SUBJECT CODE NO:- P-4
FACULTY OF ENGINEERING AND TECHNOLOGY
T.E.(MECH/PROD) Examination May/June 2017
Theory of Machines-II
(Revised)

[Time: Three Hours]   [Max.Marks:80]

Please check whether you have got the right question paper.
N.B   i) Solve any three questions from each section.
                           ii) Assume suitable data whenever necessary.

Section A

Q.1 A   Explain the interference & undercutting   05
    B   A pinion of 20 involute teeth & 125mm pitch circle diameter drives a rack. The addendum of both   08
        pinion & rack is 6.25mm what is the least pressure angle which can be used to avoid interference?
        With this pressure angle, find the length of arc of contact and the minimum number of teeth in
        contact at a time.

Q.2 A   Explain with neat sketch different types of gear trains   06
    B   The center distances between two meshing spiral gears is 260 mm & the angle between the shaft 65°.   07
        The normal circular pitch is 1μmm & the gear ratio 2.5. The driven gear has a helix angle of 35°, find.
        i.   The number of teeth on each wheel
        ii.   The exact center distance.
        iii.   The efficiency
                Assuming friction angle to 5.5°

Q.3 A   Explain the function of governor   03
    B   Each arm of a porter governor is 250mm long. The upper slower arms are pivoted to links of 40mm &   10
        50 mm respectively from the axis of rotation. Each ball has a mass of 5kg & the sleeve mass is 50 kg
        the force of friction on the sleeve of the mechanism is 40N. Determine the range of speed of the
        governor for extreme radii of rotation of 125mm & 130mm

Q.4 A   Define & explain the term "fluctuation energy" & "fluctuation of speed" as applied to flywheels.   05
    B   Riveting machine is driven by constant torque 3kw motor .The moving parts including the flywheel are 08
        equivalent to 150 kg at 0.6m radius. One riveting operation takes 1 second and absorbs 10,000N-m of
        energy. The speed of the flywheel is 300rpm before riveting find the speed immediately after riveting.
        How many rivets can be closed per minute?

Q.5 A   Describe the gyroscopic effect on ship   07
    B   An Aeroplane makes a complete half circle of 50 meters radius toward left when flying at 200 km/hr.   07
        The rotary engine and propeller of the plane has a mass of 400kg & radius of gyration of 0.3m. The
        engine rotates at 2400rpm clockwise when viewed from the rear find gyroscopic couple & its effect

Section B

Q.6 A   Explain with neat sketch centrifugal clutch.   05
    B   A single dry plate clutch transmit 7.5kw at 900rpm. The axial pressure is limited to 0.07 N/M^2 if the 08
        coefficient of friction is 0.25 find (1) mean radius & face width of the friction lining assuming the ratio
        of the mean radius to the mean radius to the face width as 4 & (2) outer & inner redii of the clutch
        plate.

Q.7 A   Discuss the relative merits & demerits of belt, rope & chain drives for transmission of power   05
    B   Obtain the expression for length of chain   08

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Q.8   A   Define & explain   05
         1.   Damped vibration
         2.   Forced vibration
         3.   Resonance
         4.   Degree of freedom
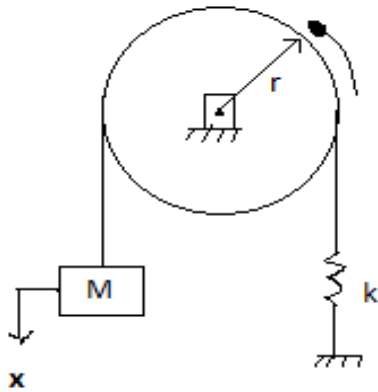   B   Determine the natural frequency of the spring mass pulley system shown in fig. 01   08

Fig-01

Q.9   A   Explain the under dumping, critical dumping & over dumping.   06
      B   In single degree damped vibrating system, a suspended mass of 8kg makes 30 oscillation in 18   07
          seconds. The amplitude decrease to 0.25 of the initial value after 5 oscillations, determine
         a.   Stiffness of the spring
         b.   Logarithmic decrement
         c.   Damping factor
         d.   Damping coefficient.
Q.10 A   Explain the magnification factor.   04
      B   Explain with neat sketch seismic instrument for measuring vibrations   04
      C   A single cylinder vertical diesel engine has a mass of 400kg & is mounted on a steel chassis frame.   06
          The static deflection O wing to the weight of the chassis is 2.4mm. The reciprocating masses of the
          engine amounts to 18kg & the stock of the engine is 160mn. A dashpot with a damping coefficient of
          2N/mm/s is also used to dampen the vibrations. In the steady state of the vibrations determine
          (i)amplitude of the vibration if the driving shaft rotate at 500 rpm
          (ii) Speed of the driving shaft when the resonance occurs.

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SUBJECT CODE NO:- P-29
FACULTY OF ENGINEERING AND TECHNOLOGY
T.E.(MECH/PROD) Examination May/June 2017
Metallurgy & Materials
(Revised)

[Time:ThreeHours] **[Max.Marks:80]**

Please check whether you have got the right question paper.

N.B
i) Solve any three questions from each section.
ii) Figure to right indicate full marks.
iii) Assume suitable data wherever required
iv) Draw suitable diagram if required

Section A

Q.1	a)	What is miller indices? With example explain how to determine miller indices.	07
	b)	With neat sketch explain different types of point detects.	06
Q.2	a)	Explain in detail solid solution strengthening with factors affecting strength.	07
	b)	What is Gibb's phase rule? State its significance to cooling curve of pure metal.	06
Q.3	a)	Explain the terms.	06
		i) Space lattice	
		ii) Equi-axised and columnar grain	
	b)	Draw a neat sketch of Eutectic phase diagram of system showing complete insolubility in solid state and explain it.	07
Q.4	a)	Draw a neat sketch of CCT diagram and explain different phase formation on it.	07
	b)	What is purpose of normalizing neat instrument? Explain the process in detail	06
Q.5		Write short note on any two	14
		1) Retained austenite	
		2) Critical temperatures on Fe-c equilibrium diagram	
		3) Strain hardening.	

Section B

Q.6	a)	What are the factors affecting the microstructure of cast iron? Explain them.	07
	b)	What is austenitic stainless steel? Explain and give its application	06
Q.7	a)	What is free cutting steel? Explain.	06
	b)	What is grey cast iron? Explain.	07
Q.8	a)	What is α-Brass? Explain different important brasses from this group	07
	b)	Give classification of aluminum alloys and explain.	06
Q.9	a)	What is metal matrix composite? Explain with example.	07
	b)	State the properties of ceramic material and give its affrication.	06
Q.10		Write short note any two.	14
		1) Nano materials	
		2) Tin bronze	
		3) Carburizing	

2017

SUBJECT CODE NO:- P-61
FACULTY OF ENGINEERING AND TECHNOLOGY
T.E.(Mech) Examination May/June 2017
Fluid Mechanics [only for Part-I]
(Revised)-II

[Time: Three Hours]   [Max.Marks:80]

Please check whether you have got the right question paper.

N.B
1) Solve three questions from each section .
2) Use of non-programmable calculator is permitted .
3) Assume suitable missing data .

