

USN

P08AU45

PES College of Engineering, Mandya-571401

(An Autonomous Institution Under VTU, Belgaum)

Fourth Semester B.E, Automobile Engineering Degree Examination, June 2010

COMPUTER AIDED MACHINE DRAWING

Model Question Paper

Time: 3 hrs

Max. Marks: 100

- Note:**
1. Answer any one question from each of the parts A, B, C.
 2. Use FIRST ANGLE projection only.
 3. Missing data, if any, may be suitably assumed.
 4. All the calculation should be on answer sheet supplied.
 5. All the dimensions are in mm.
 6. Drawing instruments may or may not be used for sketching.

PART – A

1. A cylinder 60mm diameter and 80mm long stands with its circular base on HP. A section plane perpendicular to VP and inclined at 60 degree to HP cuts the axis at a point 28mm below its top end. Draw sectional top and right views and true shape of the section. **(20 Marks)**
2. Figure 1. Shows a machine component. Draw the following views:
 - a) Front view
 - b) Top view
 - c) Side view**(20 Marks)**

PART – B

3. Draw the following views of a SOCKET and SPIGOT COTTER JOINT used for joining two rods of diameter 20mm:
 - a) Sectional front view
 - b) A view looking from socket end**(20 Marks)**
4. Draw the top view and sectional front view of single riveted but joint with double cover plates. The thickness of the plate is 9mm. show at least three rivets. Indicate all the dimensions. Use snap headed rivets and show all calculation on the answer sheet. **(20 Marks)**

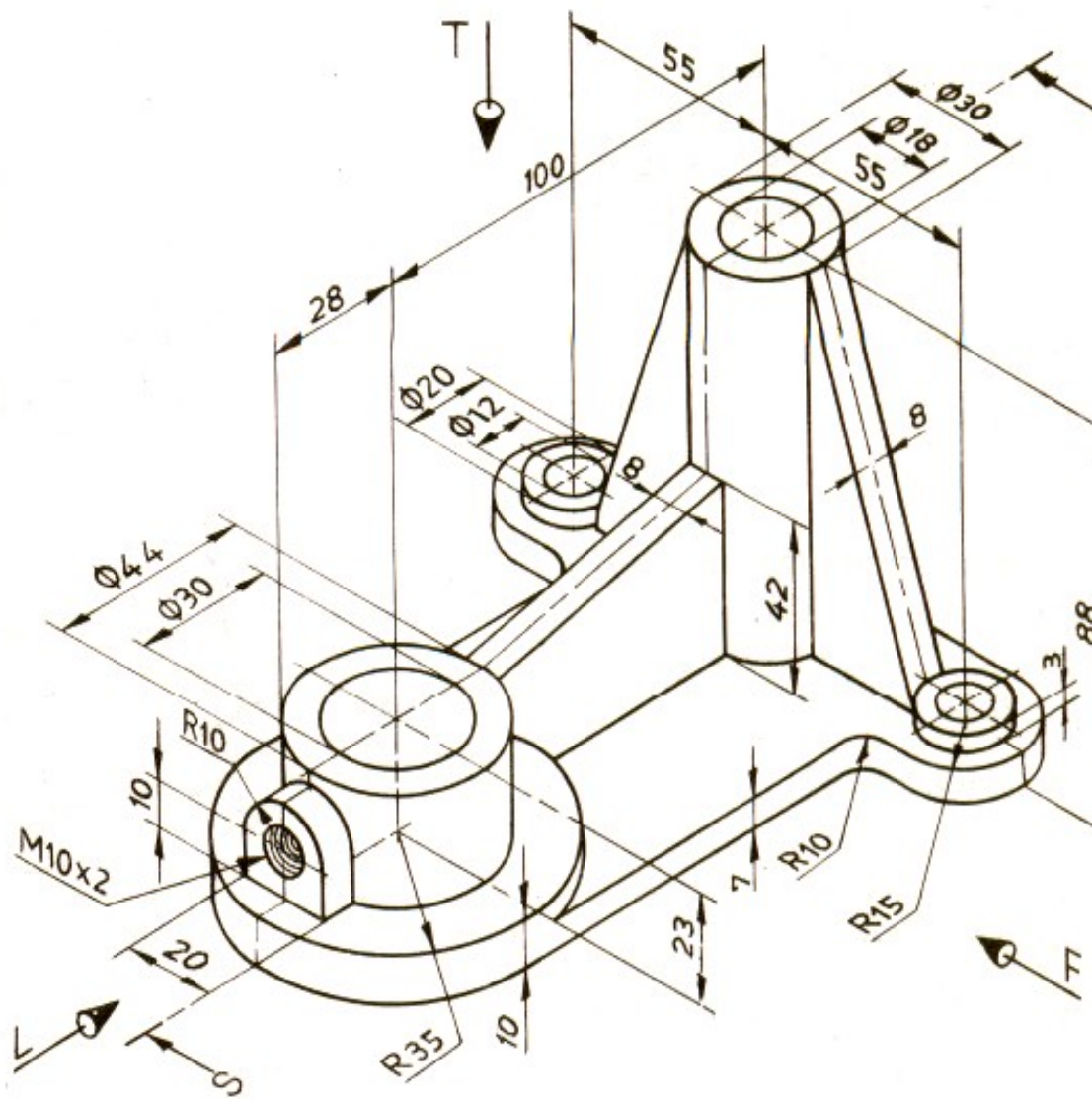
PART - C

5. Figure 2. Shows the details of screw jack. Assemble the parts and draw the following views:
 - a) An Assembled 3D View
 - b) Front view (2D) showing right half in section, and
 - c) top view (2D)**(60 Marks)**
6. Figure 3. Shows the details of an I. C. Engine Connecting rod. Assemble the parts and draw the following views. Dimension the drawings.
 - a) An Assembled 3D View
 - b) Front view (2D) with top half in section.
 - c) Top view (2D)**(60 Marks)**

