

Mech
AUTO

Be

CAD/CAM/CIM

MECH & AUTO SEP-15

Sem VIP

Date:-7-9-

Sub:- CAD/CAM QP Code : 5523

04 Hrs

[100 Marks]

N.B.:

- (1) Question No.1 is compulsory
- (2) Attempt any **four** questions out of remaining **six** questions
- (3) Figures to right indicate full marks
- (4) Assume suitable data if **necessary**.
- (5) Notations carry usual meaning.

- Q.1 (A) With help of diagram explain the concurrent engineering with respect to product cycle in a CAD/CAM Environment. 10
- (B) Explain in brief CAD system architecture. 5
- (C) List important advantages and disadvantages of NURBS. 5
- Q.2 (A) Compare Wire frame modeling with Solid Modeling. 10
- (B) Draw and explain CIM wheel of the SME to show involvement of the all the functions of an enterprise. 10
- Q.3(A) Explain in details any FOUR 3D transformations. List its benefits. 12
- (B) Explain with block diagram CAQC in detail. 08
- Q.4 (A) Explain ~~in~~ approach of CAPP systems. State its benefits over other approach. 10
- (B) Explain the following in brief: 10
1. Information systems in CIM
 2. Virtual prototyping



RJ-Con. 12712-15.

[TURN OVER

- (B) Plot the Bezier curve having endpoints $P_0 (1, 3)$ and $P_3 (7, 2)$. The other control points are $P_1 (5, 6)$ and $P_2 (6, 0)$. Plot for values for $u=0, 0.1, 0.2, \dots, 1$, if the characteristic polygon is drawn in the sequence $P_0-P_1-P_2-P_3$. 10
- Q.7 Write short notes on following: (any FOUR) 20
1. Product design and CAD/CAM
 2. Green Manufacturing
 3. Similarity coefficient matrix
 4. Design for manufacturing
 5. Graphic Standards
-



Be AUTO (Autohronics) 08/09/15 Special Exam
Sem - VII (R) SEP-15

AUTO

Sub:- AUTOTRONICS QP Code : 5618

(3 Hours)

[Total Marks : 100

NB:

1. Question No. 1 is compulsory.
2. Attempt any **four** questions from remaining.
3. Draw neat sketches in support of your answer.

- Q.1] Write short note on :
- a) Air management system. 5
 - b) Sealed beam headlight. 5
 - c) Global positioning system. 5
 - d) Electronic fuel injection. 5
- Q.2] a) Explain different charging methods of batteries. 10
- b) What are the different battery testing methods Explain cadmium test. 10
- Q.3] a) Explain Rectification from A.C to D.C. 10
- b) Explain principle, construction & working of alternator 10
- Q.4] a) Explain working of Distributor less ignition system & also explain waste spark method. 10
- b) What is ECM? Explain 2 modes of operations of ECM 10
- Q.5] a) Draw sketch of lead acid battery & explain construction & working. 10
- b) With neat sketch explain ABS and TCS 10
- Q.6] a) Give purpose & function of various types of amps used in automobiles. 10
- b) Explain the term telematics. Also explain its applications. 10
- Q.7] a) Explain working principle of any type of 3 types of sensor 10
- b) What are the different types of Fuel cells Explain any one type 10

RJ-Con. 12737-15.

ADOME (AUTO) 09/09/15
 BE sem-VII (Rev) SEP-15

AUTO

Sub:- ADOME

QP Code : 5690

(4 Hours)

[Total Marks : 100

NB.

1. Question No. 1 is compulsory.
2. Attempt any four questions from remaining.
3. Use of design data hand book is permitted.
4. Assume suitable data if required.

Q.1]	a)	Explain the types of piston.	05
	b)	Design a connecting rod for I.C. engine for the following data draw a neat sketch for lubrication path Piston dia. =100 mm Mass of reciprocating part =2.25 kg Length of connecting rod =380 mm Stroke =190 mm Speed=2000 rpm Max pressure =3.15 N/mm ² Assume suitable data if required	15
Q.2]	a)	Explain design consideration of connecting rod.	05
	b)	Design piston four stroke diesel engine for the following data Cylinder bore= 90 mm Stroke = 120 mm Gas pressure = 5 N/mm ² IMEP = 0.7 N/mm ² Mechanical Efficiency = 80 % Engine speed = 2500 RPM Assume suitable data if required. Draw neat drawing.	15
Q.3]	a)	Explain coefficient of fluctuation of speed and energy.	05
	b)	The area of the turning moment, below and above line are: -32, 408, -267, 333, -310, 226, -374, 260, -244 mm ² The scale for abscissa and ordinate 1mm = 2.4° and 1mm = 650 N/m respectively. The mean speed is 330 rpm. with a % speed fluctuation of ± 1.5%. If the hoop stress in the material of the rim is not to exceed 5.8 N/mm ² . Determine the suitable diameter and cross section for the flywheel, assuming that the weight is equal to 4 times the thickness. The density of the material may be taken to be 7800 kg/m ³ , Neglect the effect of boss and arms.	15

