

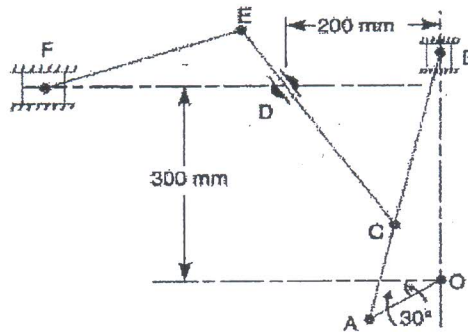
- N.B.** (1) Question No. 1 is **compulsory**.  
 (2) Attempt any **three** questions out of the remaining **five** questions.  
 (3) **Figures** to the **right** indicate **full** marks.  
 (4) Assume suitable **data** wherever required but justify the **same**.

1. Attempt any **four** of the following :—

- (a) What are the different types of kinematic pair ?  
 (b) Classify cams in details.  
 (c) State and explain D' Alemberts Principle.  
 (d) What do you mean by interference in involute gears ?  
 (e) Explain the terms slip and creep in belts.

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2. (a) Sketch a polar velocity diagram of a Hooke's Joint and mark it's salient features. 8  
 (b) A cam rotating at 150 rpm operates a reciprocating roller follower of radius 2.5 cm. 12  
 The least radius of the cam is 5 cm and the stroke of the follower is 5 cm. Ascent and descent both takes place by uniform acceleration and retardation. Ascent takes place during  $75^\circ$  and descent during  $90^\circ$  of cam rotation. Dwell between ascent and descent is  $60^\circ$ . Sketch displacement, velocity and acceleration diagrams and mark salient features.
3. (a) What is a Pantograph? Show that it can produce paths exactly similar to the ones traced out by a point on a link on an enlarged or reduced scale. 8  
 (b) In a mechanism shown in the **figure**, the crank OA is 100 mm long and rotates clockwise about O at 120 rpm. The connecting rod AB is 400 mm long. At a point C on AB, 150 mm from A, the rod CE 350 mm long is attached. This rod CE slides in a slot in a trunnion at D. The end E is connected by a link EF, 300 mm long to the horizontally moving slider F. For the mechanism in the position shown, find (i) velocity of F, (ii) velocity of sliding of CE in the trunnion and (iii) angular velocity of CE. 12





4. (a) With the help of neat sketch derive the equation for the minimum number of teeth on a pinion for involute rack in order to avoid interference. 8
- (b) Classify chains in details. 6
- (c) The power is transmitted from a pulley 1 m diameter running at 200 rpm to a pulley 2.25 m diameter by means of a belt. Find the speed lost by the driven pulley as a result of creep, if the stress on the tight and slack side of the belt is 1.4 MPa and 0.5 MPa respectively. The Young's Modulus for the material of the belt is 100 MPa. 6
5. (a) In a crank and slotted lever quick return motion mechanism, the distance between the fixed centres is 240 mm and the length of the driving crank is 120 mm. Find the inclination of the slotted bar with the vertical in the extreme position and the time ratio of cutting stroke to the return stroke. If the length of the slotted bar is 450 mm, find the length of the stroke if the line of stroke passes through the extreme positions of the free end of the lever. 8
- (b) What do you mean by Coriolis component of acceleration ? Draw all the direction of Coriolis component of acceleration. 6
- (c) State and explain Work Energy principle with the help of an example. 6
6. (a) Two mating gears have 20 and 40 involute teeth of module 10 mm and  $20^\circ$  pressure angle. If addendum on each wheel is such that path of contact is maximum and interference is just avoided, find the path of contact, arc of contact and contact ratio. Also find the addendum for each wheel. 8
- (b) Two pulleys, one 450 mm diameter and the other 200 mm diameter are on parallel shafts 1.95 m apart and are connected by cross belt. Find the length of the belt required and the angle of contact between the belt and each pulley. What power can be transmitted by the belt when the larger pulley rotates at 200 rpm, if the maximum permissible tension in the belt is  $1 \times 10^3$  N and the coefficient of friction between the belt and the pulley is 0.25 ? 8
- (c) Differentiate between involute and cycloidal gear tooth profile. 4
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Mech  
AUTO

Sub: PP-II

Date: 9/12/14

QP Code : 12500

( 3 Hours )

[ Total Marks : 80

N.B. : (1) Questions No. 1 is compulsory.

(2) Attempt any **three** questions out of remaining **five** questions.

