evaluator's Use Only)

PART-A				PART-B				PART-C			
QN	E-1	E-2	AC	QN	E-1	E-2	AC	QN	E-1	E-2	AC
1				21				33			
2				22				34			
3				23				35			
4				24				36			
5				25				37			
6				26				38			
7				27				39			
8				28							
9				29							
10				30							
11				31							
12				32							
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19											
20											
Total											
Evaluator's Sign											

Grand Total	
PART-A	
PART-B	
PART-C	
Total	
(–) Marks	
Final Total	

Marks in Words

Remarks of Evaluator/Chief Evaluator

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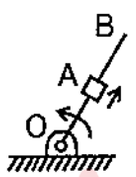
PART – A

Marks : 40

Note : Attempt all the **twenty** questions. Each question carries **2** marks. Answer should not exceed **15** words.

1 Why does the pressure angle remain constant during engagement in involute teeth gears ?

2 A link OB is rotating with a constant angular velocity of 2 rad/s in counter clockwise direction and a block is sliding radially outward on it with an uniform velocity of 0.75 m/s with respect to the rod, as shown in the figure below. If OA = 1 m, what is the magnitude of the absolute acceleration of the block at location A in m/s^2 ?



3 What is meant by self-locking brakes ?

4 Which type of ball-bearing can take up considerable amount of shaft misalignment ?

5 Define Atomic Packing Factor.

6 What are the properties required for bearing materials ?

7 List various crystalline imperfection as based on their geometry.

8 What are the two most important alloying elements added to improve corrosion resistance of steel ?

9 A thin cylinder of inner radius 500 mm and thickness 10 mm is subjected to an internal pressure of 5 MPa. What is the average circumferential (hoop) stress ?

10 What is fatigue failure ?

11 Which effects are taken into account by employing the Wahl's stress factor in design of helical springs ?

12 Why is a boss usually provided at the fulcrum of a lever ?

13 A steel bar of 200 mm diameter is turned at a feed of 0.25 mm/rev with a depth of cut of 4 mm. The rotational speed of the workpiece is 160 rpm. What is the material removal rate ?

14 What are the major defects which are likely to occur in sand castings ?

15 What are the functions of flux coating on the electrodes employed in arc welding ?

16 What is meant by unilateral and bilateral tolerance ? Give examples.

17 Define Method study.

18 What is the difference between public limited company and private limited company ?

19 What is meant by lead-time in the context of inventory control ?

20 What is Taylor's differential piece rate wage plan ?

PART – B

Marks : 60

Note : Attempt all the **twelve** questions. Each question carries **5** marks. Answer should not exceed **50** words.

21 Explain clearly why the primary inertia force in single cylinder engine cannot be balanced completely ?

22 Differentiate clearly between the functions of flywheel and governor.

23 Derive the relation for the velocity ratio of open belt drive.

24 What is creep ? List the factors that increase creep rate.

25 Draw TTT Diagram (S-curves) for a eutectoid steel.

26 Why the stress at rupture is less than the ultimate stress in a conventional stress - strain diagram ?

27 Discuss the various factors which modify the endurance limit of a mechanical or structural member ?

28 Describe the use of chills and chaplets in casting.

29 What is the difference between an open-loop positioning system and a closed-loop positioning system used in NC machine tools ?

30 Explain briefly the required properties of molding sand.

31 Briefly describe the ABC analysis for controlling inventory.

32 Explain SIMO chart.

PART – C

Marks : 100

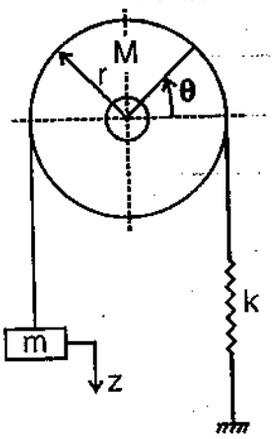
Note : Attempt any **5** questions. Each question carries **20** marks. Answer should not exceed **200** words.

33 Define the term height of governor. Derive an expression for the height of Watt governor. Also, discuss its limitation.

34 Discuss with sketch iron-carbon diagram.

35 Explain the steps in the design of spur gears, considering different causes of gear tooth failure.

36 Determine the natural frequency (ω_n) of the spring mass pulley system shown in figure, using energy method.



Spring-mass pulley

37 Explain different mechanisms of tool wear.

38 With the help of a neat sketch describe the submerged arc welding process and give its applications.

39 A project schedule is shown below. Construct a CPM network diagram and find out the critical path and the total project duration :

Activity	Duration (days)	Activity	Duration (days)
1-2	3	4-8	6
1-4	2	5-6	5
1-7	1	6-9	4
2-3	3	7-8	4
3-6	2	8-9	5
4-5	4		

SPACE FOR ROUGH WORK

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