

Total No. of Questions : 12

[Total No. of Printed Pages :4]

[4362]-134

S. E. (Production/Prod SW Engg)

Examination-2013

MATERIAL SCIENCE

(2008 Pattern)

[Time : 3 Hours]

[Max. Marks : 100]

Instructions :

- (1) Answer Q1 or Q2, Q3 OR Q4, Q5 OR Q6, From section I and Q7 OR Q8, Q9 OR Q10, Q11 OR Q12 From section II
- (2) Answers to the **two sections** should be written in **separate answer-books**.
- (3) Figures to the right indicate full marks.
- (4) Neat diagrams must be drawn wherever necessary.

Section I

Q.1

- a) What is slip in plastic deformation? Compare the slip & twinning. [04]
- b) Annealing removes the effect of strain hardening explain with all stages of annealing. [06]
- show properties before annealing on graphical form
- c) Write the advantages of cast iron over steel. [04]
- d) Show the following planes in cubic cell [04]
- (222), (110)

OR

Q.2

- a) What are the different types of imperfection in crystal structure explain dislocation with neat diagram. [06]
- b) What is composite material? Explain FRP composite with its one application in detail [04]
- c) Write true or false & give the explanation [06]
- 1) FCC metals are more ductile than BCC metals explain
- 2) Finer is the grain size lower is annealing temperature.
- d) What is ceramic material? Give min two applications of this group. [02]

Q.3

- a) Write a short note on micro hardness tester [04]
- b) Specify indenters, shape of the indentation, loads & formula for following hardness tester [06]
 - 1) Vickers Hardness tester
 - 2) Brinell Hardness tester
- c) Compare X ray radiography with Gyama radiography [04]
- d) What is notch sensitivity ? [02]

OR

Q.4 a) Write short note on following (Any two) [08]

- 1) Erichson cupping test
- 2) Creep
- 3) Dye penetrant test
- 4) Poldi test

b) Draw self explanatory sketches of following [06]

- 1) S-N Cruves for A1 2) Charpy specimens
- 3) Intercrystalline & Intracrytalline fractures
- c) Which hardness tester you will recommend for measuring the hardness of plating in silver plated component explain. [02]

Q.5

a) Cooling curve of pure metal is similar to cooling curve of an eutectic alloy explain [04]

b) Draw an Equilibrium Phase diagram for metal A & B that are partially soluble in solid state. Metal B has maximum solubility of 1% for A at 190°C and 0.2% at room temperature.

Maximum solubility of B in A is 6% which reduces to 1% at room temperature. A melts at 270°C and B melts at 232°C. A & B forms eutectic at 50:50 composition at 190°C. discuss slow cooling alloy having 30% B in A from its liquids temperature to room temperature with the calculation of individual phases at different temp. by the application of lever rule & draw its microstructure at room temperature. [10]

- c) Define following [02]
 - 1) System 2) Variable

OR

Q.6

a) What is solid solution? Explain different types of solid solution with neat

diagram. [04]

b) What is eutectic transformation? Write different uses of eutectic alloys? [04]

c) Draw the equilibrium diagram for the materials having 100% solubility in each other in liquid as well as in solid state & explain cooling alloy having 40% B from its liquidus temperature to room temp. [08]

| Wt of B | 0 | 20 | 40 | 60 | 80 | 100 |
|-------------------------|------|------|------|------|------|------|
| Liquidus temperature °C | 1084 | 1200 | 1275 | 1345 | 1440 | 1455 |
| Solidus temperature °C | 1084 | 1165 | 1235 | 1310 | 1380 | 1455 |

Section II

Q.7

a) fine grained material shows better strength than Coarse grained materials explain with hall-Petch equation. [04]

b) Which method is suitable for strengthening of pure metal? Explain [04]

c) With neat diagram explain the working principal of a resistance pyrometer & write its advantages & disadvantages over the other. [04]

d) Explain characteristics of martensitic transformation as effective strengthening mechanism. [04]

OR

Q.8 Write short note on following (any four) [16]

- 1) Calibration of a thermocouple
- 2) Composite materials
- 3) Optical pyrometer
- 4) Dispersion strengthening
- 5) Total radiation pyrometer

Q.9

a) What is corrosion? Which factors are consider in designing the material to get good corrosion resistance explain with neat diagrams. [08]

b) Explain with neat diagram physical vapor deposition? State its advantages, disadvantages & application over other processes. [06]

c) Explain methods to prevent differential aeration corrosion. [04]

OR

Q.10

a) State true or false & justify your answer [06]

1) Single phase materials have better corrosion resistance than two phase material explain.

2) Highly cold worked materials are prone for intergranular corrosion.

b) Write short note on [12]

1) Diffusion coating.

2) Electroplating

3) Ion implantation

Q.11

a) Method of powder production decides the characteristics of metal powders discuss. [08]

b) Powder metallurgy is the only production method for production of self [04]

c) Define the following

1) Apparent density 2) Tap density. [4]

OR

Q.12

a) What are the advantages & disadvantages of Powder Technology over other manufacturing processes. Give minimum 4 specific applications of the same. [08]

b) Explain with the flow chart production of refractory materials? [04]

c) Explain why Lubricants are necessary ingredient in compaction? [04]

Total No. of Questions : 12

[Total No. of Printed Pages :6]

[4362]-137

**S. E. (Production/Production S/W) -
2013
Design of Machine
elements
(2008 Pattern)**

[Time : 3 Hours]

[Max. Marks : 100]

Instructions :

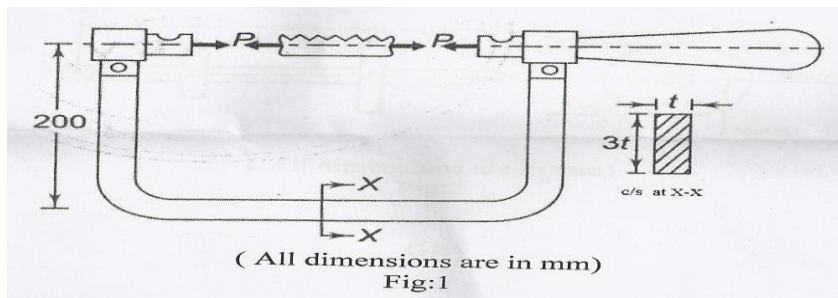
- (1) Answer **any three** questions from each section.
- (2) Answers to the **two sections** should be written in **separate answer-books**.
- (3) Figures to the right indicate full marks.
- (4) Neat diagrams must be drawn wherever necessary.
- (5) Use of electronic pocket calculator is allowed.
- (6) Assume suitable data, if necessary.

Section I

Q.1) (a) Explain the various stages in design of machine elements. [6]

b) Why factor of safety is necessary in the design? [4]

c) The frame of a hacksaw is shown in fig: 1. The initial tension P in the blade should be 300 N. the frame is made of plain carbon steel 30C8 with tensile yield strength of 400 N/mm^2 and factor of safety is 2.5. the cross section of the frame is rectangular with a ratio of depth to width as 3 as shown in fig :1. Determine the dimension of the cross-section



[8]

OR

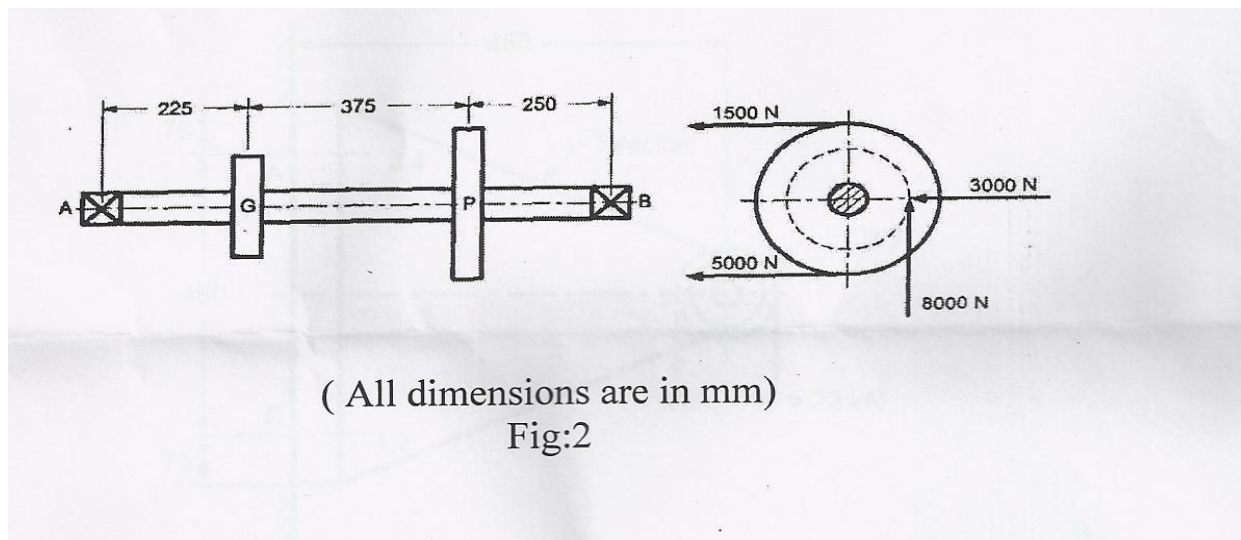
Q2 (a) Explain the difference between bearing stress and crushing stress with suitable example. [4]

b) Design a cotter joint to transmit a load of 100 kN in tension or compression. Assume the following stresses for socket, spigot and cotter material. Draw a neat sketch which shows all dimensions. [14]

- Allowable tensile stress = 90 N/mm^2 .
- Allowable crushing stress = 170 N/mm^2 .
- Allowable shear stress = 60 N/mm^2 .