[TURN OVER

Q.4]	a)	Explain manufacturing of connecting rod	05
	b)	Design only crank pin and web for the following data: Piston dia. = 200 mm, stroke = 350 mm Pressure at inlet = 1.25 N/mm ² obliquity ratio = 4 Engine speed = 300 rpm. Engine power = 75 kW. Weight of flywheel = 7 KN. Mean dia. of flywheel = 1.4 m.	15
Q.5]	a)	Explain the design consideration for overhead cam shaft.	05
	b)	Design the dimension of tangent cam to operate on inlet valve on an inline engine (i) for dwell = 0° (ii) for period of dwell = 20° of cam shaft travel. Inlet valve opens at 15° before T.D.C. and close 65° after B.D.C. Max. lift is 10 mm. Diameter of cam shaft is 32 mm, Diameter of roller = 20 mm and engine speed = 2000 rpm.	15
Q.6]	a)	Explain wrist pin offset	05
	b)	Design the various component of the valve gear mechanism for a horizontal diesel engine for the following data Bore = 140 mm Stroke = 270 mm Power = 8.25 kW Speed = 475 rpm Gas pressure = 3.5 N/mm ² Length of rocker arm = 150 mm Included angle = 160° Valve weight = 3 N	15
Q.7]		Write short notes on 1. Development of cam outline showing quieting ramp. 2. Explain the design consideration camshaft. 3. Stresses in flywheel rim. 4. Ergonomics consideration in design.	20



TM & MP (Auto) 11/09/11

Be sem - VII (Rev) Sep-15

AVTO

Subj - TM & MP

Date: 11-9-11

QP Code : 5898

(3 Hours)

[Total Marks : 100

NB:

1. Question No. 1 is compulsory.
2. Attempt any **four** questions from remaining.
3. Draw neat sketches in support of your answer.



- Q.1] a) Explain the purpose of the vehicle insurance. 5
- b) Explain the procedure to obtain Drivers License. 5
- c) Differentiate between Rural and Urban Transport 5
- d) Write a note on ARAI. 5
- Q.2] a) Explain advantages and limitations of Land, water and Air transport 10
- b) What are the different types of forms used in RTO 10
- Q.3] a) Explain the structure of Motor Vehicle Department. 10
- b) Explain the duties of Driver and Conductor in case of Accident. 10
- Q.4] a) Explain the Bus and crew scheduling procedure of STU. 10
- b) Explain various types of Fares and Fare collection methods.. 10
- Q.5] a) Explain the working of research organizations VRDE and CIRT. 10
- b) Describe the basic elements of Transport system. 10
- Q.6] a) Explain the objectives of taxation and write a note on tax exemption vehicles. 10
- b) Explain various documents which are to be kept by vehicle owner 10
- Q.7] a) Write a detail note on Bus Depot layout 10
- b) What Records need to be maintained in Goods Transport Organization? 10

R.J-Con. 12873-15.

- (i) Suitable tool
- (ii) Suitable speed and feed for machining.
- (iii) Show starting point and load unload point.
- (B) A rectangle ABCD has vertices A(1,1), B(2,1), C(2,3), D(1,3) . It has 10
to be rotated by 30° CCW about point P (3, 2). Determine: (i) the
composite transformation matrix (ii) the new coordinates of
rectangle.
- Q.3(A) Explain any one hidden line removal algorithm and explain how the 10
algorithm determines which entities are hidden
- (B) Explain contact and non-contact inspection methods in Computer 10
Aided Quality Control (CAQC)
- Q.4 (A) Explain any two rapid prototyping processes. 10
- (B) Write a complete APT program (geometric and motion commands) 10
to machine the outline of the geometry as shown in Figure 2. Assume
suitable data.