Section A

Q.1	a)	Explain the properties of fluids .	06
	b)	Determine the viscosity of a liquid having kinematic viscosity 6 stokes and specific gravity 1.9	07
Q.2	a)	State and explain types of fluid flow	06
	b)	The stream function for a two – dimensional flow is given by $\psi=2xy$, calculate the velocity at that point p(2,3) find the velocity potential function Φ.	07
Q.3	a)	Define the equation of continuity. Obtain an expression for continuity equation for a three dimensional flow .	06
	b)	Explain the principle of venturimeter with neat sketch .derive the expression for the rate of flow of fluid through it.	07
Q.4	a)	Define and derive hydrostatic law.	06
	b)	Explain the terms i) path line ii) streak line iii) stream line iv) stream tube	07
Q.5	a)	A rectangular plane surface 2m wide and 3m deep lies in water in such a way that its plane makes an angle of 30^0 with the free surface of water. Determine the total pressure and position of center of pressure when the upper edge is 1.5m below the free water surface	07
	b)	Determine the specific gravity of fluid having viscosity 0.05 poise and kinematic viscosity 0.035 stokes .	07

Section B

Q.6	a)	Define displacement thickness. Derive an expression for the displacement thickness.	06
	b)	A thin plate is moving in still atmospheric air at a velocity of 5m/s. The length of the plate is 0.6m and width 0.5m. calculate i) the thickness of the boundary layer at the end of the plate ii) drag force on one side of the plate . Take density of air as 1.24kg/m^3 and kinematic viscosity 0.15 stokes .	07
Q.7	a)	Obtain von karman momentum integral equation	06
	b)	A crude oil of kinematic viscosity 0.4 stoke is flowing through a pipe of diameter 300mm at the rate of 300 liters per sec. Find the head lost due to friction for a length of 50m of the pipe .	07
Q.8	a)	What are the methods of dimensional analysis? Describe the Rayleigh's method for dimensional analysis .	06
	b)	Find an expression for the drag force on smooth sphere of diameter D, moving with a uniform velocity V in a fluid of density ρ and dynamic viscosity μ.	07
Q.9	a)	Explain the Buckingham's pie method.	06
	b)	Derive Darcy's formula to calculate the frictional head loss in pipe.	07
Q.10	a)	Obtain expression for the loss of head in a sudden expansion in the pipe.	07
	b)	Explain the non dimensional number.	07

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SUBJECT CODE NO:- P-62
FACULTY OF ENGINEERING AND TECHNOLOGY
T.E.(Mech) Examination May/June 2017
Fluid Mechanics & Machinery
(Revised)-I

[Time: Three Hours]   [Max.Marks:80]

Please check whether you have got the right question paper.

N.B
      i) Solve any three questions from section A and any three questions from section B.
      ii) Assume suitable data if necessary.

Section A

Q.1	a)	What do you mean by the term viscosity? Explain.	05
	b)	A solid cone of maximum radius R and vertex angle 2θ is rotating with an angular velocity of w. An oil of viscosity μ and thickness t fills the gap between the cone and the housing. Derive an expression for the torque required and the rate of heat dissipation in the bearing.	08
Q.2	a)	Explain different types of equilibrium of floating bodies.	05
	b)	A hollow wooden cylinder of specific gravity 0.7 has an outer diameter of 610 mm and inner diameter of 310 mm it is required to float in oil of specific gravity 0.9. calculate:	08

      i)   The maximum length (height) of cylinder so that it shall be stable when floating with its vertical axis

      ii)   The depth to which it will sink.

Q.3	a)	Derive Bernoulli's equation for flow of an incompressible frictionless fluid from consideration of momentum.	06
	b)	An oil of sp. gr. 0.8 is flowing through a venturimeter having inlet diameter 20 cm and throat diameter 10 cm The oil- mercury differential manometer shows a reading of 20 cm. calculate the discharge of oil through the horizontal venturimeter. Take Cd = 0.98.	07
Q.4	a)	Explain the following terms:	08

      i)   Model
      ii)   Prototype
      iii)   Model analysis
      iv)   Hydraulic analysis

	b)	An air duct is to be modeled to a scale of 1:20 and tested with water which is 50 times viscous and 800 times denser than air. When tested under dynamically similar conditions, the pressure drop between two sections in two model is 235 KPa. What is the corresponding pressure drop in prototype?	05
Q.5		Answer any 2 of following:	14

      a) What is vapour pressure? Explain.
      b) Explain piezometer.
      c) Explain application of CFD.

SECTION B

Q.6   a)   Show that the force exerted by a jet of water on moving inclined plate in the direction of   07
jet is given by $F_x = \varrho.a.(V-u)^2 \sin^2\theta$
Where ,
-    a   -   area of jet.
-    v   -   velocity of jet.
-    Q   -   Inclination of plate with jet.

       b)   A jet of water of diameter 60 mm moving with a velocity of 40 m/s, strikes a curved fixed   06
symmetrical plate at the center. Find force exerted by the jet of water in the direction of
the jet, if the jet is deflected through an angle of 120^0 at the outlet of the curved plate.

Q.7   A single jet pelton turbine is required to drive a generator to develop 10000 kw. The available head 13
at the nozzle is 800 mm. Assuming electric generation efficiency 94% pelton wheel efficiency 88%,
coefficient of velocity for nozzle 0.97, mean bucket velocity of 0.46 of jet velocity, outlet angle of
bucket 15^0 and relative velocity of water leaving the buckets 0.85 of that Intel, find:
- i)   Flow in m^3/s
- ii)   Diameter of jet.
- iii)   The force exerted by the jet on buckets:

Q.8   a)   Explain the working of single – stage centrifugal pump with neat sketch.   05
       b)   A centrifugal pump is delivering 0.04 m^3 of water per second to a height of 20 m through a   08
150 mm diameter 100 mm long pipeline. If Intel losses in suction pipe are equal to 0.33 m
and friction factor is 0.06 for pipeline. find power required to drive the pump. Assume
overall efficiency of pump as 70 percent.

Q.9   a)   Describe with neat sketch, working of hydraulic coupling.   05
       b)   It is required to transmit 36.76 kw power from an accumulator through a pipeline 100 mm   08
diameter and 1500 m long. The ram is loaded with a weight of 1226.25 kN and the friction
loss in pipeline equals 2 percent of total power being transmitted. Determine the diameter
of the ram if friction coefficient is 0.01.

Q.10   a)   Obtain an expression for the capacity of a hydraulic accumulator.   07
       b)   Give the operational difficulties commonly experienced in centrifugal pumps and their   07
remedies.

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SUBJECT CODE NO:- P-94
FACULTY OF ENGINEERING AND TECHNOLOGY
T.E.(Mech) Examination May/June 2017
Industrial Management & Engineering Eco.
(Revised)

[Time: Three Hours]   [Max.Marks:80]

Please check whether you have got the right question paper.

N.B
i) Attempt any three from each section
ii) Figure to the right indicate full marks .
iii) Assume suitable data if necessary and state them clearly .   .