Q3) A pulley weighing 1.2 kN and 500 mm diameter is driven by a horizontal belt drive. The power is transmitted through a solid shaft to a pinion keyed to the shaft which in turn meshes with a gear. The belt tension and a component of gear reactions on the pinion are as shown in Fig-2. The allowable shear stress for the shaft and key material is 55 N/mm^2 . Design the shaft and square key. Assume shaft and key are made of the same material. The shock and fatigue factors are: $K_b=2.0$ and $K_f=1.5$

Also find the torsional deflection of the shaft. [16]



OR

Q.4 (a) Explain with a neat sketch the construction and working of bushed-pin type of flexible flange coupling with design procedure and show the important dimensions. [10]

b) Design of muff coupling to connect two mild steel shafts to transmit 35 kW at 1440 r.p.m. The C.I. sleeve connects the shafts through two mild steel sunk keys. The maximum torque transmitted is 25% greater than average torque.

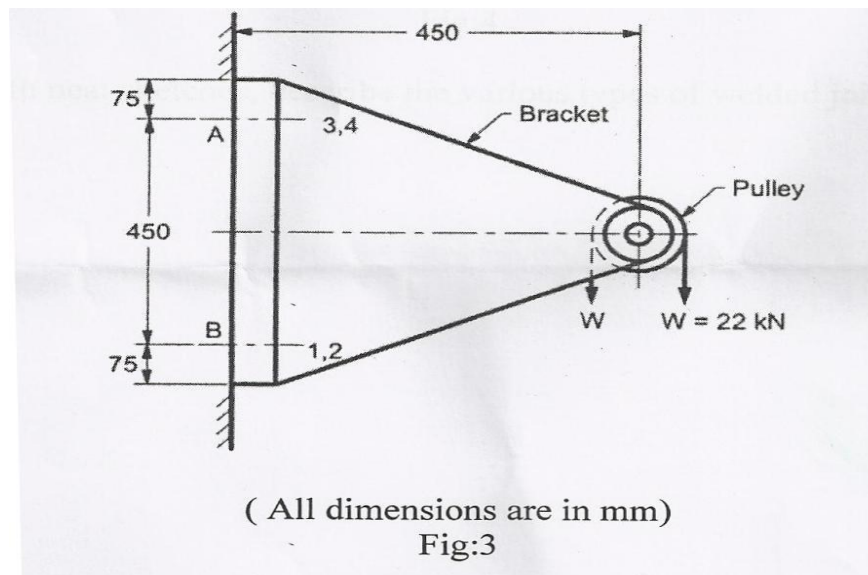
Material properties : [6]

- Allowable shear stress for C.I = 15 N/mm^2 .
- Allowable shear stress for mild steel = 65 N/mm^2 .
- Allowable crushing stress for mild steel = 160 N/mm^2 .

Q.5 (a) Fig-3. Shows a pulley bracket supported to vertical wall by 4 bolts, two each at location A and B. the pull 'W' on each side of the wire rope over the pulley is 22 kN. [12]

Determine the size of the coarse threaded metric bolts using allowable shear stress of MPa for bolt material. Bolts may be selected from the following table.

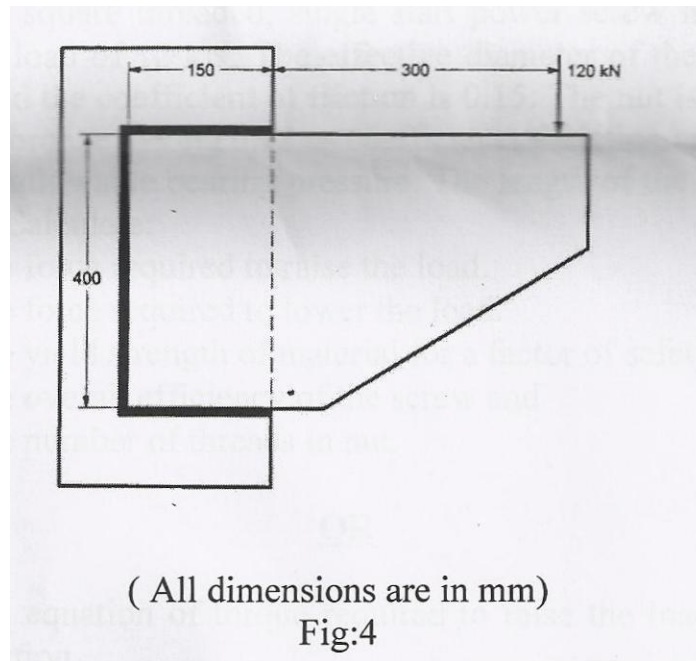
| Bolts size | M16 | M20 | M24 | M30 | M33 | M36 |
|----------------------------|-----|-----|-----|-----|-----|-----|
| Stress Area, mm^2 | 157 | 245 | 353 | 561 | 696 | 817 |



b) Describe with neat sketch any two locking devices used in threaded joints [4]

OR

Q.6 (a) A bracket plate carrying a load of 120 kN is to be welded to a column as shown in Fig-4. Find the size of the weld, if the allowable shear stress in the weld is 110 MPa. [12]



b) with neat sketches, describe the various types of welded joints. [4]

Section II

Q.7 (a) What do you understand by self-locking screw? Explain the condition for self-locking. [4]

b) A 26 x 5 square threaded, single start power screw is used to support a load of 12 kN. The effective diameter of the collar is 46 mm and the coefficient of friction is 0.15. the nut is made of phosphor bronze having 0.12 as coefficient of friction and 6 MPa as allowable bearing pressure. The length of the handle is 300 mm. calculate: [12]

- 1) The force required to raise the load.
- 2) The force required to lower the load
- 3) The yield strength of material for a factor of safety of 4.
- 4) The overall efficiency of the screw and

5) The number of threads in nut.

OR

Q.8 (a) Derive an equation of torque required to raise the load against thread friction. [4]

b) A power screw having double start square threads of 25 mm nominal diameter and 5 mm pitch is acted upon by an axial load of 10 kN. The outer and inner diameters of screw collar are 50 mm and 20 mm respectively. The coefficient of thread friction and collar friction may be assumed as 0.2 and 0.15 respectively. The screw rotates at 12 rpm. Assuming uniform wear condition at the collar and allowable thread bearing pressure of 5.77 N/mm^2 , find : [12]

- (1) The torque required to rotate the screw,
- (2) The stresses in screw, and
- (3) The height of nut.

Q.9 (a) It is required to design helical compression spring with plain ends for carrying a maximum statics force of 1000N. The allowable shear stress and modulus rigidity for spring material are 400 N/mm^2 and 85 kN/mm^2 respectively. The spring rate is 48 N/mm. if spring index is 5, determine: [12]

- (1) Wire diameter
- (2) Total number of coils
- (3) Free length and
- (4) Pitch

Draw neat sketch of spring and give necessary dimension.

b) Explain the following terms

- (1) Spring Index
- (2) Surge in spring. [4]

OR

Q.10 (a) Design a helical compression spring for a spring operated pressure relief valve with following data: [16]

- Operating pressure = 1.25 N/mm^2

- Valve lift = 3.5 mm at 10% pressure rise over operating pressure
- Diameter of valve = 25 mm
- Limiting mean coil diameter = 40 mm
- Permissible shear stress for the spring = 500N/mm^2
- Modulus of rigidity for spring material = 83×10^3 MPa
- The available standard spring wire diameters are: 2, 3, 4, 5, 6, 7, 8 and 10 mm.

Draw a neat sketch of spring and give necessary dimension.

- Q.11 (a) Define the ergonomics and state its objectives. [4]
- b) Explain Morgan's color code? [4]
- c) Explain the role of the following aspects in the aesthetic design [10]
- (1) Shape
 - (2) Symmetry
 - (3) Balance
 - (4) Material

OR

- Q12 (a) What is Design for Assembly? Explain the general principles to be followed while designing the parts for assembly. [8]
- b) Describe the various guide lines to be followed in design of the parts for the following process:
- (1) Forging
 - (2) Casting [10]

UNIVERSITY OF PUNE
[4362-114]

S.E(Mech/Production/Mech SW/ Prod SW/ Auto) Examination,2013
Engineering Mathematics - III
(2008 pattern)

Time-Three hours

Maximum Marks-100

Total No. of Question=12

[Total no. of printed pages= 5]

Note:

- (1) In section I attempt Q1 or Q2, Q3 or Q4, Q5 or Q6 in section II attempt Q7 or Q8, Q9 or Q10, Q11 or Q12.
 - (1) Use of electronic pocket calculator and steam table is allowed
 - (2) Answers to the two sections should be written in separate answer books.
 - (3) Neat diagram must be drawn necessary.
 - (4) Figures to the right indicate full marks.
 - (5) Assume suitable data wherever necessary.
-

SECTION-I

Q.1

(a) Solve any three.