Figure: 1

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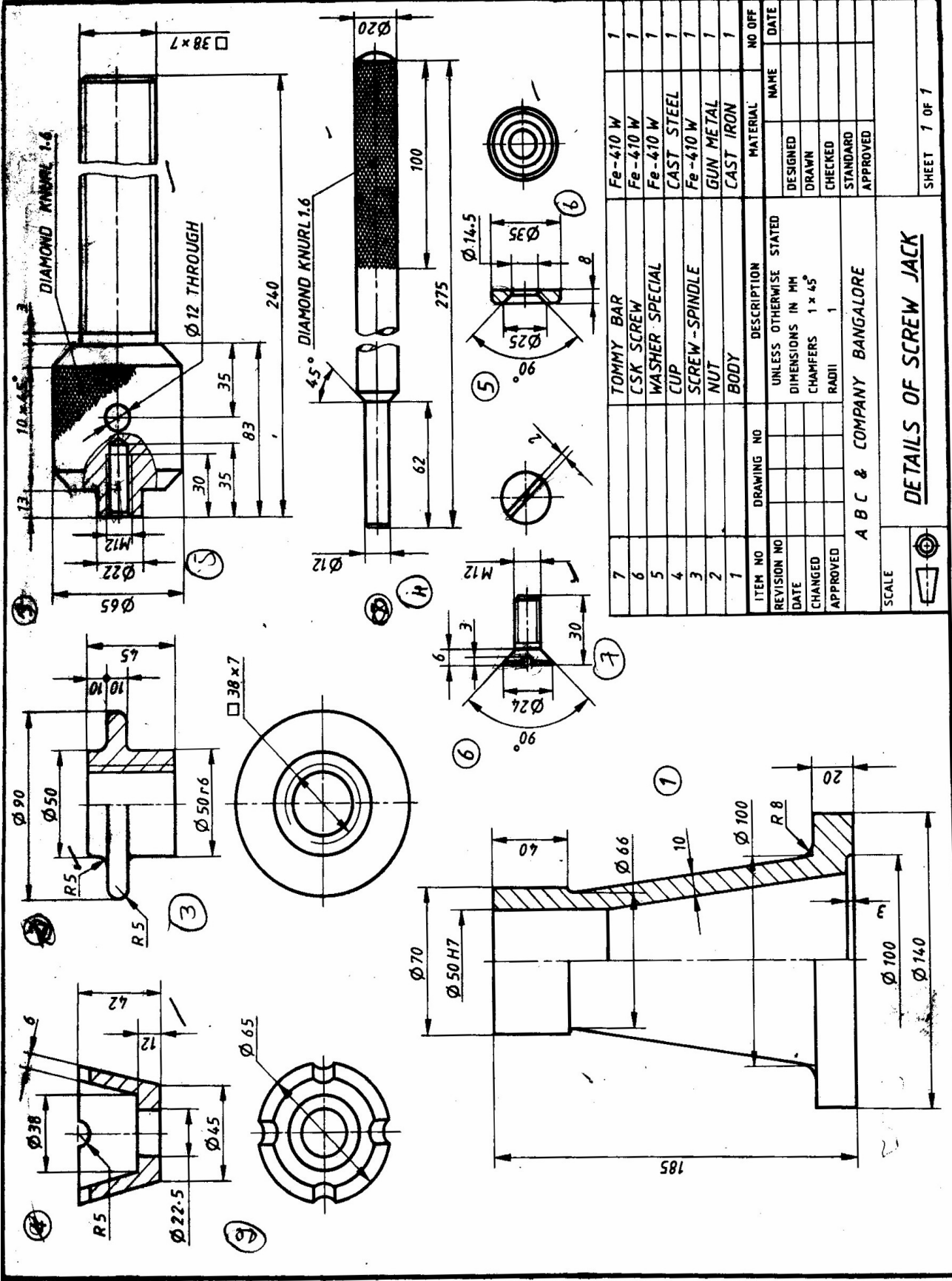
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Note to students:

ONE question to be answered from each of the parts A, B and C
PART-A shall contain TWO questions from unit I-V,
PART-B shall contain TWO questions from unit VI-IX,
PART-C shall contain TWO questions from unit X of the syllabus}