Section A

Q.1	a)	'Management is development of people and not the direction of things'. Explain	07
	b)	Define entrepreneurship? Explain the function of an entrepreneur	06
Q.2	a)	What are the functions of management? Explain any one in detail?	07
	b)	Explain the process of Knowledge management?	06
Q.3	a)	Explain in brief co- operative enterprise?	07
	b)	Differentiate between individual proprietorship and partnership?	06
Q.4	a)	Explain Job specification in organization?	07
	b)	Explain the role of HRM in retirement of personnel in organization	06
Q.5		Write short notes on any three	
	a)	Benefits of TQM	05
	b)	Management by objectives	05
	c)	Line organization	04
	d)	Objectives of Trade Union	04
	e)	Manpower planning	04

Section -B

Q.6	a)	Discuss elasticity of demand?	07
	b)	Explain perfect competition type of market?	06
Q.7	a)	What are the objectives and importance of inventory control?	07
	b)	What are the relationship among different elements of cost?	06
Q.8	a)	A German Company produces 200 units of input shaft. The direct material cost is Rs. 4800. D.irect labor cost is Rs7200. The administration, distribution, and selling overheads are 7 % , 8% and 10% of factory cost respectively. The factory overheads are 40% of the prime cost. Determine the selling price per product to obtain a profit of 14%	08
	b)	What is the scope and importance of financial management	05
Q.9	a)	Enlist various methods of replacement analysis? Explain any two in detail?	07
	b)	Explain types of depreciation ?	06
Q.10	a)	Write short notes on any three	
	1)	ABC analysis	05
	2)	Demand function	05
	3)	Monopoly type of market	04
	4)	Overheads	04

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SUBJECT CODE NO:- P-129
FACULTY OF ENGINEERING AND TECHNOLOGY
T.E.(MECH/PROD) Examination May/June 2017
Design of Machine Elements-I
(Revised)

[Time: Three Hours]   **[Max.Marks:80]**

N.B
1. Solve any three questions from each section
2. Use separate answer-book for each section
3. Figures to the right indicate full marks.
4. Assume suitable data, if necessary and state them clearly.

Section A

Q.1   a) Define the following   04
          i)   Torsional shear stress
          ii)   Leverage
          iii)   Factor of safety
          iv)   Stiffness

      b) Explain basic procedure of machine design.   04

      c) Explain aesthetic considerations of design.   04

Q.2   Explain in detail the design procedure of a socket and spigot joint.   12
Q.3   a) Derive the expression for eccentric load parallel to axis bolt.   06
      b) A C frame is subjected to a force of 15 KN as shown in figure1. It is made of grey cast iron FG 300   06
          and factor of safety is 2.5. Determine the dimensions of the cross section of the frame.
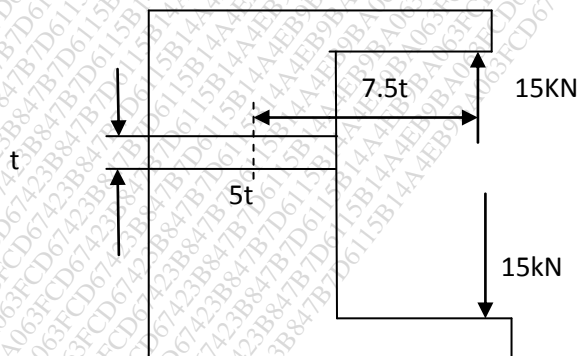

Fig.1

Q.4   Derive the design procedure of a protective rigid flange coupling.   12
Q.5   Write short notes on the following (any four)   16
      a. Ergonomic consideration in design.
      b. Design procedure of knuckle joint.

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c. Selection and use of theories of failures.
d. Bolt of uniform strength.
e. Recirculating ball screw.

Section B

Q.6   A steel rod is subjected to a reversal axial load is 200KN. Find the diameter of the rod for a factor of   12
safety2. Neglect column action. The material has an ultimate tensile stress of 1070 MPa and yield stress
910 MPa. The endurance stress in reverse bending is 50% of ultimate stress.
The axial loading factor = 0.7, surface factor = 0.8; stress concentration factor = 1.

Q.7   a) Explain low cycle and high cycle fatigue.   4
     b) A 40 mm diameter shaft is made of carbon steel having ultimate tensile stress of 630 MPa and   8
       yield stress in shear is 255 MPa. It is subjected to torque which fluctuates from 2100Nm
       to-810Nm. Using Soderberg method, calculate the factor of safety. The endurance stress in shear
       is 173.5MPa and yield stress in shear is 255MPa.

Q.8   A helical compression spring is required to deflect through approximately 25mm when the external force   12
varies from 550 N to 1050 N. The spring index is 6. The spring has square and ground ends. There should
be a gap of 1 mm between the adjacent coils when subjected to maximum force 1050N. The spring is
made of cold drawn steel wire with ultimate tensile strength of 1000 Mpa and permissible shear stress of
50% of ultimate tensile stress and (G= 81370 Mpa). Design the spring and calculate wire diameter, mean
coil diameter, number of active coils, solid length, free length, required spring rate.

Q.9   a) Derive the expression for eccentric load perpendicular to axis of riveted joint.   4
     b) A bracket is attached to a vertical column by means of 4 identical rivets which is subjected to an
       eccentric load of 28KN as shown in figure 2. Determine the diameter of rivets, if the permissible   8
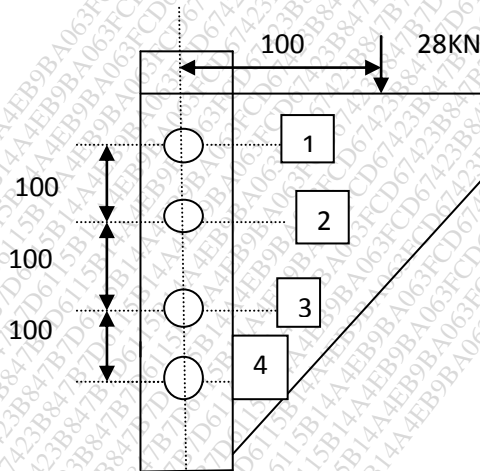   shear stress is 60 MPa.

Fig 2

Q.10   Write short notes (any four)   16
     a) Stress concentration causes and remedies
     b) Surge in springs
     c) Advantages of welded joint over riveted joint
     d) Comulative fatigue damage
     e) Short Peening

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SUBJECT CODE NO:- P-211
FACULTY OF ENGINEERING AND TECHNOLOGY
T.E. (MECH/PROD) Examination May/June 2017
Design of Machine Elements - II
(Revised)

[Time: Three Hours]   [Max.Marks:80]

Please check whether you have got the right question paper.

N.B
    i) Attempt any three questions in each section.
    ii) Assume suitable data if necessary.
    iii) Use non-programmable calculator and design data book is allowed

Section A

Q.1   A gear drive is required to transmit a mmaximum power 20 KW. The pinion runs at 600 rpm and has the   13
velocity ratio of 1.5. The center distance between the shafts is 650mm. The teeth has 20° stub involute
profile. The static stress for cast iron gears may be taken as 80 MPA and face width as 10 times the module.
Find out module, face width and number of teeth on each gear. Check the design for dynamic and wear
loads considering the dynamic load factor in the Buckingham equation as 80 and the material combination
factor for the wear as 1.4. Assume i) velocity factor kv=$\frac{3}{3+v}$. ii) Tooth from factor.
Y=0.175-$\frac{0.841}{t}$.