(12)

(i) $(D^2 - 6D + 13)y = 8e^{3x} \sin 4x + 2^x$

(ii) $(D^4 - m^4)y = \sin mx$

(iii) $\frac{d^2 y}{dx^2} + \frac{1}{x} \frac{dy}{dx} = \frac{12 \log x}{x^2}$

(iv) $(D^2 - 3D + 2)y = e^{e^x}$

(b) If $\frac{dx}{dt} - w y = a \cos pt$

(5)

$\frac{dy}{dt} + w x = a \sin pt$ show that

$$x = A \cos wt + B \sin wt + \frac{a}{p+w} \sin pt$$

$$y = B \cos wt - A \sin wt - \frac{a}{p+w} \cos pt$$

OR

Q.2 (a) Solve any Three (12)

(i) $(D^2 - 4D + 4)y = e^{2x} + x^3 + \cos 2x$

(ii) $(D^2 + 2D + 1)y = \frac{e^{-x}}{x+2}$

(iii) $(1+2x)^2 \frac{d^2 y}{dx^2} - 8(1+2x) \frac{dy}{dx} + 16y = 8(1+2x)^2$

(iv) $(D^2 + 4)y = \tan 2x$ (use variation of parameter method)

(b) Solve (5)

$$\frac{dx}{d^2 - yz} = \frac{dy}{y^2 - zx} = \frac{dz}{z^2 - xy}$$

Q. 3

(a) Find Laplace transform (any two) of the following functions. (6)

(i) $f(t) = \frac{e^{at} - e^{bt}}{t}$

(ii) $f(t) = \sin ht \sin t$

(iii) $f(t) = \int_0^t \frac{\sin t}{t} dt$

(b) Solve following equation by using Laplace transform . (5)

$$\frac{d^2 y}{dt^2} - 3 \frac{dy}{dt} + 2y = 12e^{-2t}, y(0) = 0 \quad \text{and} \quad y'(0) = 0$$

(c) Solve the integral equation $\int_0^\infty f(x) \cos \lambda x dx = 1 - \lambda, 0 \leq \lambda \leq 1$ (5)

$$= 0 \quad x > 1$$

OR

Q.4

(a) Find reverse Laplace transform (any two) (8)

$$(i) \frac{1}{(S^2+4)^2} \quad (ii) \frac{S^2+2}{S(S^2+4)} \quad (iii) \cot^{-1}(S-1)$$

(b) Evaluate by using Laplace transform (4)

$$\int_0^{\infty} \frac{e^{-at} - e^{-bt}}{t} dt$$

(c) Show that Fourier transform of (4)

$$f(x) = e^{-|x|} \text{ is } \frac{2}{1+\lambda^2}$$

Q.5

(a) A tightly stretched string with fixed ends at $x=0$ & $x=l$ is initially in a position given by $y(x, 0) = Y_0 \sin^3\left(\frac{\pi x}{l}\right)$. If it is released from this position find the displacement y at any

distance x from one end at any time ' t ', if it satisfies the equation $\frac{\partial^2 y}{\partial t^2} = c^2 \frac{\partial^2 y}{\partial x^2}$ (8)

(b) Solve $\frac{\partial u}{\partial t} = k \frac{\partial^2 u}{\partial x^2}$ if (9)

(i) $u(x, t)$ is bounded

(ii) $u(0, t) = 0$

(iii) $u(l, t) = 0$

(iv) $u(x, 0) = \frac{u_0 x}{l} \quad 0 \leq x \leq l$

OR

Q.6

(a) A rectangle plate with insulated surface is 10 cm wide and so long composed with width that it may be considered infinite in length. If the temperature along short edge $y=0$ is given by $u(x, 0) = 100 \sin\left(\frac{\pi x}{10}\right) \quad 0 \leq x \leq 10$. while the two edges at $x=0$ & $x=10$ as well as the other short edge are kept at 0° C . Find steady state temperature $u(x, y)$. if it satisfies $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$ (9)

(b) Use Fourier transform to solve (8)

$$\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2} \quad 0 \leq x \leq \infty, t > 0$$

- (a) $u(0,t)=0 \quad t > 0$
 (b) $u(x,0)=1 \quad 0 < x < 1$
 $\quad \quad \quad = 0 \quad x > 1$
 (c) $u(x,t)$ is bounded

SECTION -II

Q.7

(a) Fluctuation in the Aggregate of marks obtained by two groups of students are given below .Find out which of the two shows greater variability. (6)

| | | | | | | | | | | | | | | | |
|---------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Group A | 518 | 519 | 530 | 530 | 544 | 542 | 518 | 550 | 527 | 527 | 531 | 550 | 550 | 529 | 528 |
| Group B | 825 | 830 | 830 | 819 | 814 | 814 | 844 | 842 | 842 | 826 | 832 | 835 | 835 | 840 | 840 |

- (b) For the following distribution ,find (6)
- (i) First 4 moments about the A.M.
- (ii) Coefficient of skewness and kurtosis
- $A=5, \mu'_1=2, \mu'_2=20, \mu'_3=40 \quad \text{and} \quad \mu'_4=50,$
- (c) In a Poisson distribution, if $p(r=1)=2p(r=2)$, find $p(r=3)$ (4)

OR

Q.8

(a) Given $r=0.9, \sum xy=70, 6y=3.5, \sum x^2=100$ find the number of item ,if x and y are derivations from arithmetic mean. (5)

(b) On an average a box containing 10 articles is likely to have 2 defectives, If are consider a consignment of 100 boxes, how many of them are expected to have three or len defective? (5)

(c) In a distribution ,exactly normal, 7 % of the items are under 35 and 89 % are under 63, Find the mean and standard deviation of the distribution. (6)

$A_1=0.43, z_1=1.48, A_2=0.39, z_2=1.23$

Q.9

(a) Find the directional derivative of $\varphi = xy^2 + yz^3$ at the point (1,-2,2) towards the point

$$(2,3,4) \quad (6)$$

$$(b) \text{With usual notation ,show that} \quad (6)$$

$$(i) \quad \nabla \times [\bar{a} \times (\bar{b} \times \bar{r})] = \bar{a} \times \bar{b}$$

$$(ii) \quad \nabla [(\bar{r} \times \bar{a}) \cdot (\bar{r} \times \bar{b})] = \bar{b} \times (\bar{r} \times \bar{a}) + \bar{a} \times (\bar{r} \times \bar{b})$$

$$(c) \text{Show that } \bar{F} = (6xy + z^3)\bar{i} + (3x^2 - z)\bar{j} + (3xz^2 - y)\bar{k} \text{ is irrotational find scalar } \phi \text{ such that } \bar{F} = \nabla \phi \quad (5)$$

OR

Q.10

$$(a) \text{ If } \bar{r} \times \frac{d\bar{r}}{dt} = 0 \quad (6)$$

show that \bar{r} has constant direction

$$(b) \text{Show that the vector field } \bar{F} = f(r)\bar{r} \text{ is always irrotational and determine } f(r) \text{ such that the field is solenoidal also} \quad (6)$$

$$(c) \text{If the directional derivatives of } \phi = axy + byz + czx \text{ at } (1,1,1) \text{ has maximum magnitude 4 in a direction parallel to y-axis, find the values of a,b,c.} \quad (5)$$

Q.11

$$(a) \text{Find the work done in moving a particle from } (0,1,-1) \text{ to } \left(\frac{\pi}{2}, -1, 2\right) \text{ in a force field.}$$

$$\bar{F} = (y^2 \cos x + z^3)\bar{i} + (2y \sin x - 4)\bar{j} + (3xz^2 + 2)\bar{k} \quad (6)$$

$$(b) \text{Using divergence theorem, evaluate}$$

$$\int_s (y^2 z^2 \bar{i} + z^2 x^2 \bar{j} + x^2 y^2 \bar{k}) d\bar{s} \text{ where 's' is the upper part of the sphere } x^2 + y^2 + z^2 = a^2 \text{ above the plane } z=0. \quad (6)$$

$$(c) \text{Verify Stokes Theorem for } \bar{F} = x^2 \bar{i} + xy \bar{j} \text{ for the surface of a square lamina bounded by } x=0, y=0, x=1, y=1 \quad (5)$$

Q.12

(a) Using Green's theorem, show that the area bounded by a simple closed curve C is given by $\frac{1}{2} \int_C x dy - y dx$. Hence find the area of the circle $x = a \cos \theta, y = a \sin \theta$ (5)

(b) For $\vec{F} = 4xz\vec{i} + xy z^2\vec{j} + 3z\vec{k}$, evaluate $\int \int_s \vec{F} \cdot d\vec{s}$ where s is the closed surface of a cone $z^2 = x^2 + y^2$ above the xoy plane and bounded by the plane $z=4$ (6)

(c) Evaluate $\int \int_s \text{curl } \vec{F} \cdot \hat{n} \cdot ds$ for the surface of a hemisphere $x^2 + y^2 + z^2 = a^2$ above the xoy plane, where $\vec{F} = (x^2 + y - 4)\vec{i} + 3xy\vec{j} + (2xz + z^2)\vec{k}$ (6)

University of Pune
[4362]-118
S. E. Examination-2013
Mech/ Mech SW/ Auto
ELECTRICAL TECHNOLOGY
(2008 Pattern)

[Time : 3 Hours]

[Max. Marks : 100]

Instructions :

- (1) Answer **Q1 or Q2, Q3 or Q4, Q5 or Q6** from section I and **Q7 or Q8, Q9 or Q10, Q11 or Q12** from section II.
- (2) Answers to the **two sections** should be written in **separate answer-books**.
- (3) Black figures to the right indicate full marks.
- (4) Neat diagrams must be drawn wherever necessary.
- (5) Use of non-programmable pocket size scientific calculator is allowed.
- (6) Assume suitable data, if necessary.