Figure: 2



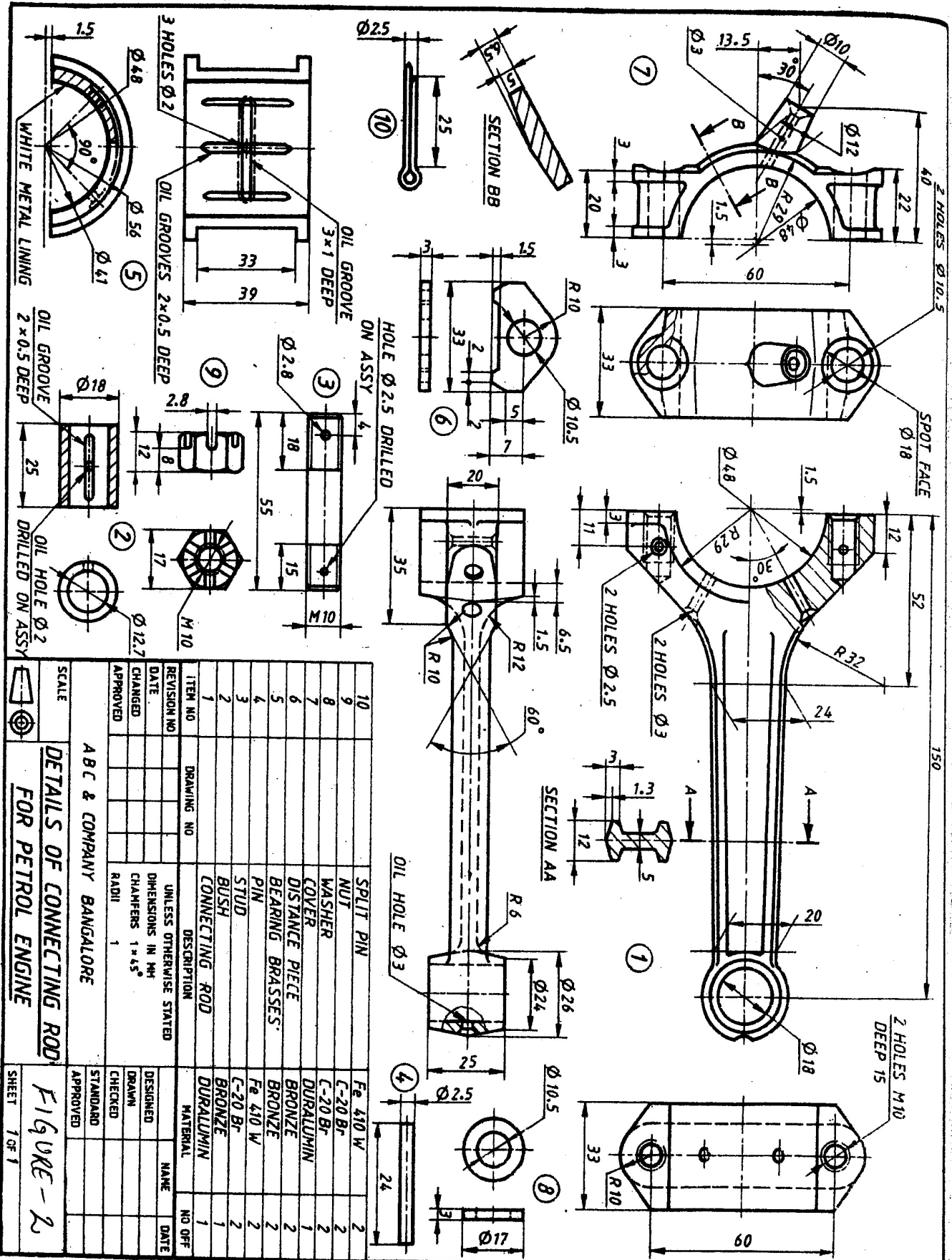
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6		CSK SCREW	Fe-410 W	1
5		WASHER SPECIAL	Fe-410 W	1
4		CUP	CAST STEEL	1
3		SCREW - SPINDLE	Fe-410 W	1
2		NUT	GUN METAL	1
1		BODY	CAST IRON	1

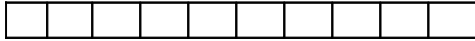
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SCALE		ABC & COMPANY BANGALORE	
DETAILS OF SCREW JACK		SHEET 7 OF 7	

Figure: 3





USN

P08AU42

P E S College Of Engineering, Mandya
(An Autonomous Institution under V T U, Belgaum)
Fourth Semester B.E. Automobile Engineering Degree Examination, June 2010
Material Science and Metallurgy

Time: 3 Hrs**Model Question Paper****Max. Marks: 100****Note. Answer any Five Full questions selecting at least Two From each part****PART -A**

- 1 a. Define coordination number & APF. 4 Marks
b. What are vacancies. How are they formed and explain the formation of Schottky and Frenkel defects. 6 Marks
c. Aluminum of lattice parameter of 0.405 nm has FCC crystal structure. Calculate its atomic radius. 4 Marks
d. Write Fick's laws of diffusion and illustrate with examples. 6 Marks
- 2 a. Define i) Elastic strength ii) Stiffness iii) Resilience iv) Toughness v) Ductility vi) Malleability 6 Marks
b. Explain the properties applicable to non-linear elastic materials 6 Marks
c. Explain off-set Yield strength 3 Marks
d. Derive an expression for the true stress and True strain of a material in terms of Engineering stress and Engineering strain. 5 Marks
- 3 a. what are different types of fracture in metals. 6 Marks
b. How the fatigue strength and fatigue limit of materials are determined? 6 Marks
c. Define the term creep. Illustrate the phenomenon citing an example 8 Marks
- 4 a. Explain the following for production of fibre - reinforced plastics (FRPs) i) Spray - up process. ii) Pultrusion process. 12Marks
b. What are composite materials? Explain how they are involved in improving the quality. 8 Marks

PART -B

- 5 a. Write a note on Gibb's phase rule defining the various quantities in the equation and connected with it and also discuss which of those factors could constitute possible degrees of freedom of a system. 6Marks
b. Two metals A and B of melting points 1000 °C and 800°C possessing complete mutual liquid solubility and negligible mutual solid solubilities, and having no chemical affinity form a eutectic at 600°C of composition 60% B. No solid state reactions occur in the series. Assume solidus and liquidus lines to be straight. Draw the phase diagram for the series. Predict the number, type, composition and extent of the phases present in an alloy containing 60% A at 700°C and at room temperature of 25°C. 14Marks
6. a Write a neat sketch of iron carbon equilibrium diagram and label the areas and explain the solidification of hyper eutectoid steels. 8 Marks
b. Distinguish between pearlite, Bainite, and martensite. 6 Marks
c. With a neat sketch explain T-T-T diagram. Indicate its use to a mechanical engineer in practice. 6 Marks
- 7 a What is meant by heat treatment of metals? What are the objectives of the heat treatment of metals? 4 Marks
b. Define cyaniding and nitriding. Discuss their purposes and advantages. 8 Marks
c. Describe Jominy End quench test for the determination of hardenability of steels. 8 Marks
8. a Compare grey cast iron, malleable iron and S.G iron in terms of the properties microstructures and applications. 12Marks
b. Explain the properties and uses of i) Al - Si alloys ii) Phosphor Bronze 8Marks

Automobile Engineering
Fourth Semester B.E. Degree Examination, July 2010
Model Question Paper
Heat Transfer (P08AU46)

Time : 3 Hrs

Max. Marks : 100

Note:

1. Answer any FIVE full questions.
2. All questions carry equal marks.
3. Assume suitable data wherever necessary.
4. Use pf heat transfer data book is permitted.