Q.2   Design a pair of bevel gear's to transmit 15 KW at 600rpm. Gear ratio is 2 and the pinion has 24 teeth of 20° 13
involute full depth. The material for the pinion as well gear is the same with safe stress of 110 mpa and face
width b=$\frac{l}{3}$ find the module, face width, cone distance and pitch circle diameter of the both gears. Assume
K$_v$=$\frac{3.5}{3.5+\sqrt{v}}$, where V= peripheral velocity in m/s. shaft angle is 90°. Check the design for wear strength and
dynamic tooth load given that S$_{es}$= 600mpa, E$_p$ & E$_q$= 2x10^5 mpa. C= dynamic load factor = 300KN/m and
u' = tooth form factor = 0.154-$\frac{0.912}{T_f}$ and   Velocity factor=$\frac{3}{3+v}$

Q.3 A   Explain epicyclic gear train.   03
     B   A planetary gear is train consisting of spur gear is shown in fig 1. The sun gear 'A' rotates in clockwise 20 Kw   10
power at 1460 rpm to the gears train. The number of teeth on sun gear A. planet gear B and ring gear C are
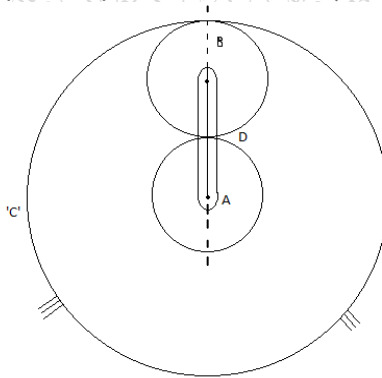20, 40 and 100 respectively. Calculate the torque that arm D can deliver to its output shaft.

Fig 1.

Q.4   A cone clutch transmits 20 Kw, at 200 rpm. Following data are available μ=0.25 and maximum permissible   13
intensity D$_f$ pressure is o.35 mpa. Semicone angle is 13°, outside diameter 260 mm, Using uniform wear
theory calculate
    i.   Face width of friction lining.
    ii.   Operating force.

Q.5   Write short notes   (any three)   14

i. Compare between spur gear and helical gear.
ii. Uniform pressure and used uniform theory of clutch.
iii. Thermal consideration in clutch design.
iv. Lewis equation for helical gear
v. Gear material.

Section B

Q.6 A Explain hydrostatic bearing. **03**

B In a journal bearing of 100mm diameter with a bearing clearance of 0.1 mm, it is found suitable to use lubricating oil with viscosity 60 cp (centipoise). The shaft runs at 500 rpm and develop a bearing pressure of 1.5 N/mm². Determine: - i) bearing pressure when the shaft speed is increased to 600 Rpm, other parameter remaining same. ii) Viscosity at 0.15mm bearing clearance, 450 rpm of shaft and 2.0 N/mm² bearing pressure. **10**

Q.7 A Compare between rolling contact bearing and sliding contact bearing **03**

B A deep grove ball hearing has a dynamic capacity 25,000N and is to operate on following work cycle of different radial loads. **10**

5800N at 200 rpm for 25% of time, 8900N at 500 rpm for 35% of time & 4000N at 400 rpm for remaining time. Assume that the loads are steady and that the inner race rotates. Find the average life of bearing in hours.

Q.8 Two shafts 1.2m apart are connected by a belt drive. 120 kW power is to be transmitted at 1440 rpm of driver pulley which is of 300 mm diameter. The speed ratio is there. The angle of groove on the pulley is 30°. Area of cross section of belt is 450mm and permissible stress is 2.5 mpa. Density of belt material is 1000 kg/m³ and μ=0.25. Find the no. of belts required and length of belt. **13**

Q.9 A What is self locking in brake? **03**

B A differential band brake as shown in fig.2 has an angle of contact of 220°. The band has a compressed woven lining and bears against a cost iron drum of 350mm diameter. This is sustains a torque of 350Nm and the coefficient of friction between the band and the drum is 0.3. Find **10**

i. The necessary force (p) for the clockwise and anticlockwise rotation of the drum.
ii. The value of "OA" for the brake to be self locking when the drum rotates clockwise.
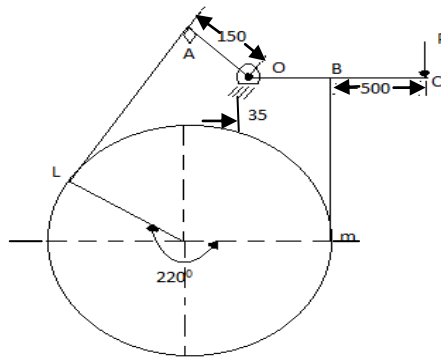
Fig.2

Q.10 Write short on (Any three) **14**

a. Types of belts
b. Long shoe and short brake
c. Variable loading in bearing
d. Compares between belt drive and gear drive
e. Sommerfield number

SUBJECT CODE NO:- P-234
FACULTY OF ENGINEERING AND TECHNOLOGY
T.E.(MECH) Examination May/June 2017
Heat Transfer
(Revised)

[Time: Three Hours]   **[Max.Marks:80]**

Please check whether you have got the right question paper.

N.B
- i. Solve any three questions from each section.
- ii. Figures to the right indicate full marks.
- iii. Assume suitable data, if necessary.
- iv. Use of non- programmable calculator and data – book is allowed.

Section A

Q.1   a)   Derive general heat conduction equation in Cartesian coordinates. Under what condition does this gets reduced to Laplace equation.   06

     b)   A hollow copper sphere has outer radius 5cm. The internal temperature gradient may be assumed to be negligible and the temperature of sphere is to be maintained at $100°C$ by an embedded electric heater. It is proposed to reduce the heat loss by providing a layer of insulation at the outer surface$\left(K = \frac{0.5W}{MK}\right)$. A housewife says to her engineer husband "evon a 1cm thick layer can reduce the heat loss and 5cm thick layer can reduce it by about 50%." The husband calls the statement "wrong". Whose side of argument do you take? How will you convince the other party with the help of calculations? Assume outside air at $20°C$. Unit surface conductance at the outer surface$= 10W /m^2K$.   07

Q.2   a)   Explain effectiveness and efficiency of fins.   06

     b)   A steel tube carries steam at a temperature of $320°C$. A thermometer pocket of iron ($K = 52.3 \ W / m°C$) of inside diameter 15mm and 1mm thick is used to measure the temperature. The error to be tolerated is 1.5% of maximum. Estimate the length of the pocket necessary to measure the temperature within this error. The diameter of the steel tube is 95mm. assume $h = 93 \ W /m^2°C$ and tube wall temperature is $120°C$ suggest a suitable method of locating the thermometer pocket.   07

Q.3   a)   Discuss the difference between thermal and hydrodynamic boundary layer.   06

     b)   A vertical cylinder 1.5m high and 180mm in diameter is maintained at $100°C$ in an atmosphere environment of $20°C$. Calculate heat loss by free convection from the surface of cylinder. Assume properties of air at mean temperature as $ᵽ = 1.06 \ \frac{kg}{m^3}$,$\vartheta = 18.97 \times 10^{-6} \ m^2/s$ $Cp = 1.004 \ KJ / Kg°C$ and $K = 0.1042 \ W /m°C$ 07

Q.4   a)   Explain the mechanisms of conduction, convection and radiation with suitable examples.   06

     b)   Hot air at a temperature of $60°C$ is flowing through a steel pipe of 10cm diameter. The pipe is covered with two layers of different insulating materials of thickness 5cm and 3cm and their corresponding. Thermal conductivity are $0.23\frac{W}{MK}$ and$0.37\frac{W}{Mk}$. The ambient temperature is $25°C$. Find the rate of heat loss from 50cm length of pipe. Neglect resistance of steel pipe. Also find temperature at inner and outer surface.   07

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Q.5 Write short notes on only two. 14
    a) Buckingham's π therem
    b) Significance of Biot Number, Fourier number and Nusselt number.
    c) Thermal contact resistance.