SECTION I

Q1 a) Show that in the two-wattmeter method of power measurement, the power consumed by a balanced 3-ph. Load with lagging power factor of 0.866 equals the sum of the two wattmeter readings. 6

b) What are requirements of a good lighting scheme? State two examples of special purpose lighting. 6

c) Explain use of CT and PT for measurement of power in single phase system with the help of neat sketch. 6

OR

Q2 a) Explain one wattmeter method for measurement of reactive power in three-phase circuit with the help of suitable sketch and phase or diagram. 6

b) What are objectives of Tariff? Explain TOD tariff. 6

c) The power in a 3-phase circuit is measured by two wattmeters. If the total power is 100 KW and power factor is 0.66 leading; what will be the reading of each wattmeter? For what p.f. will one of the wattmeter read zero? 6

Q3 a) Derive an expression for the torque developed by an induction motor under running conditions. Hence obtain the condition for maximum torque developed. 8

b) Discuss the role of various components of typical distribution transformer substation with the help of single line diagram. Also write the specifications of a distribution transformer. 8

OR

Q4 a) Discuss three phase transformer connections with the help of suitable diagrams. Comment on their possible applications. 8

b) The power input to the rotor of a 440V, 50Hz, 6-pole, 3-phase induction motor is 100 KW. The rotor electromotive force is observed to make 120 cycles per minute. Calculate: 8

i) rotor speed

ii) mechanical power developed

iii) rotor copper loss per phase

iv) rotor resistance per phase if rotor current is 60 A.

Q5 a) What is principle of working of split-phase induction motor? Explain the operation of capacitor start motor and state its applications. 8

b) Discuss the concept of synchronous reactance and synchronous impedance in case of an alternator on load. Draw and explain phasor diagram of a loaded alternator. 8

OR

Q6 a) Explain construction and working of shaded pole type induction motor with the help of suitable sketches. State its applications. 8

b) A 3-phase, 600 KVA alternator has a rated terminal voltage of 3300V. The stator winding is star-connected and has a resistance of $0.37 \Omega/\text{phase}$ and a synchronous reactance of $4.3 \Omega/\text{phase}$. Calculate the voltage regulation for full load at a power factor of (i) unity and (ii) 0.8 lagging. 8

SECTION-II

Q7 a) Explain any two types of DC motors with the help of its circuit diagram and write their Voltage and Current relations. 6

b) Write short Note on 12

i) Stepper Motor

ii) A.C. Servo Motor

OR

Q8 a) A 250 Volts D.C. Shunt motor is running at a Speed of 1000 r.p.m. and drawing 8 amps. Current at NO LOAD. Motor armature resistance $R_a=0.2 \text{ ohms}$ and Field resistance $R_{sh}=250 \text{ ohms}$. Calculate the speed when motor is taking a Current of 51 amps. Assume constant flux. 6

b) Explain construction of D.C. motor with neat sketch. 6

c) Explain the significance of the name 'Universal Motor' and which motor can be developed as Universal motor some design changes and How? 6

Q9a) Enlist various turn ON methods of SCR and explain best suited method for operation. 6

- b) Explain V-I characteristics of TRIAC 6
- c) Draw the Symbols of i) SCR ii)DIAC iii)MOSFET iv)IGBT 4

OR

- Q10 a) Explain the construction & working of MOSFET 6
- b) Draw the V-I characteristics of SCR & show Holding Current, Latching Current and on state Voltage drop of SCR on it. 6
- c) State applications of TRIAC and SCR 4
- Q11a) Explain the need of constant V/F ratio in the speed control of Induction motor? 6
- b) Explain the importance of speed torque characteristics in the selection of the drive (give suitable examples) 6
- c) State any four advantages of ELECTRICAL drives 4

OR

- Q12 a) Explain single phase full converter Fed D.C. drive with suitable diagrams. 6
- b) Write short note on Factors governing selection of the drives. 6
- c) State working principle of frequency control of three phase induction motor 4

UNIVERSITY OF PUNE
[4362]-131
S. E.(Production Engineering.)Examination - 2013
HEAT AND FLUID ENGINEERING
(2008 Pattern)

[Total No. of Questions:]
[Time : 3 Hours]

[Total No. of Printed Pages :4]
[Max. Marks : 100]

Instructions :

- (1) Answers three questions from Sections I and three questions from Section II.*
 - (2) Answers to the two sections should be written in separate answer-books.*
 - (3) Black figures to the right indicate full marks.*
 - (4) Neat diagrams must be drawn wherever necessary.*
 - (5) Use of logarithmic tables, slide rule, Mollier charts, electronics pocket calculator is allowed.*
 - (6) Assume suitable data, if necessary.*
-

SECTION-I

- Q1 a) Classify the following fluids. [5]
- i) Water
 - ii) Sugar solution
 - iii) Printer's ink
 - iv) Air glycerine
 - v) Molten metal
- b) A rectangular plate of 0.50m x 0.50m dimensions weighing 500 N [8]
slides down an inclined plane making 30° angle with horizontal, at a
velocity of 1.75 m/s, if the 2 mm gap between the plate and inclined
surface is filled with a lubricating oil, find its viscosity in N.s/m²
- c) Explain briefly the following [5]
- i) Surface tension
 - ii) Capillarity
 - iii) Vapour pressure
 - iv) Cavitation
 - v) Cohesion and adhesion

OR

- Q2 a) State and prove 'Pascal's Law' [5]
b) What is the significance of metacentric height? For rotational stability [8]
is it enough that the floating body has as large a metacentric height as possible? Explain.
c) Suggest manometric arrangement to measure a pressure difference [5]
of i) 50 N/m^2 ii) 20 kN/m^2 between two points along a pipe carrying water. How will the arrangement differ if the pipe carries air?
- Q3 a) Differentiate between the Eulerian and Lagrangian methods of [6]
representing fluid flow.
b) In a fluid, the velocity field is given by [10]
$$\mathbf{v} = (3x + 2y)\mathbf{i} + (2z + 3x^2)\mathbf{j} + (2t - 3z)\mathbf{k}$$

Determine:
i) The velocity components u, v, w at any point in the flow field
ii) The speed at point $(1, 1, 1)$
iii) The speed at time $t = 25$ at point $(0, 0, 2)$
Also classify the velocity field as steady, or unsteady,
uniform or non uniform and one, two or three dimensional

OR

- Q4 a) What is a Pitot tube? How is it used to measure velocity of flow at [6]
any point in a pipe or channel?
b) Describe an orifice meter and find an expression for measuring [6]
discharge of fluid through a pipe with this device.
c) What are the limitations of Bernoulli's equation? [4]
- Q5 a) Describe Buckingham's method or π theorem to formulate a [10]
dimensionally homogenous equation between the various physical quantities effecting a certain phenomenon.
b) Draw a neat sketch of the Reynolds apparatus, and explain how [6]
the laminar flow can be demonstrated with the help of the apparatus.

OR

- Q6 a) Derive Darcy-Weisbach formula for calculating loss of head due [6]
to friction in a pipe
b) What is meant by water hammer? Derive an expression for the rise [10]
of pressure when the flowing water in a pipe is brought to rest by closing the valve gradually.

SECTION-II

- Q7 a) Describe proximate analysis and ultimate analysis and their relevance [6]
b) Describe calorific values of fuel and its measurement [6]
c) What do you understand by fuel? Describe different types of fuel. [6]

OR

- Q8 a) Classify the boilers and briefly describe each type of them [6]
b) Describe superheater, economizer, and preheater with neat sketches. [6]
also indicate suitable location of these on a boiler with line diagram. [9]
c) Differentiate between fire tube and water tube boilers [3]
- Q9 a) Explain reversed Carnot cycle and its limitations. [6]
b) In a refrigerator working on Bell Coleman cycle the air enters [10]
compressor at 1 bar and (-10°C) and gets compressed upto 5.5 bar.
Compressed air is cooled to 27°C at same pressure before being sent to
expander for expansion upto 1bar and then passes through refrigerated
space. Determine refrigeration capacity power required to run
compressor and COP of system if air flow rate is 0.8 kg/s.

OR

- Q10 a) Explain sensible heating and sensible cooling on –psychrometric [4]
Chart.
b) Write short notes on relative humidity, specific humidity, dry bulb [5]
temperature, dew point temperature, wet bulb temperature.
c) Classify refrigerants and list desired properties of refrigerants. [7]
- Q11 a) Write short notes on the following: [6]
i) Free air delivery
ii) Volumetric efficiency
iii) Air flow rate measurement in reciprocation compressors.
b) What do you understand by multistage compression? What are [6]
its merits over single stage compression?
c) Discuss the significance of intercooling upon the performance of [4]
multistage compression.