PART A

1. (a) Explain the different modes of heat transfer. **(8 Marks)**

(b) Derive the general heat conduction equation in cylindrical coordinates. **(12 Marks)**
2. (a) Explain:
i) Thermal conductivity ii) Thermal diffusivity **(4 Marks)**

(b) Derive expression for radial heat transfer and temperature distribution along the radius of a hollow cylinder whose inside and outside surfaces are maintained at steady state temperature T_1 and T_2 respectively and constant thermal conductivity.
Also obtain expression for overall heat transfer co-efficient based on inner radius. **(10 Marks)**

(c) Derive an expression for critical thickness of insulation of a cylinder and explain the significance of critical thickness of insulation. **(6 Marks)**
3. (a) Derive an expression for temperature distribution and heat flow in a fin of finite length with an adiabatic end. **(8 Marks)**

(b) An electronic semi conductor device generates 38×10^{-3} kcal/hr of heat. To keep the surface temperature at the upper safe limit of 75°C , it is desired that the generated heat should be dissipated to the surrounding environment which is at 30°C . The task is accomplished by attaching aluminium fins 0.5mm^2 square and 10mm to the surface. Workout the numbers of fins if thermal conductivity of fin material is 165kcal/m-nOK and the heat transfer co-efficient is $10.75\text{kcal/m}^2\text{nok}$.
Neglect the heat loss from the tip of the fin. **(12marks)**
4. (a) what are biot and Fourier numbers? Explain their physical significance. **(8marks)**

(b) Aluminium sphere of mass 5.5 kg and initially at a temperature of 290°C is suddenly immersed in a fluid at 15°C . The convective heat transfer co efficient is $58\text{w/m}^2\text{K}$. Estimate the time required for the sphere to reach 95°C , using lumped heat capacity method of analysis. Take properties of aluminium density 2700kg/m^3 $\rho=900\text{J/kg K}$ $K=205\text{w/mk}$. **(12marks)**

PART B

- 5 a) Using dimensional analysis obtain a relation between dimensionless numbers in forced convection. **(8marks)**

b) A light oil with 20°C inlet temperature flows at a rate of 600 kg/min through 5 cm ID pipe which is enclosed by a jacket containing condensing steam at 150°C if the pipe is 10m long, find the outlet temperature of the oil. The properties of oil at 85°C are:
 $\rho = 800\text{ Kg/m}^3$, $C_p = 2.09\text{ kJ/Kg K}$
 $K = 0.502\text{ kJ/m-hr }^\circ\text{C}$, $\nu = 3.6 \times 10^{-6}\text{ m}^2/\text{se}$ **(12marks)**

6. a) What is the significance of the following dimensionless numbers?

- i) Reynolds iii) Nusselt
ii) Prandtl iv) Grashoff.

(10marks)

b) Considering the body of a mass as a cylinder of 30 cm diameter and 160 m height. If the temperature of the body is to be maintained at 36.5°C , find out the amount of heat generated in the body of a mass per hour. Temperature of surrounding is 13.50C .

(10marks)

7. (a) Obtain an expression for the mean temperature difference for a counter flow heat exchanger.

(8 Marks)

(b) An economizer is to be purchased for a power plant. The unit is to be large enough to heat 7.5kg/s of water from 71 to 182°C . There are 26kg/s of flue gases ($C_p = 1.0\text{kJ/kg.k}$) available at 426°C . Estimate

1) The outlet temperature of the flue gases.

2) The heat transfer area required for a counter flow arrangement if the overall heat transfer coefficient is $57\text{W/m}^2\text{ oK}$

(12 Marks)

8. (a) State and prove Kirchoff's law of radiation.

(8 Marks)

(b) Explain the concept of view factor as applied to radiation heat transfer.

(4 Marks)

(c) Derive an expression to calculate the net rate of heat transfer between two black surfaces. **(8 Marks)**

Sub. Code: P08AU43

P.E.S. College of Engineering, Mandya
(An Autonomous Institution under VTU, Belgaum)
Automobile Engineering
Fourth Semester B.E. Degree Examination, July 2010
Model Question Paper
Manufacturing Process - II

Time : 3 Hrs

Max. Marks : 100

Note : Answer any FIVE full questions selecting at least two questions from each part.