Section B

Q.6 a) Differentiate between filmwise and dropwise condensation. 06
    b) Assuming the sun (diameter $=1.4 \times 10^9 m$) as a black body having a surface temperature of 5750K 07
and at a mean distance. of $15 \times 10^{10} m$ from the earth (diameter $=12.8 \times 10^6 m$), estimate the
following:
      i. The total energy emitted by the sun.
      ii. The emission received per m^2 just outside the atmosphere of the earth.
      iii. The total energy received by the earth if no radiation is blocked by the atmosphere of the
earth.

Q.7 a) State, prove and explain Weins displacement law. 06
    b) For a hemispherical furnace, the flat floor is at 700K and has an emissivity of 0.5. The hemispherical 07
roof is at 1000K and has a emissivity of 0.25. Find the net radiations heat transfer from roof to
floor.

Q.8 a) Derive an expression for LMTD in counter flow heat exchanger. 06
    b) A counter – flow heat exchanger is used to cool 3600 kg/hr of oil ($Cp = 2000 \, J \, /kgK$)at 150°C 07
with the help of water ($Cp = 4178 \, J \, /kgK$)flowing at the rate of $3710 kg/hr$. Water enters at
298K. The overall heat transfer coefficient is 500 $\frac{W}{m^2 K}$ and the surface area is $4.872 \, m^2$. Calculate
exit temperatures of oil & water.

Q.9 a) Draw temperature profile for hot and cold fluids for 06
      i. Evaporator
      ii. Condenser.
      Also mention relations to calculate their effectiveness.
    b) A double walled flask may be idealized to be equivalent to two infinite parallel plates. The 07
emissivities of walls are 0.3 and 0.7 respectively. The space between them is evacuated. A shield of
polished aluminum of $\epsilon = 0.05$ is inserted between them. Find the reduction in heat transfer due
to insertion of radiation shield.

Q.10 Write short notes on any two 14
    a) Pool Boiling Curve
    b) Black, White and Grey body.
    c) Fouling and Fouling Factor.

2017

SUBJECT CODE NO:- P-265
FACULTY OF ENGINEERING AND TECHNOLOGY
T.E.(Mech) Examination May/June 2017
(A) Tool Engineering (OLD)

[Time: Four Hours]   [Max.Marks:80]

Please check whether you have got the right question paper.

N.B
    i)   Attempt any three questions from each section.
    ii) Assume suitable data and dimensions if required.
   iii) All dimensions are in mm.

SECTION A

Q.1   (a) During Orthogonal cutting with 10° rake the following observations were made F_t = 300N, F_c=1000N, Feed=0.05mm. Determine coefficient of friction, shear stress, work done in overcoming chip tool friction and work done in shearing unit volume of the material. Assume that the depth of cut = 10mm.   08

(b) Draw the neat sketches of different cylindrical locators.   05

Q.2   (a) Describe the nomenclature of tap with neat sketches.   08

(b) What are the machining factors used to evaluate machinability?   05

Q.3   (a) Explain in detail different method of designation of cutting tools.   08

(b) Draw neat sketches of different drill bushes used in drill jig.   05

Q.4   (a) What is tool life? Describe the Taylor tool life relationship in detail.   08
Enlist the criteria used to evaluate tool life.

(b) What is mean by fool-proofing in jig design? Explain with suitable example.   05

Q.5   Design, draw and dimension suitable jig to drill DIA 10 mm 2 holes in component shown in fig.1. Draw minimum two views of assembly drawing of jig and detail drawing of jig plate and drill bush.   14

SECTION B

Q.6   (a) What is the function of stripper? What are the various types of strippers in use in dies? Explain with neat diagram.   08

(b) How does a transfer die differ from a progressive die? Explain and illustrate when it would be used?   05

Q.7   (a) What is a spring back and how is it controlled in bending dies?   08

(b) Prepare minimum two strip layouts for the component shown in fig.2 and estimate the percentage of utilization.   05

Q.8   (a) Explain with neat sketches: 09
Embossing dies, coining dies and V-bending dies

(b)Determine the center of pressure for the component shown in fig.2   04

Q.9   A shell to be drawn to a mean diameter of 75mm and a mean height of 200mm. Determine the developed blank size and number of draw would be necessary to draw shell. Assume corner radius is 3mm and reductions of 50, 40, 30% for each draw. Determine the height of shell in each draw stages.   13

2017

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Q.10   Write short note on any two of following   14
        a. Forging die design factors.
        b. Two plate injection mould.
        c. Press classification and selection.

Fig 1.
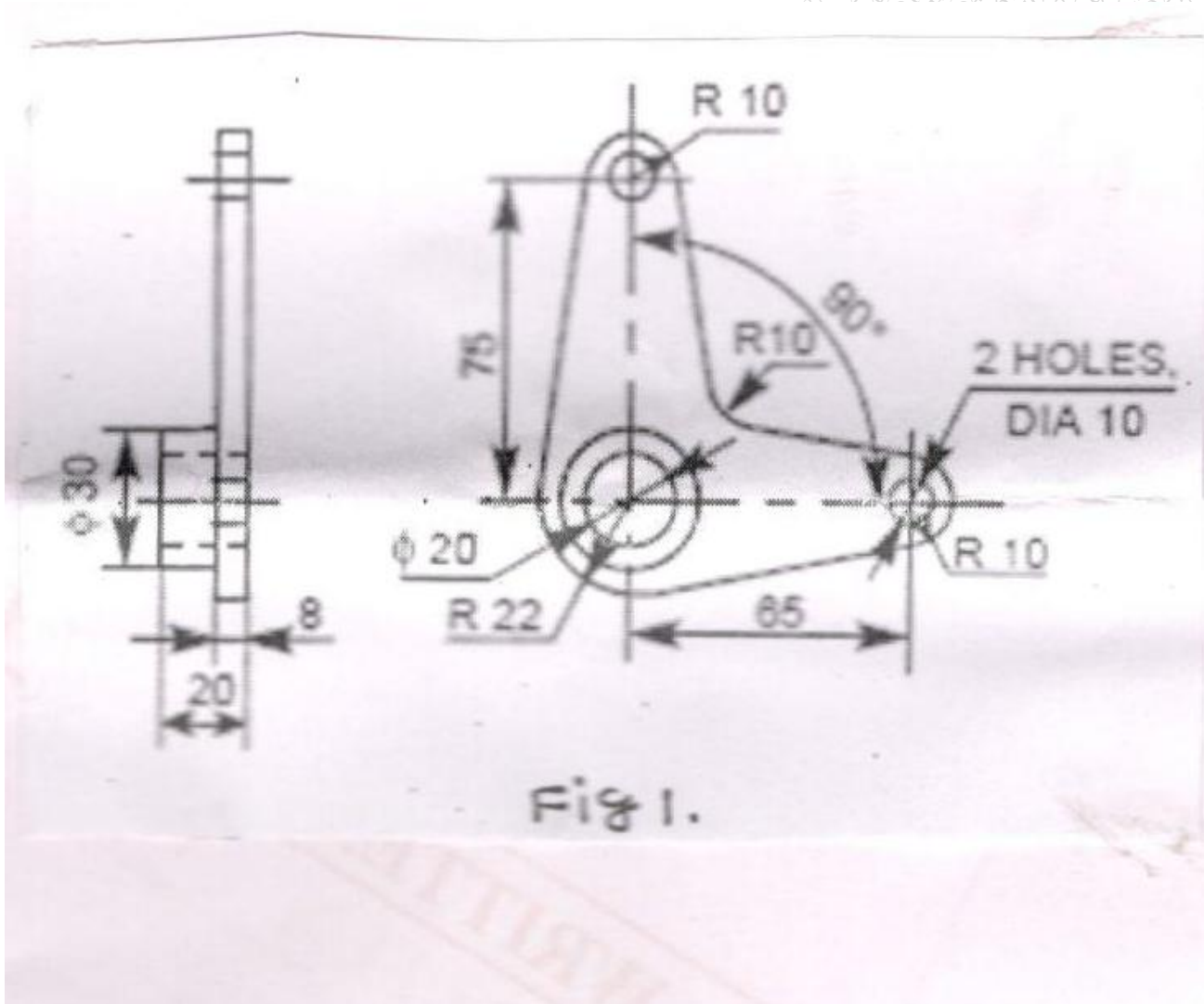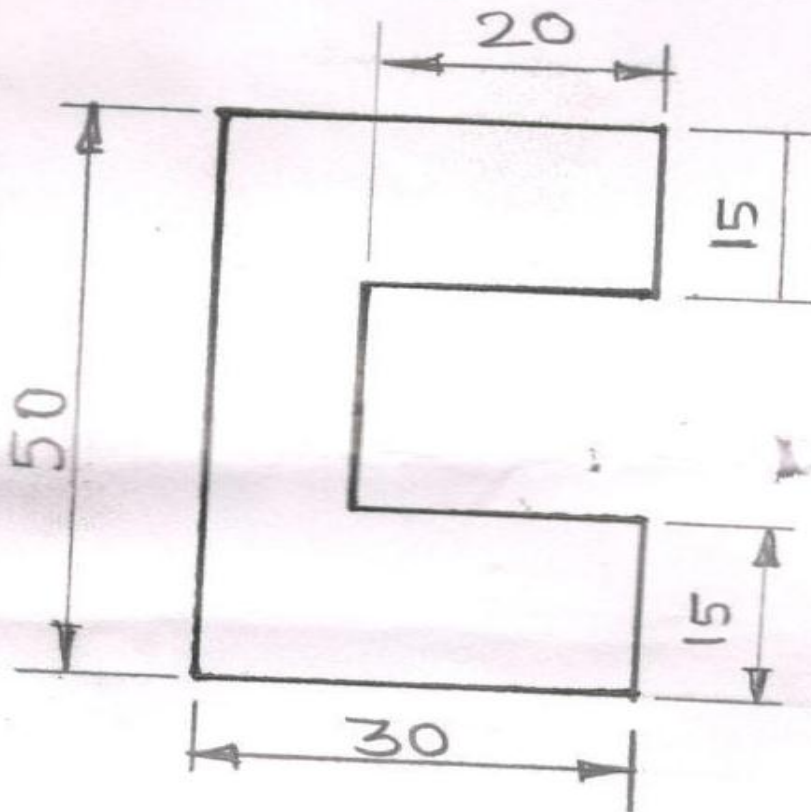
THK = 1 mm   T_S = 240 N/mm²