OR

- Q12 a) Write short notes on the following: [9]
- i) Brake power,
 - ii) Indicated Power,
 - iii) Brake specific fuel consumption,
 - iv) Indicated specific fuel consumption,
 - v) Brake mean effective pressure,
 - vi) Indicated mean effective pressure,
 - vii) Mechanical efficiency
 - viii) Brake thermal efficiency
 - ix) Indicated thermal efficiency
- b) Draw and explain diesel and otto cycles. [7]

UNIVERSITY OF PUNE
[4362]-132
S. E. (Production) Examination - 2013
STRENGTH ANALYSIS OF MACHINE ELEMENTS
(2008 Pattern)

[Total No. of Questions :12]
[Time : 3 Hours]

[Total No. of Printed Pages :6]
[Max. Marks : 100]

Instructions :

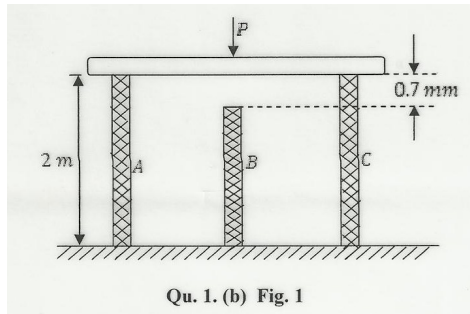
- (1) Answer **any one** question from each unit of section I & section II respectively.*
 - (2) Answers to the **two sections** should be written in **separate answer-books**.*
 - (3) Black figures to the right indicate full marks.*
 - (4) Neat diagrams must be drawn wherever necessary.*
 - (5) Use of non-programmable electronic pocket calculator is allowed.*
 - (6) Assume suitable data, if necessary.*
-
-

SECTION-I

UNIT-I

- Q1 a) State and explain the Hooke's law for tri-axial state of stresses. 6
- b) A rigid steel plate as shown in **Fig.1** is supported by three posts A, B and C of high strength concrete each having 200 mm X 200 mm square cross section and length 2m. Before the load 'P' is applied the middle post 'B' is shorter than the other two by an amount $\delta = 0.7$ mm. Determine the maximum load P if modulus of

elasticity of concrete is 30 Gpa and allowable stress in compression is 18Mpa.



10

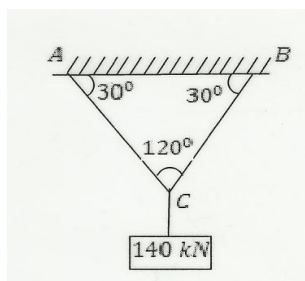
OR

Q2 a) Derive the expression for change in length for a steel rod of diameter d , length L and specific weight w , hanging freely under its own weight. Hence obtain the total elongation of a rod of diameter 90mm, length 5 m and specific weight 80 kN/m^3 , hanging freely and subjected to an axial pull of 50kN at its lower end. Assume $E = 210 \text{ GPa}$.

8

b) Two steel rods AC and BC each 6 m long are connected at C as shown in **Fig. 2**. A load of 140 kN is hung from C, if the permissible stress in the rods is 100 MN/m^2 , determine the diameter of the rods. Also calculate vertical displacement of point C. $E = 200 \text{ GPa}$.

8

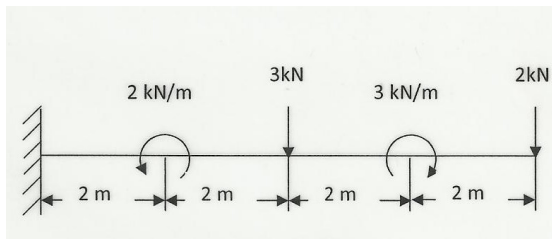


UNIT-II

Q3 a) In a simply supported beam, the two supports are 5 m apart. The beam is 8 m long with two overhangs of 2 m and 1 m on the left hand and the right hand sides respectively. The beam carries concentrated loads of 40kN at the left hand end, 40 kN at 4 m, 20kN at 6m both from the left and 20 kN at the right end of the beam. Draw shear force and bending moment diagrams for the beam.

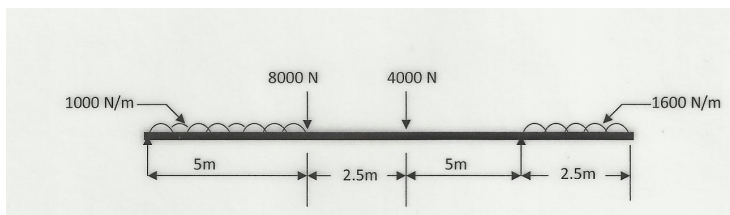
10

b) Find the reaction at the fixed end of the cantilever loaded as shown in **Fig.3**. Also draw the shear force diagram and bending moment diagram for the beam. 8

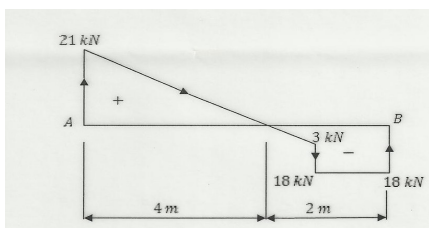


OR

Q4 a) Draw shear force and bending moment diagrams for the beam shown in the **Fig. 4**. Locate the point of contra-flexure. 8



b) For a simply supported beam AB the shear force diagram is as shown in **Fig. 5**. Draw bending moment diagram and load diagram for this beam. 10



UNIT-III

Q5 a) Define precisely the following 6

- i. Pure bending
- ii. Moment of resistance
- iii. Section modulus

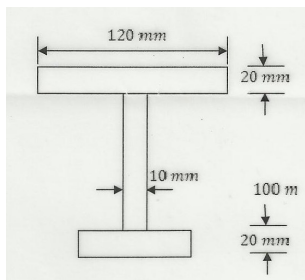
b) A timber beam is simply supported at the ends and carries a concentrated load at mid span. The maximum longitudinal stress is σ_{max} and the maximum shearing stress is T_{max} . Find the ratio of span to depth of beam ignoring the self-weight of the beam.

10

OR

Q6 a) Compare the section moduli of two beams of the same weight and length if the first is a solid circular beam of diameter D and the second is a circular tube of outer diameter D_1 and inner diameter D_2 . 6

b) The cross section of a cantilever bracket is 'I' section as shown in **Fig. 6**. The top flange is 120 mm X 20 mm, bottom flange is 40 mm X 20 mm and web is 10 mm thick and 160 mm deep. If in bending the tensile stress is not to exceed 90 MPa and the compressive stress is not to exceed 143 MPa, determine the moment of resistance of the section. If the length of bracket is 1.2 m, find maximum value of vertical point load that can support at its free end. 10



SECTION-II

UNIT-IV

Q7 a) Show that in a direct stress system, the maximum shear stress in a body is half the magnitude of the applied stress. 8

b) A piece of material is subjected to two perpendicular tensile stresses of 300 MPa and 150 MPa. Determine the normal and shear stress components on a plane, the normal of which makes an angle of 40° with the 300 MPa stress. Also, find the resultant. 8

OR

Q8 a) What is strain energy of a material? Derive the expressions for the strain energy in different forms. 8

b) A 10 mm diameter mild steel bar of length 1.5 m is stressed by a weight of 120 N dropping freely through 20 mm before commencing to stretch the bar. Find the maximum instantaneous stress and the elongation produced in the bar. Take $E=2 \times 10^5 \text{ N/mm}^2$. 8

UNIT-V

Q9 a) Develop the torsion equation, and discuss its assumptions and limitations. 8

b) Determine the diameter of a solid shaft which will transmit 90 kW at 160 rpm if the shear stress in the shaft is limited to 60 N/mm^2 . Find also the length of the shaft, if the twist must not exceed 1° over the entire length. Take $c=8 \times 10^4 \text{ N/mm}^2$.

10

OR

Q10 a) A solid aluminum shaft 1 m long and 50 mm diameter is to be replaced by a tubular steel shaft of the same length and the same outside diameter (i.e. 50 mm) such that each of the two shafts could have the same angle of twist per unit torsional moment over the total length. What must the inner diameter of the tubular shaft be? Modulus of rigidity of steel is three times that of aluminum. 10

b) A hollow shaft with external and internal diameters of 120 mm and 80 mm respectively is to be replaced by a solid shaft of the same weight. Find the torques transmitted by the shafts if the permissible shear stress is 100MPa. If the solid shaft is replaced by a hollow shaft of 160 mm external diameter, what is the torque transmitted for the same weight of the shafts? 8

UNIT-VI

Q11 a) A simply supported beam has a span of 15 m and carries two point loads of 4 kN and 9 kN at 6 m and 10 m respectively, from one end. Find the deflection under each load and the maximum deflection. $E=200 \text{ GPa}$ and $I= 400 \times 10^6 \text{ mm}^4$.

8

b) State and develop the analogies between the real beam and the conjugate beam.