PART-A

- 1 a. With neat sketches give nomenclature of a single point cutting tool. (07 Marks)
b. Briefly explain the mechanism and types of chip formation. (07 Marks)
c. What is meant by tool signature? Explain each term of a tool designated as 8 -12-10-7-5-15-1.5 (06 Marks)
2. a. Derive an expression for shear plane angle with respect to orthogonal cutting. (07 Marks)
b. Explain the effect of the following cutting parameters and tool life
(i) Cutting Speed (ii) Tool Geometry (06 Marks)
c. A 75 mm diameter mild steel bar was turned at 220 rpm to get a good life of 14 min. The rpm was changed to 260 and tool life obtained was 10 min. Find out the value of n and C. (07 Marks)
3. a. Briefly explain the desirable properties of cutting tool material. (07 Marks)
b. Briefly explain the salient features of coated carbides and ceramics. (06 Marks)
c. What are the properties of a good cutting fluid (07 Marks)
4. a. Explain the work holding devices in a capstan lathes (05 Marks)
b. Differentiate between capstan and turret lathes. (05 Marks)
c. Explain the turret tooling layout for production of hexagonal headed bolt. (10 Marks)

PART-B

- 5 a. With neat diagram explain the constructional features and working principle of a shaper. (10 Marks)

b. A shaper is operated at 120 cutting strokes per min and is used to machining a work piece of 250 mm length and 120 mm width. Feed is 0.6 mm/ stroke and the depth of cut is 6 mm a approach and over travel distances are 25 mm each. Calculate the total machining time. **(05 Marks)**

c. Differentiate between a shaper and planer. **(05 Marks)**

6. a. Explain with a neat sketch the geometry of twist drill.

b. Give the classification of drilling machines

c. With simple sketches explain the following process.

(i) reaming

(ii) Trepanning

(09 Marks) (05 Marks)

(06 Marks)

7. a. With sketches differentiate between up milling and down milling ? **(06 Marks)**

b. What is indexing ? Explain compound indexing? **(06 Marks)**

c. Clearly indicate the plate number and indexing movements to be made to divide the periphery of a work piece into 87 divisions using compound indexing? The following indexing plates are available.

Plate No 1 : 15,16,17,18,19,20. :

Plate No 2 21,23,27,29,31,33.

PlateNo 3: 37,39,41,43,45,49.

(08 Marks)

8.a. Write a note on the following **(06 Marks)**

(i) Abrasives

(ii) Bonding Process

b. Explain with neat sketch surface grinding machines. **(08 Marks)**

c. List the parameters used in selections of grinding wheels. **(06 Marks)**

P.E.S. College of Engineering, Mandya
(An Autonomous Institution Under VTU, Belgaum)
Automobile Engineering
Fourth Semester B.E. Degree Examination, July 2010
Model Question Paper
Theory of Machines – I (P08AU44)

Time : 3 Hrs

Max. Marks : 100

Note : Answer any *FIVE* full questions selecting at least two questions from each part.

PART-A

1.
 - a. Define a kinematic chain. Describe various forms of kinematic chain with examples. **(05 Marks)**
 - b. Explain the Grubler's mobility equation for a planar mechanism. Determine the mobility of a cam with an oscillating follower fitted with a roller. **(05 Marks)**
 - c. Sketch and explain the kinematic chain with three lower pairs. **(05 Marks)**
 - d. Sketch and explain the elliptical trammel mechanism. **(05 Marks)**

2. Sketch and explain the following mechanisms :
 - a. Geneva wheel **(06 Marks)**
 - b. Ratchet and Pawl mechanism **(06 Marks)**
 - c. Ackermann steering mechanism **(08 Marks)**

3.
 - a. State and prove Kennedy's theorem. **(05 Marks)**
 - b. In a slider crank mechanism the lengths of crank and connecting rod are 125 mm and 500 mm respectively. The center of gravity G of the connecting rod is 275 mm from the slider. The crank speed is 600 rpm C.W. The crank makes 45 deg, from IDC cw. For the position shown locate all the instantaneous centres and find velocity of slider, point G and angular velocity of connecting rod. **(15 Marks)**

4. The stroke of a steam engine is 400 mm and the length of the connecting rod is 600 mm. The crank rotates at 300 rpm clockwise direction and the crank is inclined at 30° with the inner dead center. The center of gravity of the connecting rod is 240 mm away from the crank end. Determine the following :
 - a. Velocity and acceleration of the piston.
 - b. Angular velocity and angular acceleration of the connecting rod.
 - c. Velocity and acceleration at the center of gravity of the connecting rod. **(20 Marks)**

PART-B

5. a. The thickness of an involute gear tooth is 4.98 mm at a radius of 50.8 mm and a pressure angle of 20° . Calculate the tooth thickness on the base circle. **(05 Marks)**
- b. The following data refer to the two mating involute gears of 20° pressure angle: Number of teeth on pinion is 30, gear ratio is 2, module is 12 mm and the speed of the pinion is 600 rpm. The line of contact on each side of the pitch is half the maximum possible length. Find the height of addendum for each gear wheel and the length of arc of contact. Also find the maximum velocity of sliding during approach and recess. **(15 Marks)**
6. a. Sketch and describe a bevel gear differential used in automobiles. **(06 Marks)**
- b. A fixed annular gear A and a smaller concentric rotating gear B are connected by a compound gear CD. The gear C meshes with gear A and D with B. The compound gears revolved in a pin on the arm R, which revolves about the axis of A and B. The number of teeth on gears A, B and D are 150, 40 and 100 respectively. Determine the number of teeth on gear C, if the gears A and C have twice the module of gears B and D. How many revolutions will B make for one complete revolution of the arm R? **(14 Marks)**
7. a. Derive the condition for maximum power to be transmitted by a flat belt drive and hence obtain the expression for the corresponding maximum velocity of the belt. **(06 Marks)**
- b. A rope drive is required to transmit 230kW from a pulley of one metre diameter running at 450 RPM. The safe pull in each rope is 800 N and the mass of the rope is 0.46 kg per metre length. The angle of lap and the groove angles are 160° and 45° respectively. If the coefficient of friction between the rope and pulley surface is 0.3, calculate the number of ropes required. **(14 Marks)**
8. A cam with a base circle radius of 35 mm is rotating at a uniform speed of 100 rpm in anti-clockwise direction. Draw the profile for the disc cam with reciprocating knife edge follower on the center line of the cam shaft for the following follower motion.
- a. Follower to move upward 30 mm with simple harmonic motion in 0.1 sec.
- b. Follower to dwell in next 0.15 sec.
- c. Follower to move upward to another 30 mm with simple harmonic motion in 0.15 sec.
- d. Follower to return to its starting position with uniform acceleration and retardation in the remaining period of one complete revolution of the cam shaft. However, the acceleration period is twice the retardation period.
- Determine the maximum velocity and acceleration of the follower during its outward stroke. **(20 Marks)**

MODEL QUESTION PAPER

UNIVERSITY SEAT NUMBER (USN) _____

P.E.S.COLLEGE OF ENGINEERING, MANDYA-571401.