Fig. 2.

SUBJECT CODE NO:- P-265
FACULTY OF ENGINEERING AND TECHNOLOGY
T.E.(Mech) Examination May/June 2017
(B) Tool Engineering (REV.From 2015-2016 Batch)

**[Time: Four Hours]**   **[Max.Marks:80]**

Please check whether you have got the right question paper.
N.B   i) Q. No.4 and Q.No.8 are compulsory.
             ii) Solve three questions from each Section.
             iii) Assume suitable data & Dimensions if required.
             iv) All dimensions are in mm.

Section A

Q.1   (a) In an orthogonal cutting test on a mild steel tube of size 150mm diameter and 2mm thickness, conducted 100   08
       m/min and 0.25 mm/rev feed, the following data were recorded.
       Cutting Force = 1250 N, Feed Force = 300N
       Chip thickness = 0.3mm, Contact length = 0.7 mm
       Back rake = 10°, Net horsepower = 2KW
       Calculate shear strain and shear energy per unit volume.
       (b) Draw neat sketch of Cam operated strap clamp used in fixture design.   04

Q.2   (a) Explain the various elements of a single point cutting tool with the help of neat sketch.   08
       (b) Explain with the aid of suitable diagram the indexing device used in jig design.   04

Q.3   a. What is tool life? Describe the Taylor tool life relationship in detail. Enlist the criteria used to evaluate tool life.   08

       b. Explain six point location principle followed in jig and Fixture design.   04

Q.4   Design, draw and dimension suitable jig to drill Ø6mm hole in component shown in fig. 1. (Note : Drilling of Ø6mm   16
       hole is the last operation in process).
       Draw minimum two views of assembly drawing of jig and detail drawings of Jig plate and bush.