8

OR

Q12 a) What is meant by equivalent length of columns? What are its values for different end conditions of columns? 6

b) A straight cylinder bar of 10 mm diameter and 1.5 m long is freely supported at its two ends in a horizontal position. It is loaded with a concentrated load of 150 N at the center when the center deflection is observed to be 6 mm. If placed in the vertical position and loaded vertically, what load would cause it to buckle? Also find the ratio of the maximum stress in the two cases. 10

UNIVERSITY OF PUNE
[4362]-133
S. E. Examination – 2013
MACHINE TOOL OPERATIONS
[S.E PRODUCTION 2008 COURSE]

[Time : 3 Hours]

[Max. Marks : 100]

Total No. of Questions : 12

[Total No. of Printed Pages :2]

Instructions :

- (1) Answer **any three** questions from each section.*
- (2) Use separate answer sheets for each section.*
- (3) Assume suitable data, if required.*

SECTION-I

- Q.1 a) Explain taper turning methods with suitable sketches [10]
b) Explain various types of centers, catch plats & carriers, faceplates & angle plates with suitable sketches. [8]

OR

- Q.2 a) Explain working of Tailstock with suitable sketch. [6]
b) Explain steady rest & follower rest with suitable sketch. [6]
c) Draw a sketch of single point turning with various angles associated with it. [6]
- Q.3 a) Explain various types of operations performed on drilling machine with suitable sketches [8]
b) Explain types of drill with suitable sketches. [8]

OR

- Q.4 a) Discuss specification used to specify drilling & boring machines. [8]
b) Explain multiple spindle & gang drilling machine with suitable sketches. [8]
- Q.5 a) Discuss methods of indexing. [8]
b) Explain any four milling cutters with suitable sketches. [8]

OR

- Q.6 a) Explain cam milling with suitable sketches. [8]

- b) Calculate indexing for 64 divisions, Hole circles available are-
Plate I – 15,16,17,18,19,20
Plate II – 21,23,27,29,31,33
Plate III – 37,39,41,43,47,49 [8]

SECTION –II

Q.7 a) Explain Whitworth quick return mechanism used in shaper with suitable sketch. [8]

b) Discuss classification of broaching machines on the basis of methods of operations. [5]

c) Explain, how to specify shaper & planer. [5]

OR

Q.8 a) Explain working of crank & slotted link mechanism with suitable sketch. [8]

b) Draw geometry of broach tool. [5]

c) List advantages & disadvantages of broaching operation. [5]

Q.9 a) Discuss internal centerless grinding with suitable sketches [8]

b) Explain types of bonds used in grinding wheel. [8]

OR

Q.10 a) Explain factors to be considered in selection of grinding wheels. [8]

b) Explain the terms grit, grade and structure used in grinding the terms loading. [8]

Q.11 a) Explain lapping with suitable sketches. [8]

b) Explain metal spraying with suitable sketch. [8]

OR

Q.12 Write short notes on the following [16]

i) Buffing.

ii) Super finishing.

iii) Hot dipping.

[Total No. of Printed Pages: 6]

[4362]-135

(Theory Of Machines) (2008 Pattern)

[Max. Marks: 100]

S:

- 1 **Answer** three questions from section I and three questions from section II.
- 2 Answers to the **two sections** should be written in **separate answer-books**.
- 3 Neat diagrams must be drawn wherever necessary.
- 4 Assume suitable data, if necessary.
- 5 Use of logarithmic tables, slide rule, Mollier charts, electronics pocket calculator is allowed

| | | | |
|-----|---|--|-----|
| Q.1 | A | Describe briefly the function of Elliptical Trammel. | [4] |
| | B | What is kutzbach's criterion for degree of freedom of plane mechanisms? In what way is gruebler's criterion different from it? | [6] |
| | C | What is meant by Equivalent mechanisms? | [6] |

Q.2 A What do you mean by a pantograph and what are its uses? [4]

 B Name the two different types of steering Gear mechanism. [4]

 What are their merits and demerits?

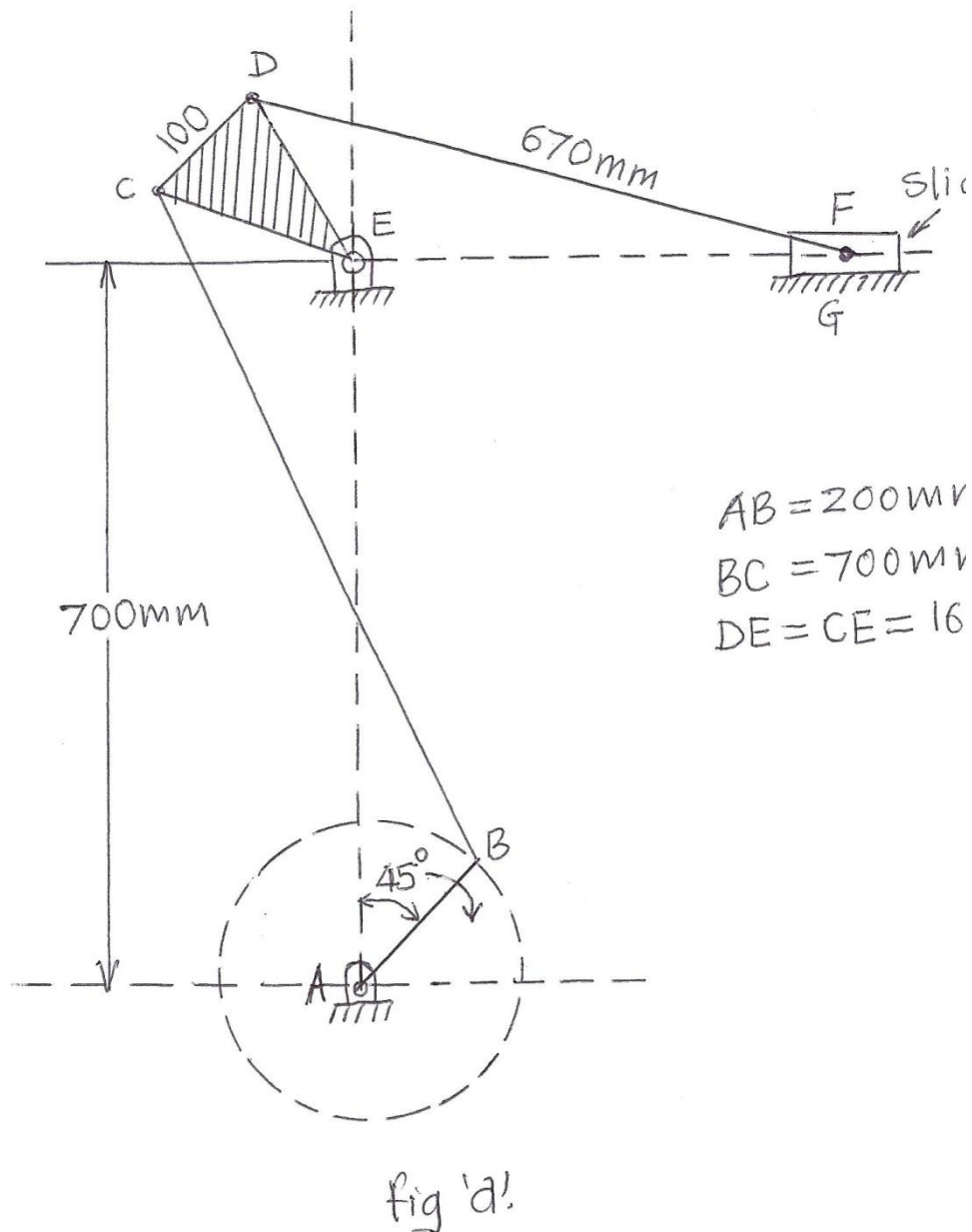
 C Describe various inversions of a slider-crank mechanism [8]

 giving examples.

- Q.3 A Explain the procedure to decide direction of coriolis component of Acceleration. [4]
- B Describe the method of drawing the velocity & acceleration diagram for a slider-crank mechanism [6]
- C The length of the crank & connecting rod of a reciprocating engine are 100mm and 400mm respectively. The crank is rotating at a uniform speed of 240 rpm. Using klein's construction [8]
- i) The acceleration of a piston.
- ii) The acceleration of the middle point of the connecting rod.
- iii) Angular acceleration of connecting rod when the crank has turned through 45° from inner Dead Centre.

OR

- Q. 4 A A rigid link AB is rotating anticlockwise about point A about point a with angular velocity ' ω ' and angular acceleration ' α ' Describe the method of drawing the acceleration diagram and find the total acceleration of 'B' w.r.to 'A' [4]
- B The crank AB of the mechanism shown in fig 'a' is rotating with a speed of 30rpm [14]
- i) Draw velocity and acceleration diagram
- ii) Find the linear acceleration of slider F.
- iii) Find the angular acceleration of links BC, CED and FD



- Q. 5 A How is tribology useful in the conservation of energy? [5]
- B Instead of providing lubrication between two rubbing surfaces, is it advisable to improve the surface finish of the two surfaces to reduce friction? [5]
- C What is friction instability and how it is related to stick slip process? [6]

OR

- Q. 6 A What are the science-subject whose knowledge is required for tribology? [4]
- B How does lubrication help in reducing the coefficient of friction? [4]
- C What are the main criteria for classification of wear and what are various types of wear? [6]
- D With increase in temperature why does the viscosity of lubricant decreases? [2]

SECTION II

- Q. 7 A Why the slack side of the belt of a horizontal belt drive is preferable to place on the top side? [4]
- B A cross-belt drive is to transmit at 7.5 kw at 1000 rpm of the smaller pulley. The diameter of the smallest pulley is 25cm and velocity ratio is 2. The centre distance between the pulley is 125cm. A flat belt of thickness 6mm and of coefficient friction is 0.3 is used over the pulleys. Determine the necessary width of the belt if the maximum allowable stress in the belt is 175N/cm^2 and density of the belt is 1 gm/cm^3 . [8]
- C Define and explain slip and creep of belt [4]