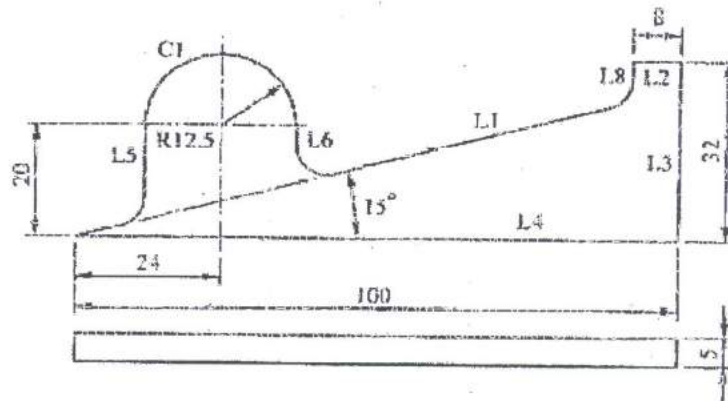


Figure 2

- Q. 5 (A) Write a program in object oriented language for 2D transformation 10
which include functions for the following operations: (i) rotation @
x-axis (ii) scaling

- (B) Explain the CIM wheel with neat sketch along with the features and functioning of CIM systems 10
- Q.6 (A) Explain part classification and coding in Group Technology in detail 07
- (B) Explain similarity coefficient matrix. 03
- (C) List benefits using Artificial Intelligence in CAPP system 05
- (D) Write short note on design for assembly 05
- Q.7 Write short note on (any two)
- (i) Automated material handling systems
 - (ii) Wire frame modeling 20
 - (iii) Light and shade ray tracing
 - (iv) 3D rotation transformation
-

Con. 11900-14.

MECH

Sub: - MD-II

Date: 4/6/14

QP- Code : MV-20163

(REVISED COURSE)

(4 hours)

[Total marks: 100]

- N.B.: 1) Q. No. 1 is compulsory.
 2) Attempt any **four** questions out of remaining six questions.
 3) Design data book such as PSG, Mahadevan are allowed.
 4) Assume suitable data if required.

- Q 1 a) Explain the force analysis in case of the bevel gears. 5
 b) Explain static and dynamic seals. 5
 c) Explain the concepts of the bends in case of the wire ropes. What is its significance? 5
 d) Define static load carrying capacity, dynamic load carrying capacity, equivalent load and cubic mean load related to rolling contact bearings. 5
- Q 2 A two stage gear box is used to transmit 10 KW power from an electric motor running at 1440 rpm to a machine with overall reduction ratio of 18. For the first stage helical gear pair,
 i) Determine the module using bending failure. 8
 ii) Check the gears for dynamic load by using both Barth velocity factor method and Buckingham's method. 8
 iii) Check the gears for wear strength. 4
- Q 3 a) The SKF bearing No. 6312 is subjected to the following load cycle; 14

Phase	Radial load (KN)	Radial load (KN)	Speed (RPM)	Time (Sec.)
I	3	1.5	300	12
II	5	2	280	21
III	8	3	250	27

Determine the expected life of the bearing in hours with probability of survival 92 %. The loads are with light shock, outer race rotates and operating temperature is 140 °C.

- b) What are the desirable properties of a good bearing material used in sliding contact bearings. 6
- Q 4 A rotary cam with central translatory roller follower has following motions; Forward stroke of 20 mm in 100° of cam rotation with parabolic motion, dwell for 40°, return stroke in 120° with SHM and remaining dwell to complete the cycle.
 Mass of the follower is 1 kg, cam shaft speed is 600 rpm, external force during forward stroke is 500 N and during return stroke is 100 N.
 Design;
 i) Cam 8
 ii) Follower with pin and spring 8
 iii) Cam shaft 4

[TURN OVER

- Q 5 a) A worm and worm wheel drive is used to transmit 11 KW power from an electric motor running at 1440 rpm to a machine running 12-14 hours per day with reduction ratio of 15.
- i) Determine the module based on wear failure. 8
 - ii) Check for dynamic load. 4
- b) A hydro dynamically lubricated full journal bearing is used to support a radial load of 15 KN. The speed of the journal is 1500 rpm. Use L/D ratio as 1 and bearing pressure 1.5 N/mm^2 . Find the length and diameter of the bearing. Assume suitable fit and at average clearance find, minimum oil film thickness, coefficient of friction and oil flow rate. 8
- Q 6 A centrifugal pump is required to pump the water for the following specification;
- Static suction head : 4 m
 - Length of suction pipe : 6 m
 - Static delivery head : 4 m
 - Length of delivery pipe : 6 m
 - Discharge : 1000 LPM
- Design;
- i) Pipe diameters 3
 - ii) Impeller and impeller shaft 8
 - iii) Casing 4
- Select the suitable motor 3
- Draw the layout. 2
- Q 7 The following specifications refers to an EOT crane;
- Load to be lifted : 80 KN
 - Hoisting speed : 6 m/min
 - Application : Class-II
- i) Select suitable wire rope and find its life. 8
 - ii) Select standard hook and check the induced stress at the most critical section. Design a nut for the hook and select suitable bearing. 6
 - iii) Design the pulley axle and select suitable bearings. 4
 - iv) Design the cross piece and shackle plates. 2