2017

φ 50

φ 30

12

φ6

φ12

6

28
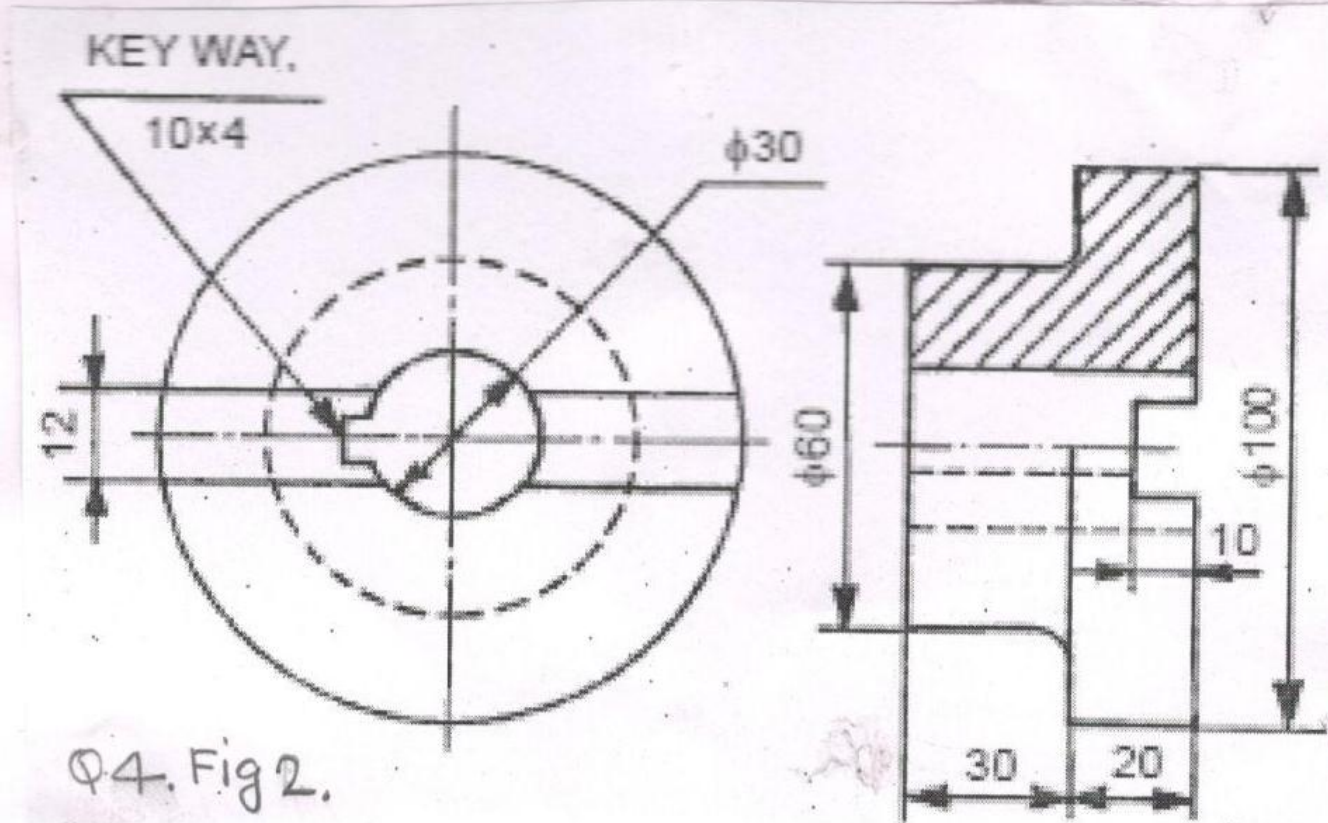
10

70

15

φ 20

R 16

2 HOLES,
DIA12
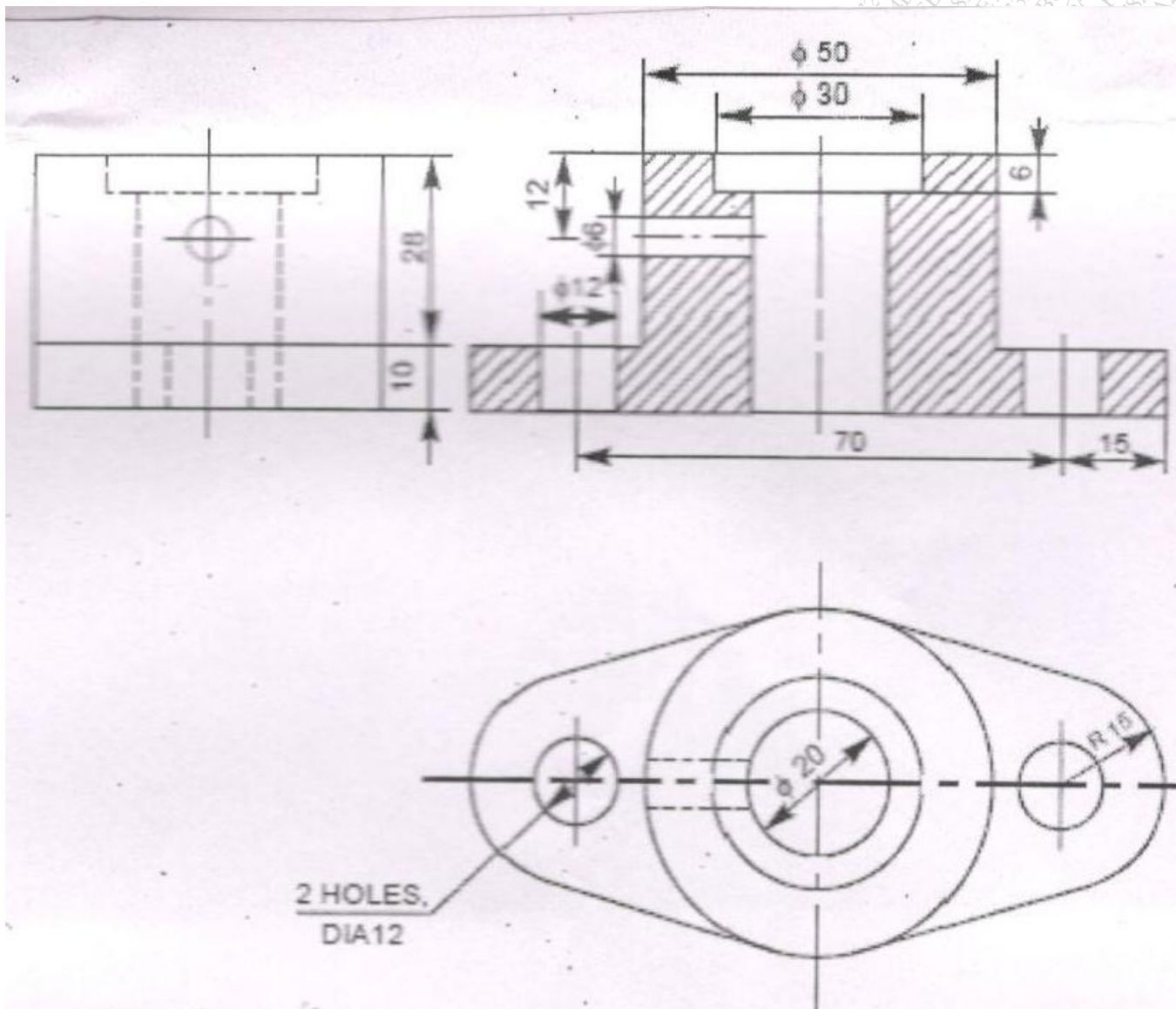
Q.4 Fig.1

OR

Design, draw and dimension suitable fixture to machine slot 12 mm wide and 10mm deep in component shown in   16
Fig.2
Draw minimum two views of assembly drawing of fixture and detail drawings of any two important components.

2017

KEY WAY,
10×4

φ30

12

Q4. Fig 2.

φ60

φ100

10

30   20

Section B

Q.5 (a) What is a spring back and how is it controlled in bending dies? 06
(b) Describe with neat sketches the nomenclature of twist drill. 06

Q.6 (a) What is the Function of stripper in progressive dies? Explain the various types of stripper with neat sketches. 06

(b) Describe with neat sketches the nomenclature of tap. 06

Q.7 (a) How does a hand reamer differ from a machine reamer? Explain with neat sketches 06
(b) Assume a shell to be drawn to a mean diameter of 75mm and a mean height of 200mm. What is the developed 06
blank size required and how many drawing operations would be necessary to draw shell? (Assume corner radius = 3mm).

2017

Q.8 Design and draw progressive press tool for producing component shown in Fig.3   16
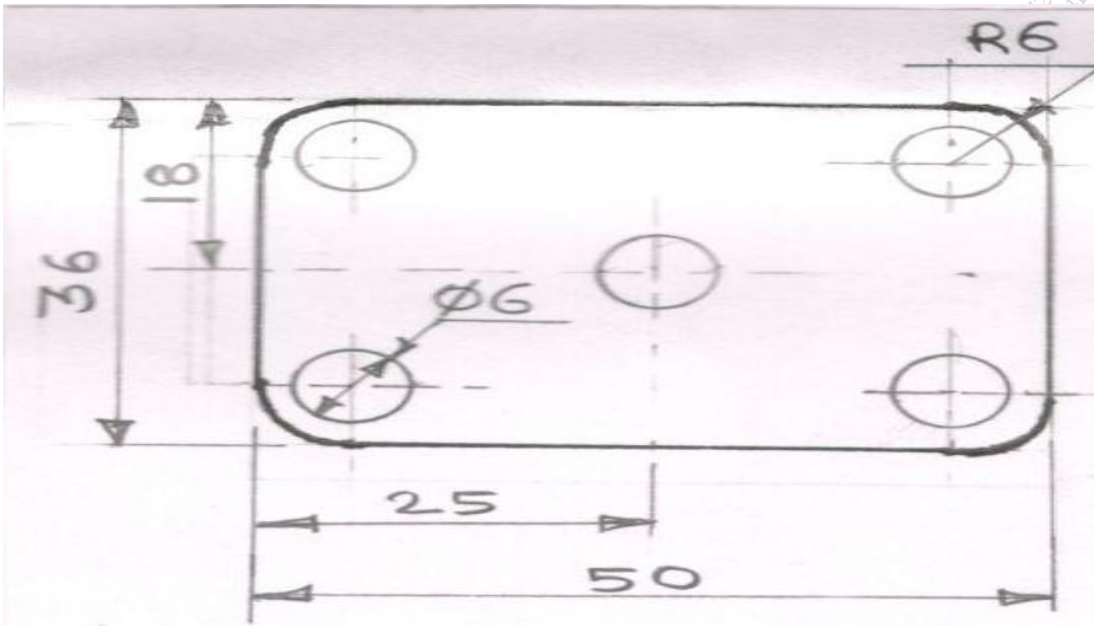   i)   Draw Strip layout.
        ii) Solve necessary design calculations.
        iii) Determine center of pressure.
        iv) Draw sectional front view of three stage progressive die and
        top view of lower half of die.
        v)   Specify bill of material