(An Autonomous Institution under VTU, Belgaum)

SIXTH SEMESTER B. E. – SEE - FOR THE ACADEMIC YEAR: 2010-11

Course with Code:-Automotive Chassis and Suspensions (P08AU61)

AUTOMOBILE ENGINEERING

Time: 3 hrs

Max.Marks:100

Note: Answer any five full questions choosing at least two questions from each part.

PART-A

1. a. Explain with a neat sketch, layout of a front engine rear wheel drive. Also list its advantages and disadvantages.
(10 Marks)
b. Two cars similar in all respects, except that one has rear wheels drive and the other front wheel drive, are used on a test track. If the engine power does not limit the ability to climb grades, state which car can ascend the steeper grade, if the weight of each car is 14239N with 50% on each axle, the wheel base 2.666m, the CG above the ground is 0.5334m and the coefficient of friction of the track is 0.6, what is the difference between in grades which either car can ascend, if the engine power is not the limitation.
(10 Marks)
2. a. What are the various loads acting on the chassis frame? What are the different cross sections used for the construction of chassis frame? Mention their relative merits.
(10 Marks)
b. Explain the effects of various factors on the performance of a tyre. Also justify the importance of tyre rotation with respect to tyre performance.
(10 Marks)
3. a. Derive expression for bearing loads on front axle.
(06 Marks)
b. Sketch and explain starring linkage for vehicle with
i) Rigid axle front suspension ii) independent front suspension.
(08 Marks)
c. A motor car has a wheel base of 2.743 m and pint centre of 1.065m. The front and rear wheel track is 1.217m. Calculate the correct angle of outside lock and turning circle radius of the outer front and inner rear wheels when the angle of inside lock is 40° .
(06 Marks)
4. a. Derive an expression for velocity ratio in a Hooke's joint.
(06 Marks)
b. An automobile engine develops 28kW at 1500rpm and its bottom gear ratio is 3.06. If a propeller shaft of 4mm outside diameter is to be used, determine the

inside diameter of mild steel to be used, assuming a safe shear stress of 55×10^3 Kpa for the mild steel. **(06 Marks)**

c. Sketch and briefly rear axle drives. **(08 Marks)**

PART-B

5. a. Explain with a neat sketch the working of a pneumatic brake used in automobiles. What are its merits and demerits compared to hydraulic brakes? **(11 Marks)**

b. A motor car has a wheel base of 2.64m the height of its centre of gravity above the ground is 0.61m and it is 1.12m in front of the rear axle. If the car is traveling at 40km/hr on a level track, determine the maximum distance in which the car may be stopped, when

- i) the rear wheels are braked
- ii) the front wheels are braked
- iii) all wheels are braked

The coefficient of friction between the tyre and the road may be taken as

0.6. **(09 Marks)**

6. a. What are the advantages of independent suspension over rigid axle suspension system? **(04 Marks)**

b. Explain construction on working of hydraulic shock absorber **(06 Marks)**

c. A typical coil suspension spring has 10 effective coil of a mean diameter 125mm and made out of wires of 15mm diameter. The spring is designed to carry, a maximum static load of 3531.6N. calculate shear stress and deflection under these load conditions. If maximum shear stress of 637650KN/m^2 is allowable in the material, what is the possible clearance in the spring? Take value of $G=73575 \times 10^3$ kpa.

(10 Marks)

7. a. Explain any two types of wheels used in automobiles. **(06 Marks)**

b. Write advantages of radial ply tyres over cross ply tyres. **(04 Marks)**

c. Explain different tests to be carried out on vehicle chassis frame. **(10 Marks)**

8. Sketch and explain the following chassis components used in recent vehicles with advanced technologies.

- i) Steering systems
- ii) Brakes
- iii) Suspension
- iv) Wheels

(5x4=20 Marks)

University seat number (USN)

P. E. S COLLEGE OF ENGINEERING, MANDYA-571401.

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MODEL QUESTION PAPER

SIXTH SEMESTER B. E. – SEE - FOR THE ACADEMIC YEAR: 2010-11

Course with code: AUTOMOTIVE TRANSMISSION (P08AU62)

Credits: 04

Time: 3 hrs

Max.

Marks: 100

Note: 1. Answer any five full questions choosing at least two questions from each part

2. Figures/ layouts are to be drawn using pencil only

PART- A

- 1) a) Explain the traction, tractive effort and various resistances to the motion of a vehicle with the help of graphs

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b) A vehicle of total weight 49050 N is held at rest on a slope of 10° . it has a wheel base of 2.25 M and its centre of gravity is 1.0 M in front of the rear axle and 1.5 M above the ground level. Find

- a) What are the normal reactions at the wheels ?
b) Assuming that sliding does not occur first, what will be the angle of slope so that the vehicle will overturn ?

c) Assuming all wheels are to be braked, what will be the angle of the slope so that the vehicle will begin to slide if the coefficient of adhesion between the tyre and ground is 0.35 ? (12 Marks)

2) a) Discuss the various factors affecting torque transmission in a clutch (4 Marks)

b) With sketch explain the construction and working of a single plate clutch (8 Marks)

c) Derive an expression for effective mean radius and torque transmitted in case of a cone clutch

(8 Marks)

3) a) Determine the size of the clutch plate suitable for a vehicle employing a single plate type of friction clutch and developing 37.5 KW at 4200 rpm. The inside diameter of the clutch plate is 0.6 times its outside diameter and it is to be ensured that even after a loss of 30 % of the engine torque due to wear of the clutch facing, the clutch does not slip. The intensity of pressure on the facing is not to exceed 70 KN/m². Assume $\mu=0.3$

(8 Marks)

b) With simple sketch and graph explain the principle of fluid flywheel and its characteristics at different speeds.