(3) Assume **suitable** data if **necessary**.

(4) Illustrate your answer with **neat sketches** wherever **necessary**.

1. Attempt any **four** :-

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(a) Show that in metal cutting operation,  $V_v = V_c \cdot \gamma_c$ .

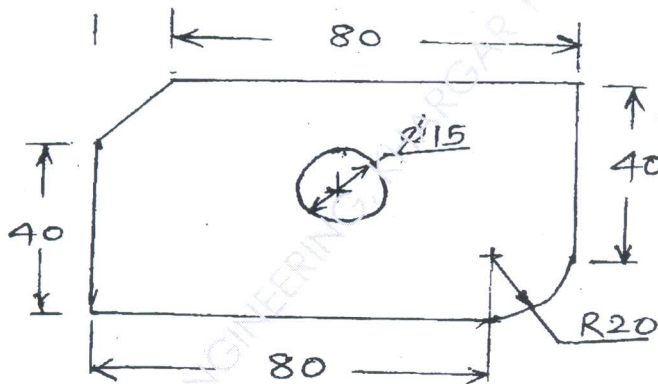
(b) Describe Ratial drilling machine with neat sketch.

(c) Explain orthogonal rake system.

(d) Describe internal grinding machine with neat sketch.

(e) Discuss cutting fluids.

2. (a) Write a part programme using G-code and M code for machining external contour and drilling hole, at the centre as shown in figgur. All dimensions are in mm. 10



(b) Derive the relationship  $2\phi + \beta + \gamma = \frac{\pi}{2}$  in merchant's theory, clearly stating the assumptions. 10

3. (a) Explain the various steps involved in designing circular pull type broach. Draw appropriate sketches. 10

(b) Derive expression for tool life for minimum cost criteria in metal cutting. 10

4. (a) Describe carbides and ceramics as cutting tools. 10

(b) Draw two dimensional tool dynamometer and explain it features. 5

(c) List gear manufacturing methods explain any one in detail with neat sketch. 5

GN-Con. 10554-14.

[ TURN OVER

5. (a) Explain with an example, graphical method of designing form tool. 10  
(b) A workpiece of 38 mm diameter is being turned on a lathe with a tool having rake angle of  $33^\circ$  and a feed of 0.15 mm/rev. The length of chip over one revolution of workpiece is 72 mm. The cutting speed is 12.5 m/min the tangential force is 410 N and feed force is 170 N 10  
Calculate :-  
(i) Coefficient of friction on a rake face  
(ii) Thickness of chip  
(iii) Velocity of shear  
(iv) Velocity of chip along the tool face.

6. Write short notes on (any four) :-

- (a) Lapping and honing  
(b) Dressing and truing of grinding wheel  
(c) Co-ordinate measuring machine  
(d) Nomenclature of drilling tool  
(e) Geometry of Milling cutter.

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**GN-Con. 10554-14.**



MT Auto (rev) sem-IV

10/12/13

QP Code : 12540

(3 Hours)

[Total Marks: 80]

- N.B:
- (1) Question No. 1 is compulsory.
  - (2) Attempt any three questions from remaining five questions.
  - (3) Figures to the right indicate full marks
  - (4) Illustrate the answer with neat sketches wherever required.
  - (5) Answers to questions should be grouped & written together.

1. Write short note on **any four** of the following: (20)
  - a) Burgers vector
  - b) Creep Resistant Materials
  - c) Importance of Iron as engineering material
  - d) Maraging heat treatment process
  - e) Classification of alloying elements
  - f) Composite materials
2. (a) Draw and explain Isomorphous and Eutectoid Phase diagrams. (8)  
(b) Explain the process of dislocation generation by Frank Read source. (6)  
(c) Explain Andrade's analysis of the classical creep curve. (6)
3. (a) What is Surface hardening? Name its different methods. Discuss any one method in detail. (8)  
(b) Draw a neat and labelled microstructure of White Cast Iron, Grey Cast Iron and Nodular Cast Iron. (6)  
(c) What is Critical Resolved Shear Stress? Derive the expression for Critical Resolved Shear Stress for deformation by slip. (6)
4. (a) Explain the stages of recrystallization annealing and factors affecting it. (8)  
(b) Discuss the Subzero heat treatment of Steel. (6)  
(c) What are the limitations of Plain Carbon Steel? Explain the effect of alloying elements on phase transformation. (6)
5. (a) State Griffith's theory of brittle fracture and derive Griffith's equation. (8)  
(b) Discuss the Full Annealing heat treatment of Steel. (6)  
(c) Give classification on stainless steel. (6)
6. (a) Draw neat Iron- Iron Carbide Equilibrium diagram indicating all important temperature, phases and composition. (8)  
(b) Explain fatigue limit for ferrous and nonferrous alloys with the help of S-N diagram. (6)  
(c) What are Nano Materials? Write a note on Nano Composites. (6)

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GN-Con: 11492-14.