OR

- Q. 8 A Distinguish between initial tension & centrifugal tension in a belt [4]
- B Determine the maximum power that can be transmitted using a belt of $100\text{mm} \times 10\text{mm}$ with an angle of lap of 160° . [8]
The density of belt is 10^{-3}gm/mm^3 and coefficient of friction may be taken as 0.2

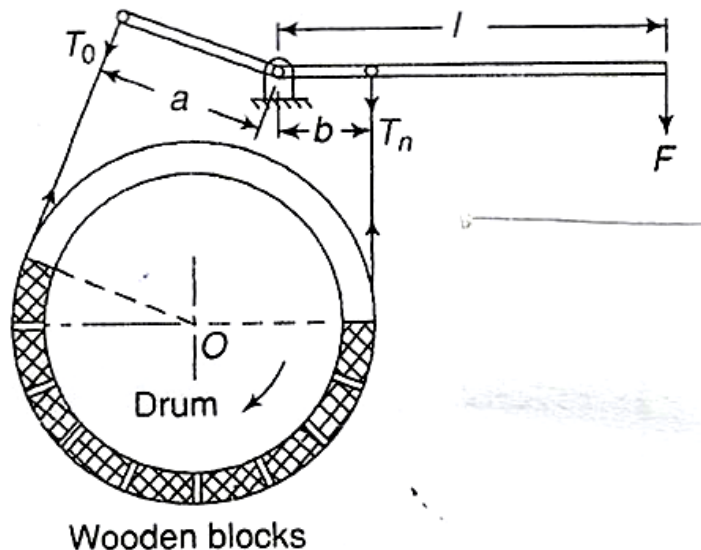
The tension in the belt should not exceed 1.7 N/mm^2 .

- C What are the relative advantages and disadvantages of chain and belt drive? [4]

- Q. 9 A Describe the working of a band and block brake with the help of a neat sketch deduce the relation for ratio of tight and slack side tensions. [6]

- B Differentiate between brakes and dynamometer. [4]

- C A band and block brake has 14 blocks. Each block subtends an angle of 14° at the centre of the rotating drum. The diameter of the blocks is 65mm the two ends of the band are fixed to the pins on the lever at distances of 50mm and 210 mm from the least force required to be applied at the lever at a distance of 600mm from the fulcrum if the power absorbed by the blocks is 180 KW at 175rpm. Coefficient of friction between the block and the drum is 0.35. [6]

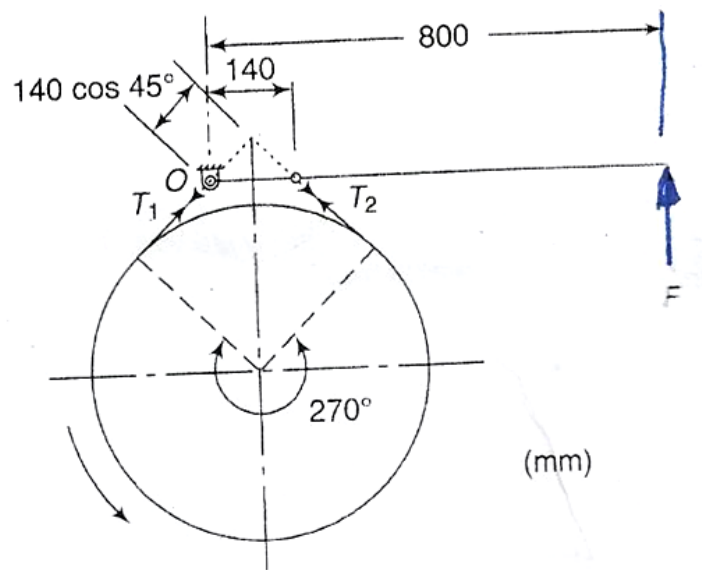


OR

- Q. 10 A Describe the construction and operation of a prony brake absorption dynamometer. [5]

B What is meant by a self locking and self energized brake [3]

C A simple band brake is applied to a drum of 560 mm diameter which rotates at 240 rpm. The angle of contact of a band is 270° . One end of the band is fastened to a fixed pin and the other end to the brake lever, 140mm from the fixed pin. The brake lever is 800mm long and is placed perpendicular to the diameter that bisects the angle of contact. Assuming the coefficient of friction as 0.3, Determine the necessary pull at the end of the lever to stop the drum if 40KW of power is being absorbed. Also find the width of the band if its thickness is 3mm and the maximum tensile stress is limited to 40N/mm^2 [8]



Q. 11 A The length of crank and connecting rod of a horizontal [9]

reciprocating engine are 200mm and 1.0m respectively.

The crank is rotating at 200rpm. When the crank has turned 30° from the inner dead centre, find analytically: i)

Acceleration of the piston ii) velocity of the piston

iii) Angular velocity of the connecting rod and iv) Angular

acceleration of the connecting rod.

B What is meant by a dynamically equivalent system? [6]

C State D'Alembert's principle. [3]

OR

Q. 12 A When and why is the correction couple applied while considering the inertia of the connecting rod of a reciprocating engine? [4]

B A rigid link, 500mm. long, has mass 2kg and radius of gyration 200mm. Replace this link by dynamically equivalent system of two concentrated masses located at the ends of the link. [4]

C Connecting rod has mass 2.5kg. it oscillates 60 times in 50 seconds when suspended from the small end centre. And it will take 45 seconds when it suspended from big end centre. The distance. Between small and centre and big end centre, of the rod is 220mm. Find the position of C.G and moment of inertia of connecting rod about its C.G. [10]

[Total No. of Questions: 12]

[Total No. of Printed Pages: 3]

UNIVERSITY OF PUNE

[4362]-136

S. E. PRODUCTION Examination - 2013

**Welding and Foundry
(2008 Course)**

[Time: 3 Hours]

[Max. Marks: 100]

Instructions:

- 1 Answers to the **two sections** should be written in **separate answer-books***
- 2 Figures to the right indicate full marks.*
- 3 Neat diagrams must be drawn wherever necessary.*
- 4 Assume suitable data, if necessary.*

SECTION -I

Q.1 A Explain with neat sketch Metal Inert Gas (MIG) welding process with its advantages, disadvantages, and applications. 10

 B Explain Voltage-current and Voltage-Arc length Characteristics in Welding. 8

OR

Q.2 A Describe with neat sketches Submerged Arc Welding with its advantages, disadvantages and applications. 10

 B Explain with effect of Direct Current Straight polarity (DCSP) and Direct Current Reverse Polarity (DCRP) on weld bead deposition and heat distribution. 8

- Q. 3 A Distinguish with suitable sketches types of oxyacetylene gas flame. 8
- B How are dissimilar metals welded by resistance welding and which variables of this process are to be considered? 8

OR

- Q. 4 A Describe seam welding with its advantages, disadvantages and applications. 8
- B Compare with neat sketch leftward and rightward gas welding techniques. 8
- Q. 5 A Explain with neat sketch electron beam welding process with its advantages and disadvantages. 8
- B Write short note on explosive welding. 8

OR

- Q. 6 A Write short note on dye penetrant testing of weld. 8
- B Compare soldering and brazing process with respect to flux used, process temperature, joint design and filler metal used. 8

SECTION II

- Q. 7 A With neat sketch explain the construction and operation of a Cupola furnace. 8
- B Write the procedure for permeability test of moulding sand. 8

OR

- Q. 8 A Which are the different ingredients of moulding sand? State their importance during mould making. 8
- B Explain in details various allowances given to the patterns. 8
- Q. 9 A Explain with neat sketch various centrifugal casting processes. 8
- B Differentiate between permanent mould casting and 8

pressure die-casting.

OR

- | | | | |
|-------|---|--|----|
| Q. 10 | A | Explain with neat sketch Investment Casting processes. | 8 |
| | B | Explain various casting defects with their causes and remedies. | 8 |
| Q. 11 | A | Explain with sketch various components of gating system and their functions. | 10 |
| | B | What is riser? How to improve efficiency of it? | 8 |

OR

- | | | | |
|-------|---|--|---|
| Q. 12 | A | Differentiate between pressurized and un-pressurized gating system. | 6 |
| | B | Write note on NRL Method for riser Design. | 6 |
| | C | Using Caine's method calculate the size of cylindrical riser (Height = Diameter) necessary to feed steel slab casting 30x30x5 cm. with side riser, casting is poured horizontally into the mould. Data for steel casting $a = 0.1$, $b = 0.03$ and $c = 1.0$ | 6 |

UNIVERSITY OF PUNE
[4362]-138
S. E.(Production) Examination – 2013
INDUSTRIAL ORGANISATION AND MANAGEMENT
[2008 COURSE]

[Time: 3 Hours]

[Max. Marks: 100]

Total No. of Questions: 12

[Total No. of Printed Pages: 3]

Instructions:

- (1) Answer any **three questions** from each section.
- (2) Answers to the two **sections** should be written in separate **answer-books**.
- (3) Use of the logarithmic table is allowed.
- (4) Neat diagrams must be drawn wherever necessary.
- (5) Assume suitable data, if necessary.