(8 Marks)

c) With sketch explain the working principle of sprag type one way clutches (8 Marks)

4) a) Sketch and explain the single stage torque converter. How does it differ from a fluid flywheel ?

(10)

Mark

b) With sketch explain any one of the method used to increase the higher efficiency range of a torque converter

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PART _ B

5) a) Explain the construction and working of a constant mesh gear box. Highlight the advantages and disadvantages over the sliding mesh gear box
(10 Marks)

b) A four speed gear box is to be constructed for providing the ratios of 1.0, 1.46, 2.28 and 3.93 to 1 as nearly as possible. The diametral pitch of each gear is 3.25 mm and the smallest pinion is to have at least 15 teeth.

Determine the suitable number of teeth of the different gears. What is then the distance between the main and lay shaft ?

(10 Marks)

6) a) Sketch and explain the principle of epicyclic gearing. Mention its advantages.
(10 Marks)

b) Sketch and explain the working of a Wilson planetary gearbox
(10Marks)

7) a) What is automatic transmission ? Explain with the aid of layout the Borg-warners automatic transmission.

(10Marks)

b) With layout explain the electric transmission system and its limitations.

(10 Marks)

8.) Write short notes on any four of the following.

a) Advanced transmission used in recent vehicle

b) Double declutching

c) Transfer box

d) Over drives

e) Phase and stage in torque converter

5 Marks each

University seat number (USN)

P. E. S COLLEGE OF ENGINEERING, MANDYA-571401.

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MODEL QUESTION PAPER

SIXTH SEMESTER B. E. – SEE - FOR THE ACADEMIC YEAR: 2010-11

Course with code: Design of Machine Elements - II (P08AU63)

Credits: 04

Time: 3 hrs

Max.

Marks: 100

Note: 1) Answer any five full questions choosing at least two questions from each part. 2) Use of data hand book is permitted 3) Missing or wrongly printed data, if any, may be assumed suitably and stated clearly

Part- A

1. a) What are the assumptions made to derive the equation $\sigma = \frac{My}{Ae(Rn + y)}$ and what are the differences between simple beam and curved beam.

(6 Marks)

b) A curved beam with a circular central line has trapezoidal cross section and it is subjected to pure bending in its plane of symmetry. The face 100mm is the concave side of the beam and is 100mm from the centre of curvature and the load line. If the depth of the trapezoid is 100mm, find the proper value of the other parallel face to the concave side to make extreme fibre stress in tension and compression numerically equal.

(14 Marks)

2. a) A flat circular plate is used to close the flanged end of a pressure vessel of internal diameter of 300 mm. The vessel carries a fluid at a pressure of 2.5 N/mm^2 . A soft copper asbestos gasket is used to make the joint leak proof. Eight bolts are used to fasten cover plate on to the pressure vessel. Selecting carbon steel C30 as material for the bolt, determine the size of the bolts.

(8

Marks)

b) Design a shrink fit joint to join two barrels of diameters 50mm X 100mm and 100mm X 150mm, maximum tangential stress in the components due to shrink fitting must be limited to 80 N/mm^2 . The material of the barrels has a modulus of elasticity of $0.211 \times 10^6 \text{ N/mm}^2$ and a poisson's ratio of 0.28. Also determine the axial force required to disengage the joint and the maximum power that can be transmitted at a rated speed of 1000 rpm.

(14Marks)

3. a) Explain the following:

i) Surge in springs

ii) Equalised stresses in leaf springs.

(7 Marks)

b) A helical valve spring is to be designed for operating load range of 100N to 150N; 100N when valve is closed, 150N when valve is open. The deflection of the spring valve lift in the above load range is to be 8mm. Assuming severe service and $C=10$ design the spring completely.

(13 Marks)

4. a) Distinguish between

- i) a clutch and brake
 - ii) a simple and a differential band brake
- (4 Marks)

b) In a disc clutch the axial force is 4500N. The inner radius of contact is 50mm and the outside radius is 100mm. Assuming uniform wear, determine i) maximum pressure ii) minimum pressure iii) average pressure and iv) draw pressure distribution.

(6 Marks)

c) A differential band brake is operated by a lever length 500mm. The brake drum has a diameter of 500mm and the maximum torque on the drum is 1000N-M. The band brake embraces $\frac{2}{3}$ rd of the circumference. One end of the band is attached to a pin 80mm from the fulcrum and on the side of the force acting and the other end is attached to pin 100mm on the other side of the fulcrum. If the band brake is lined with asbestos fabric having a coefficient of friction 0.3, find the least operating force required.

(10 Marks)

Part- B

5. a) Explain the classification of gears and their applications.

(6 Marks)

b) A reciprocating compressor is to be connected to an electric motor with the help of spur gears. The distance between the shafts is to be 500mm. the speed of the electric motor is 900 r.p.m. and the speed of the compressor shaft is desired to be 200 r.p.m. The torque to be transmitted is 5000 N-m. Taking starting torque as 25% more than the normal torque, determine i) Module and face width of the gears using 20 degrees stub teeth, and ii) Number of teeth and pitch circle diameter of each gear. Assume suitable values of velocity factor and Lewis factor.