N.B.:

- (1) Question No.1 is compulsory
- (2) Attempt any four questions out of remaining six questions
- (3) Figures to right indicate full marks
- (4) Assume suitable data if necessary.
- (5) Notations carry usual meaning.

- Q.1 (A) Write short note on concurrent engineering in product design. 06
 (B) Write short note on computer aided process planning (CAPP). 07
 (C) Plot the Bezier curve having endpoints $P_0 (1, 3)$ and $P_3 (7, 2)$. The other control points are $P_1 (5, 6)$ and $P_2 (6, 0)$. Plot for values for $u=0, 0.1, 0.2, \dots, 1$, if the characteristic polygon is drawn in the sequence $P_0-P_1-P_2-P_3$. 07
- Q.2 (A) Write a part program using G and M codes for finishing a forged component as shown in Figure 1. Assume the speed and feed on the turning center as 500 rpm and 0.3 mm/rev respectively. Assume suitable data if necessary. 10

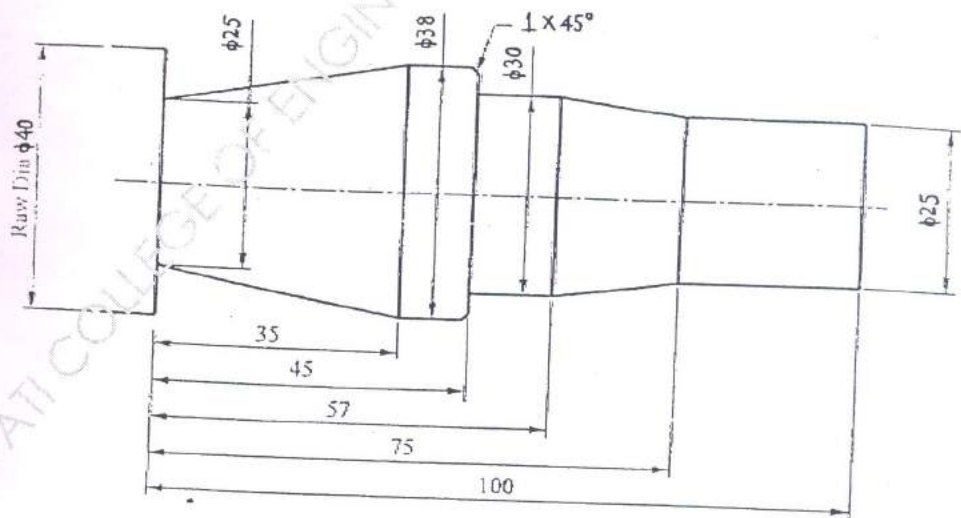


Figure 1

RJ-Con. 9111-15.

[TURN OVER

(B) Consider a triangle ABC having coordinates A(5,5) B(8,5) and C(5,10). Determine the new vertex position if:

- The triangle is rotated by 60° anticlockwise about the vertex A.
- The triangle is scale by 2 times in X direction and 3 times in Y direction about vertex A.

Q.3 Write short note on

- Adaptive control in manufacturing
- Artificial Intelligence in Computer Aided Process Planning (CAPP)
- Socio-techno-economic aspects with respect to Computer Integrated Manufacturing (CIM).

Q.4 (A) Write short note on (i) Essentials of Computer Aided Design workstations and its functions (ii) Visual realism

(B) Write a complete APT program (geometric and motion commands) to machine the outline of the geometry as shown in Figure 2. The component is 5 mm thick. The milling tool used is 5 mm in diameter. Consider spindle speed as 1000 rpm and feed as 0.3 mm/rev. Assume suitable data if necessary.