- N. B. :** (1) Question No.1 is **compulsory**.  
 (2) Answer any **three** questions from remaining **five** questions.  
 (3) **Figures** to the **right** indicate **full** marks.

1. Solve any **four** :- 20
- (a) Explain different types of diodes based on their operating quadrants of V-I characteristics.
- (b) What is the concept of R-L & R-L-E load in case of phase controlled rectifiers?
- (c) Design scaling adder using op-amp to give output as follows  $V_0 = -(V_1 + V_2 + 3V_3)$  where given inputs  $V_1, V_2$  &  $V_3$ .
- (d) State & prove De Morgan's theorem using truth table.
- (e) What is linear actuator motor? Give two applications.
2. (a) Classify & explain triggering methods of SCR with circuit diagrams. 7  
 (b) Compare power BJT, IGBT & MOSFET on the basis of their principle & characteristics. 7  
 (c) Explain triac-diode circuit with the help of any one application. 6
3. (a) What is the necessity of inner current loop control circuit? 7  
 (b) Write a short note on speed control of a.c. motors. 7  
 (c) What is the principle of operation of bridge inverter? Classify them on the basis of applied input. 6
4. (a) What is an instrumentation amplifier? Explain it with block diagram & enlist its applications. 7  
 (b) What are the advantages of active filter over passive filter. Draw a circuit diagram and characteristics of active low pass filter using op-amp. 7  
 (c) Explain working of monostable mode of operation of IC555 timer. 6
5. (a) Draw and explain functional diagram of MSP430 microcontroller. 7  
 (b) What is a servomotor? What are the requirements of a good servomotor? 7  
 (c) What are functions of encoder & decoder circuits? 6
6. (a) Select motors for medium power pump & conveyor applications. 7  
 (b) Explain with an application significance of multiplexer and demultiplexer circuit. 7  
 (c) What are similarities & dissimilarities of microprocessor & microcontroller? 6

SE SEM-IV (CBGS) NOV-DEC-15

SE IV CBGS [MECH + AUTO]

22/12/2015

SUB: IE

Sub: - IE

QP Code : 5514

Mech  
AUTO

(3 Hours)

[ Total Marks : 100 ]

- N.B. : (1) Question No. 1 is compulsory.  
(2) Attempt any four questions out of the remaining six questions.  
(3) Assume suitable data if necessary.

1. Solve any Five.

- Draw characteristics of SCR, Triac, MOSFET and IGBT.
- Draw connection of an LED and a switch to MSP430.
- Explain basic principle of single phase inverter.
- Enlist characteristics of ideal op-amp.
- Give an example of analog circuit, digital circuit, combinational circuit and sequential logic circuit.
- Draw torque-speed characteristics of DC shunt motor and 3-phase induction motor.
- What do you understand by R-L and R-L-E load?



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- Explain in brief functional block diagram of MSP430. 7
  - Draw and explain block diagram of closed loop speed control of DC motor. Also state need of inner current loop. 7
  - Draw and explain any one application circuit of Triac-Diac. 6
- Explain 555 monostable multivibrator. 7
  - Explain frequency control scheme of 3-phase induction motor with the help of block diagram. 7
  - Write a short note on :- Forced turn-off of SCR 6
- Draw the circuit diagram of differentiator and integrator; write the output equation of each. 7
  - Enlist triggering methods of SCR and explain any one gate triggering method of SCR. 7
  - What do you understand by a Digital circuit? Elaborate following terms regarding digital circuits :- 6
    - logic level
    - propagation delay
    - fan out.
    - noise immunity
    - power dissipation
- Elaborate:- accuracy, resolution and least significant bit regarding 10-bit ADC. 7
  - Write a short note on 'selection of motor and power rating for a pump'. 7
  - Explain asymmetrical semi controlled converter with R load and derive equation of output voltage. 6
- Compare - BLDC motor, DC motor and induction motor. 7
  - Compare- Microprocessor and Microcontroller. 7
  - Compare- TTL and CMOS technology. 6