(14 Marks)

6. A pair of carefully cut helical gears for a turbine has a transmission ratio of 10%. The teeth are 20° stub involute in the normal plane. Pinion has 25 teeth and rotates at 5000 rpm. Material for pinion and gear is 0.4% carbon steel untreated with allowable static stress of 69.66 MPa. Helix angle=30°. Power transmitted = 90 kW. Service factor = 1.25. Wear and lubrication factor = 1.25. Determine the module in normal plane and face width of the gears. Suggest suitable surface hardness for the gear pair.

(20 Marks)

7.a) Explain the thermal rating on worm gear.

(6 Marks)

b) A pair of cast iron Bevel gears connected two shafts at right angles. The pitch diameters of the pinion and gears are 80mm and 100 mm respectively. The tooth profile of the gears are of 14 ½ composite form. The allowable static stress for both the gears is 55 N/mm². If the pinion transmits 2.75 KW at 1100 r.p.m, find the module and number of teeth on each gear from the stand point of strength and check the design from the stand point of wear. The surface endurance limit as 6.30 N/mm² and E=84KN/mm² for CI.

(14 Marks)

8. a) Explain the following:
- Bearing characteristics number
 - Bearing modules

b) A full journal bearing of 60mm diameter and 120mm long has a bearing pressure of 105 N/mm^2 . The speed of the journal is 900 rpm and the ratio of journal diameter to the diametral clearance is 1000. The bearing is lubricated with oil whose absolute viscosity at the operating temperature is 35°C ., Find i) the amount of artificial cooling required and ii) the mass of the lubricating oil required, if the difference between the outlet and inlet temperature is 10°C . Take specific heat of oil as $1850 \text{ J/Kg}^\circ\text{C}$.

(12 Marks)

MODEL QUESTION PAPER

UNIVERSITY SEAT NUMBER (USN) _____

P.E.S.COLLEGE OF ENGINEERING, MANDYA-571401.

(An Autonomous Institution under VTU, Belgaum)

SIXTH SEMESTER B. E. – SEE - FOR THE ACADEMIC YEAR: 2010-11

Course with Code:-CAD/CAM/CAE (P08AU64)

AUTOMOBILE ENGINEERING

Time: 3 hrs

Max.Marks:100

Note: Answer any **FIVE** full questions, selecting at least **Two** from Part-A and **Two** from Part-B.

PART-A

- Differentiate between product cycle in conventional and computerized manufacturing systems with the help of neat diagrams.
8 marks
 - What are the designs related tasks performed by modern computer? Explain with block diagram. 8 marks
 - List the advantages gained by the adoption of CAM.
4 marks
- What are the different output devices used in a CAD system? Explain the functioning of any two devices with suitable sketches.
10 marks
 - Briefly describe the various storage devices used in computers.
10 marks
- What are the functions of a modern graphics package? Explain.
8 marks

- b) Write a brief note on solid modeling.
6 marks
- c) Explain the basic features of IGES and DMIS.
6 marks
4. a) Describe in brief, the steps involved in finite element analysis procedure.
8 marks
- b) Sketch and explain DNC setup.
6 marks
- c) What are the advantages and disadvantages of CNC technology?
6 marks

PART-B

5. a) Sketch and explain Milling tooling system.
6 marks
- b) With sketch explain ATC.
8 marks
- c) Explain Tool presetting with example.
6 marks
6. a) Explain the salient features of Horizontal and Vertical axis machining centre and list their application 10 marks
- b) Write a brief note on i) High speed machining ii)MCU
10 marks
7. a) List the steps involved in development of a CNC part program for a machining job.
10 marks
- b) Explain the following i) Tool length compensation ii) Cutter radius compensation
10 marks
8. a) With neat sketches, explain the different Robot physical configurations.
10 marks
- b) What are different types of grippers, used in robots? With neat sketches explain any two types. 10 marks

MODEL QUESTION PAPER

UNIVERSITY SEAT NUMBER (USN) _____

P.E.S.COLLEGE OF ENGINEERING, MANDYA-571401.

(An Autonomous Institution under VTU, Belgaum)

Sixth Semester B.E. Degree Examination, June-2011

Course with Code:-Surface Finishing & Treatment (P08AU665)

AUTOMOBILE ENGINEERING

Time: 3 hrs

Max.Marks:100

PART-A

- 1) a. Explain the mechanism of electroplating with suitable sketches.
10Mks
b. Explain with neat sketch Tin coating
10 Mks
- 2) a. Explain the C.V.D with suitable sketches and bring out salient features of the process. 10 Mks
b. Discuss the cathodic sputtering as a vacuum coating method.
10 Mks
- 3) a. Give an account of different moisture spraying technique.
10 Mks
b. Explain phosphate coating in detail.
10 Mks
- 4) a. Write an essay on alloy electro deposition.
10 Mks
b. With neat sketch explain the process and application of plasma coating.
10 Mks

PART-B

- 5) Discuss the various metallurgical terms done on coatings. Include the precautions to be taken in your discussion.
20 Mks
- 6) a. List the various purposes of annealing & normalizing.
6 Mks
b. How is low tempering carried out? Describe the process.
6 Mks
c. Discuss the different flame hardening process.
12 Mks
- 7) a. Discuss the heat treatment of gears.
10 Mks
b. Discuss the heat treatment of cutting tools.
10 Mks
- 8) Answer any four:
i) Spheroidising ii) Galvanising iii) Heat treatment of spindles iv) Vacuum coating
v) Sub zero treatment vi) Mechanical properties of sprayed metals.