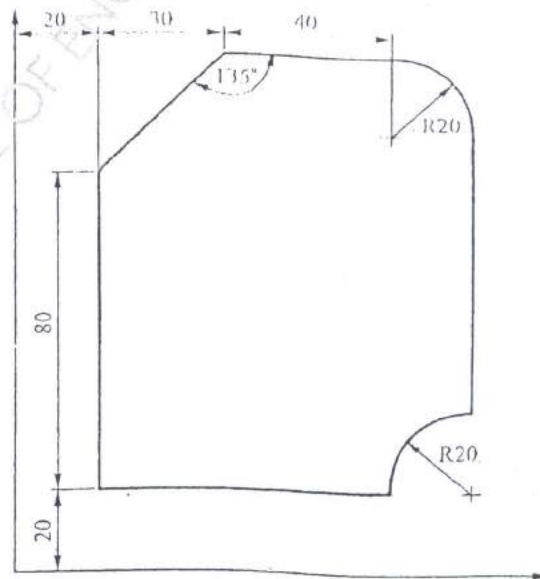


Figure 2

- Q. 5 (A) Write a program in object oriented language for 2D transformation 10
which include functions for the following operations: (i) rotation @ y-axis (ii) translation in x-direction
- (B) Write short note on (i) Reverse engineering and data capture 10
techniques (ii) Green Manufacturing
- Q.6 (A) Explain with block diagram Computer Aided Quality Control 10
(CAQC).
- (B) Write short note on (i) light and shade ray tracing (ii) design for 10
assembly and disassembly
- Q.7 Write short note on
- (A) Automated material handling and storage systems 06
- (B) Flexible manufacturing systems (FMS) 06
- (C) Feature recognition and design by feature. 08
-



30/11/15

MECH

QP Code : 5895

mech

Sub-CAD-CAM
(3 Hours)

Max. Marks: 80

Note:

1. Question No.1 is compulsory.
2. Solve any 3 from remaining 5 questions.
3. Total No. of questions to be attempted are Four
4. Assume suitable data, if necessary.



- Q1
- | | | |
|----|---|------------|
| a) | Explain the concept of homogenous coordinate system and its significance. | Marks
5 |
| b) | Explain the difference in adaptive and feedback control & in what circumstances the Adaptive Control is preferred? | 5 |
| c) | What are the major steps to solve the problem using FEM? Whether it gives exact answers? Why it has become popular? | 5 |
| d) | Explain Drive-part-check (DPC) surface syntax in APT programming by considering a suitable example. | 5 |
- Q2
- a) Write a Manual part program for finishing the following forged component as shown in Fig. 1. Illustrate the meaning of each code used in the program and the tool movement by showing the tool path. Take spindle speed as 1000 rpm and feed rate 0.5 mm/rev. Use the diametral format for programming.

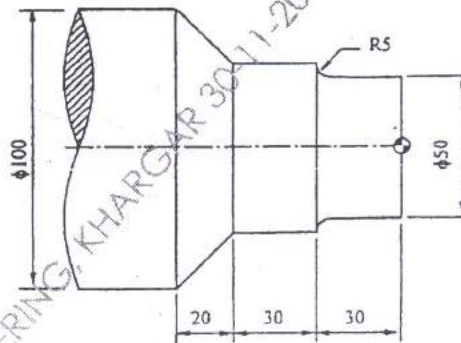


Fig. 1

- c) Write the program for the above component (fig.1) assuming the raw billet size of dia. 100 mm and length 150 mm, using the canned cycle for rough turning followed by finished turning, keeping the finishing allowance as 0.5 mm and 0.3 mm along Z and X axis respectively. 06
- d) Find the Transformation that rotates the object points through 30 degrees about point (1, 2). To what does the point (2, 3) maps? 06

TURN OVER



Q3

- a) List the different types of hidden line/surface (HLR/HSR) removal algorithm explain any one in detail.
- b) Explain Selective Laser Sintering (SLS) and how is it different from 3D printing?

Q4

- a) Explain the elements of computer integrated manufacturing and their functioning.
- b) What do you mean by parametric & nonparametric expression of curves? What are the advantages of parametric curves? Express the equation of Line & circle in parametric form.
- c) What are the different types of errors which may get introduced while converting the CAD solid model into RPT compatible format?

Q5

- a) Find the Transformation matrix which aligns a given vector $V = aI + bJ + cK$ in three dimensional space with positive Z axis.
- b) Explain-
 - i) P & H refinement methods of CAE
 - ii) Compare Bezier and B spline blending functions.