SECTION – I

Unit – I

- Q.1 a) What are limitations of line organization and functional organization? [06]
How does Line and Staff organization overcome these limitations?
- b) Briefly discuss the evolution of management practices with respect to contributions of various people. [10]

OR

- Q.2 a) Explain various basic functions of management. What are the new functions managers have to carry out in today's competitive scenario? [08]
- b) Explain any four types of business organizations with respect to capital raising capacity and liabilities. [08]

Unit-II

- Q.3 a) Explain factors affecting relationship between Efforts → Performance and performance → satisfaction with the help of Lawler and Porter model. [09]

- b) What do you mean by process models of motivations? [09]
Explain $Motivation = Valence \times Expectancy \times Instrumentality$

OR

- Q.4 a) How will you define a group? What is group dynamics? What are different steps formation of a group? [09]

- b) What are various situational variables affecting leadership styles? [09]

Explain Fiedler's contingency theory.

Unit –III

Q.5 a) Explain various elements of business plan. [08]

b) M/s Prefect Tooling is manufacturing a product which is sold for Rs.11.50/unit & the fixed cost of the assets is Rs.50,000/- with a variable cost of Rs.7.50/unit. How many units should be produced to break even? How many units must be produced to earn a profit of Rs.15,000/-? What would be the profit for sales volume of 30,000 units? [08]

OR

Q.6 a) What are basic steps in creative problem solving? [08]

b) The fixed cost for the year 2011-2012 are Rs.2,00,000/-. The estimated sales are Rs.4,00,000/-. The variable cost per unit for single product made is Rs.10.00/-. If each unit sells at Rs.50/- and the number of units involved coincides with the expected volume of output, construct the break-even chart and

- i) Determine B.E.P.
- ii) Determine the profit at a turn-over of Rs.2,80,000/-.
- iii) Find the margin of safety.
- iv) Measure the angle of incidence.

SECTION –II

Unit-IV

Q.7 a) Describe the major decisions involved in developing and advertising program? [08]

b) Define marketing and explain various steps in marketing process. [08]

OR

Q.8 a) Discuss various brand development strategies. [08]

b) Discuss the major factors that influence the buyer behavior. [08]

Unit-V

Q.9 a) Discuss the factors affecting recruitment? What is the difference between recruitment and selection? [08]

b) What is the need for training and development? Explain various types of operative training. [08]

OR

- Q.10 a) Define manpower planning. Explain objectives and benefits of manpower planning [08]
b) Explain various sources of recruitment with its advantages and disadvantages. [08]

Unit-VI

- Q.11a) Define wage. What are various factors affecting wage? Explain Various deduction an employer can do under Payment of wages act. [10]
b) The standard time of a job is 9 Hrs. & hourly rate of payment is Rs.10/-. The worker completes the job 6 Hrs. Calculate bonus & total wages earned by worker by 50-50 Halsey Incentive Plan. Compare above values to bonus & earnings by Rowan plan. Explain advantages & disadvantages of Halsey Incentive Plan. [08]

OR

- Q.12 a) Define the term factory and worker as per Factory's act 1948. Discuss briefly the provisions relating to safety of workers under factory's Act 1948. [10]
b) The workers are paid as per Bedaux plan. The hourly wage rate is Rs.20/-. Standard time for a particular job is 8 hrs. Calculate daily earning of a worker if the job is completed in 6 hrs & 8 hrs respectively. Explain advantages of Bedaux point system. [08]

[Total No. of Questions: 12]

[Total No. of Printed Pages: 2]

UNIVERSITY OF PUNE
[4362]-143-A
S. E. (Production) Examination - 2013
MANUFACTURING PROCESSES-I
(2008 Pattern)

[Time: 3 Hours]

[Max. Marks: 100]

Instructions:

- 1 Attempt one question from each unit from each section –I& section II
- 2 Answers to the two sections should be written in separate answer-books.
- 3 Black figures to the right indicate full marks.
- 4 Neat diagrams must be drawn wherever necessary.
- 5 Assume suitable data, if necessary.

SECTION –I

UNIT I

- | | | | |
|-----|---|--|----|
| Q.1 | A | Explain various types of pattern allowances with suitable sketches | 10 |
| | B | Discuss various types of sands used in moulding processes. | 8 |

OR

- | | | | |
|-----|---|--|----|
| Q.2 | A | Explain construction of cupola. | 10 |
| | B | Explain various types risers with suitable sketches. | 8 |

UNIT II

- | | | | |
|------|---|--|---|
| Q. 3 | A | Explain cold chamber die casting with suitable sketches. | 8 |
| | B | Explain investment casting with suitable sketches. | 8 |

OR

- | | | | |
|------|---|--|---|
| Q. 4 | A | Explain shell moulding with suitable sketches. | 8 |
| | B | Explain continuous casting with suitable sketches. | 8 |

UNIT III

- | | | | |
|------|---|---|---|
| Q. 5 | A | Explain taper turning methods with suitable sketches. | 8 |
| | B | Explain various types of mandrels with suitable sketches. | 8 |

OR

- | | | | |
|------|---|---|---|
| Q. 6 | A | Explain apron mechanism with suitable sketch. | 8 |
| | B | Write note on- | 8 |
| | | i. Working of tailstock with sectional view. | |
| | | ii. Steady rest and follower rest. | |

SECTION II

UNIT IV

| | | | |
|------|---|--|----|
| Q. 7 | A | Explain sensitive drilling machine with neat sketch. | 8 |
| | B | Discuss various types of reamers with neat sketches. | 10 |

OR

| | | | |
|------|---|--|----|
| Q. 8 | A | Explain types of drill with neat sketches. | 8 |
| | B | Explain Jig boring machine with suitable sketch. | 10 |

UNIT V

| | | | |
|------|---|--|---|
| Q. 9 | A | Explain column and knee type milling machine with suitable sketch. | 8 |
| | B | Discuss up milling and down milling with suitable sketch. | 8 |

OR

| | | | |
|-------|---|---|---|
| Q. 10 | A | Explain working of hydraulic shaper mechanism with neat sketch. | 8 |
| | B | Explain any four milling cutters with suitable sketches. | 8 |

UNIT VI

| | | | |
|-------|---|--|---|
| Q. 11 | A | Explain method of mounting of grinding wheel with suitable sketch. | 8 |
| | B | Explain internal centerless grinding with suitable sketches. | 8 |

OR

| | | | |
|-------|--|---------------------------|----|
| Q. 12 | | Write note on- | 16 |
| | | i. Lapping | |
| | | ii. Electroplating | |
| | | iii. Buffing & polishing. | |

UNIVERSITY OF PUNE
(4362)-143B
S.E.(Prod/Prod s/w) Examination - 2013
(2003 Pattern)
INDUSTRIAL ELECTRONICS (204084)

Total No. of Questions :
[Time: 3 Hours]

[Total No. of Printed Pages :3]
[Max. Marks: 100]

Instructions:

- (1) Use of logarithmic tables slide rule, Mollier charts packet calculator and steam tables is allowed.*
 - (2) Answers to the **two section** should be written in separate answer books.*
 - (3) Figures to the right indicate full marks.*
 - (4) Neat diagrams must be drawn whenever necessary.*
 - (5) Answer **any three** questions from each Section.*
 - (6) Assume suitable data, if necessary.*
-

SECTION-I

- Q1.a) Explain the two transistor analogy of S.C.R. [8]
b) Explain various types of protection circuits of power devices. [8]

OR

- Q2. a) Explain: [8]
i) Fan Regulator.
ii) Off-line UPS with the help of suitable diagram.
b) Draw and explain the construction, V-I Characteristics of n-channel MOSFET. [8]

- Q3. a) Draw and explain 4-bit bidirectional shift register. [8]
b) Explain log Amplifier using op-amp. [8]

OR

Q4.a) Draw and explain square wave generator using Op-amp. Sketch the output waveform and waveform across Capacitor. [8]

b) Draw block schematic of A.C. motor. Explain the procedure to control the speed. [8]

Q5. a) What are various types of stepper motor? Can we use stepper motor in Robotics ARM control? Justify your answer & mention various application of stepper motor in industries. [10]

b) State and explain area of electronics control for automatic resistance-welding Sequence. [8]

OR

Q6. Write note on: [18]

i) Fuzzy logic controller.

ii) Fan Regulator

iii) PLC

SECTION-II

Q7. a) Explain the following with block diagram. [8]

i) Temperature Controller.

ii) Ultrasonic level measurement

b) Explain with neat diagram how displacement can be measured using LVDT. [8]

OR

Q8. a) How vibrations can be measured using transducer explain in detail. [8]

b) Draw and explain the response of first order system to a step input. [8]

Q9.a) State the advantages of Laplace transform technique in solving linear differential equation. [4]

b) For the first order system find out output of the system, when input applied to the system in unit ramp. [8]

c) Explain photoelectric tachometer for measurement of angular velocity. [4]

OR

Q10. a) State and explain the following specifications of a first order system. [8]

i) Rise time ii) Time Constant

iii) Delay Time iv) Percentage overshoot.

b) Explain the performance of second order system to step second order system to step input. Comment on overshoot. [8]

Q11. Write short notes on:

[18]

- a) DAS
- b) Robotics
- c) Scada

OR

Q12. Write short note on:

[18]

- a) DCS
- b) Adaptive Supervisory control system.
- c) Thermal Power plant.