2, HOLES
Ø6

Ø40

THK = 1 mm, TS = 180 N/mm²
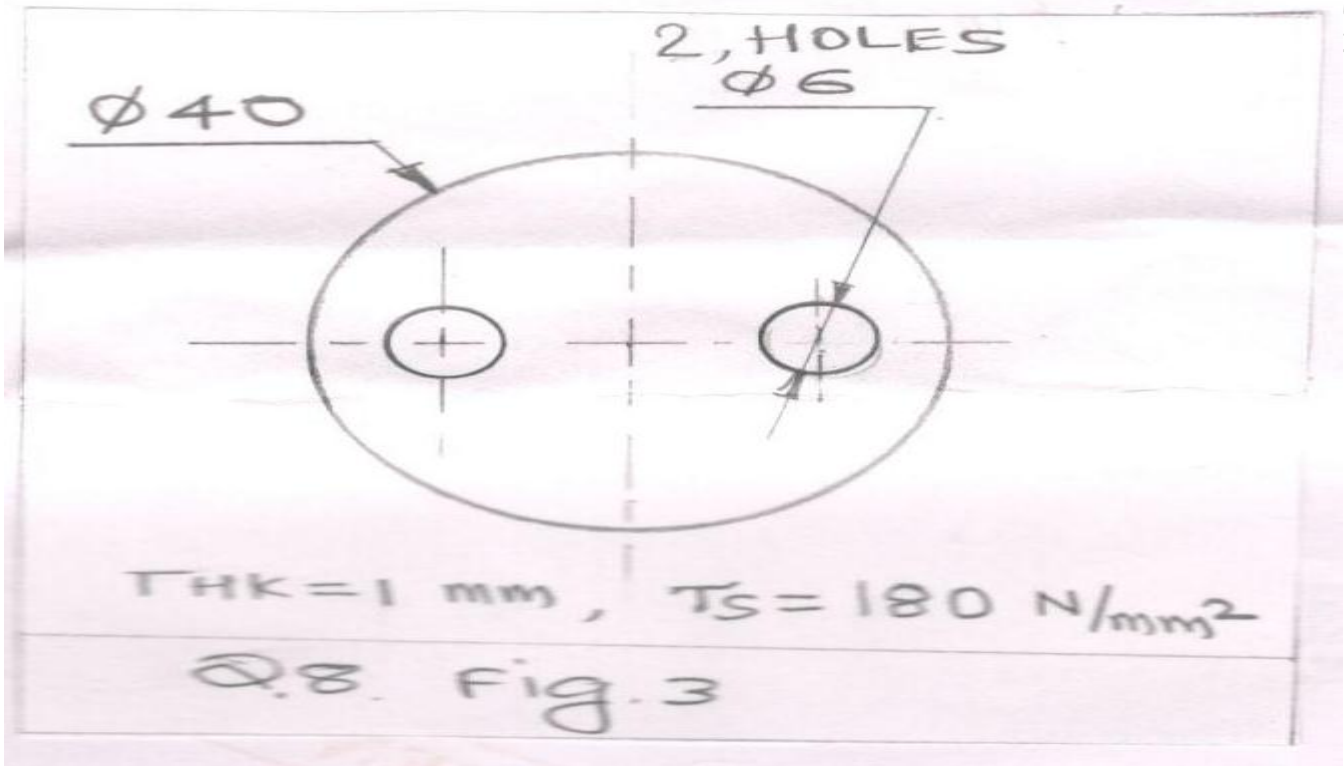
Q.8 Fig.3

OR

Design either a compound or progressive die for the components shown in fig.4   16

2017

THK= 1·5 mm, T_s = 340 N/mm²

Q8. Fig 4

SUBJECT CODE NO:- P-297
FACULTY OF ENGINEERING AND TECHNOLOGY
T.E.(Mech) Examination May/June 2017
CAD/CAM/CAE
(Revised)

[Time: Three Hours]   [Max.Marks:80]

Please check whether you have got the right question paper.
N.B   i)Use suitable data if required.
             ii)Attempt three questions from each section.

Section A

Q.1   a)Explain the hardware requirement for implementing CAD/CAM facility.   06
      b)Explain the role of CAD,CAM & CAE in product life cycle.   07

                                            OR

      a)Explain with neat diagram the data output devices used in CAD/CAM implementation.   07
      b)Explain and differentiate the vector scan and Raster scan techniques.   06

Q.2   a)Differentiate between solid modeling and wireframe modeling techniques.   07
      b)Explain the concept of pointing and positioning.   06

                                            OR

      A Rectangle ABCD is defined in a 2D graphic system by its vertices as A(2,2), B(6,2), C(6,5) & D(2,5).   13
      Perform the following transformations on this rectangle and represent it on graph paper.
      i)Translation- 2 units in x direction & 3 units in y direction.
      ii)Rotate the original fig. by 40° in anticlockwise direction about the origin.

Q.3   Write short notes on any two.   14
      a)Concurrent Engineering
      b)Software requirement for CAD applications.
      c)LCD and Plasma panels.
      d) Manufacturing data base.

Section B

Q.4   a)Discuss the role of computers in process planning.   07
      b)Explain the Group Technology & its advantages.   06

                                            OR

      Write down the APT programme for the part shown in fig.1 . Consider the thickness of part to 18mm. 13
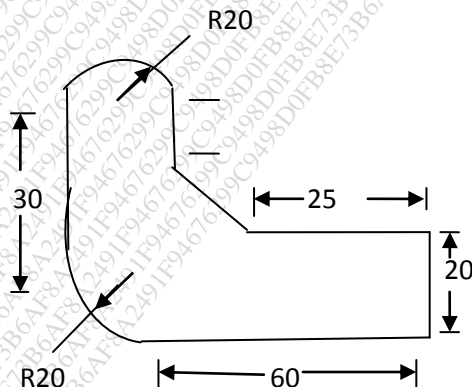

Fig.1

2017

Q.5   a)Explain the concept of Fixed 3150 and floating 3150 with reference to NC-machines.   06
    b)Explain the NC motion control systems.   07

<div align="center">OR</div>

    a)Explain the base for selection and use of Industrial Robot for spray painting and Heat treatment 06
    applications
    b)Explain with neat diagrams the different types of sensors and grippers used in Industrial Robot 07
    along with suitable example.

Q.6   Write short notes on any two: 14
    a)Robot programming
    b)CNC/DNC
    c)CAQC
    d)FMS.

2017