Q6 Explain any four of the following (any four)

- a) Automated guided Vehicle
- b) Rapid Tooling
- c) AI in Design
- d) Applications of RPT
- e) Role of CAD/CAM in CIM.

Mech

Sub: - CAD - CAM
(4 Hours)

Max. Marks: 100

10-12-15

Note:

1. Question 1 is Compulsory
2. Solve any four from remaining six
3. Figures to right indicate full marks
4. Assume suitable data if necessary



Question
No.

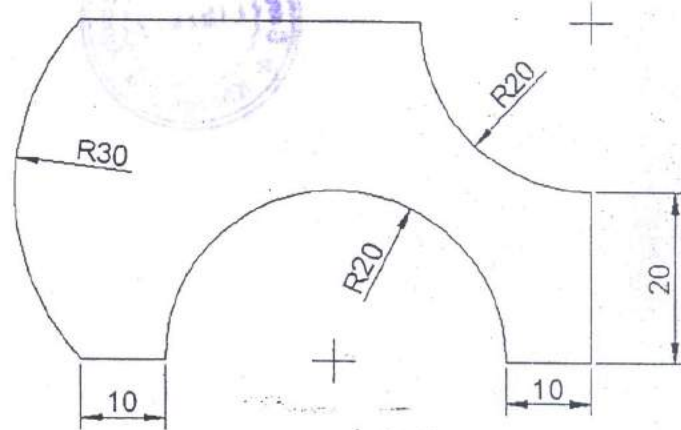
Max.
Marks

- Q.1
- a) List the benefits of Group Technology 5
 - b) Explain the significance of Graphic Standards. 5
 - c) Describe an algorithm for the removal of hidden lines. 5
 - d) Briefly explain the advantages and disadvantages of NC machines. 5
- Q.2
- a) Derive the parametric Bezier equation from the following points. (0, 0), (7, 6), (6, 5) and (4, 0). Also find the midpoint of the curve. 10
 - b) Write a program in object oriented language for 2D geometric transformation which include functions for the following operations:
a) Translation b) Rotation @ Y axis 10
- Q.3
- a) A triangle formed by three points A, B and C whose coordinates are A(50, 40), B (100, 60), C(70,80). Calculate the new coordinates if the triangle is reduced in size using the scale factors $S_x = 0.5$, $S_y = 0.7$ and base point is A. 10
 - b) Explain the advantages and applications of surface modeling. 5
 - c) Explain Data structures for interactive modeling. 5
- Q.4
- a) Explain Green Manufacturing. 5
 - b) What are the obstacles for implementation of CIM? 5

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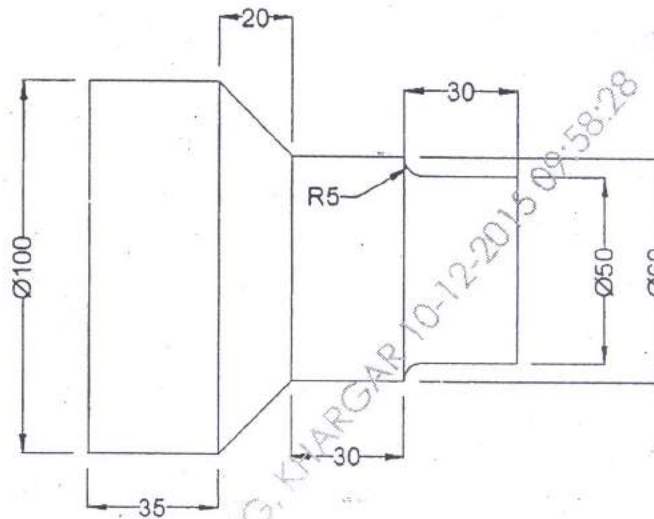


c) Write a complete APT part program to machine the profile of the geometry shown in figure. The component is 5mm thick. The end mill used is 10mm in diameter. Assume spindle speed as 1000 rpm and feed as 0.3 mm/rev. 10



Q.5

a) Write a complete part program to turn a raw bar of carbon steel of dia. 100mm as per the component drawing shown in figure. 12



Q.6

b) Describe the need for CIM and the issues addressed by CIM. 6

a) Compare CNC/DNC and FMS in detail. 8
 b) Describe the architecture of a CAD system. 6
 b) Explain Similarity coefficient matrix and its uses 6

Q.7

Write short note on any **Four**: 20

a) Velocity Feedback Device.
 b) Automated Guided Vehicles
 c) Macro statement in APT
 d) Homogeneous coordinates
 e) Non Contact Inspection method

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