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 from
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]

UNIVERSITY OF PUNE
[4362]-142
S. E. (Production) S/W (Second Semester)
Examination-2013
Production and Industrial Management-I
(2008 Pattern)

Total No. of Questions : 12   [Total No. of Printed Pages :3]
[Time : 3 Hours]   [Max. Marks : 100]

Instructions :

(1) Attempt four questions: Q.no.1 or 2, Q.no.3 or 4, Q.no.5 or 6 from section-I and Q.no.7 or 8, Q.no.9 or 10, Q.no11 or 12 from section-II
(2) Figures to the right indicate full marks.
(3) Assume suitable data, if necessary.
(4) Neat diagram must be drawn wherever necessary.
(5) Use of electronic non-programmable calculator and steam tables is allowed.

SECTION-I

Q1.

a) Explain the following in detail.   [8]
   1) Objective of Scientific Management
   2) Types of Management
b) List out single line 14 Principle of H.Fayol. Explain any two in detail   [8]

OR

Q2.

a) Explain the concept of Group Dynamics in detail along with example.   [8]
b) Explain the role of Co-operative firms in the development of Indian Economy   [8]

Q3.

a) Explain the role Industrial Engineer in typical Manufacturing Industry.   [8]
b) Explain various types of production system along with example.   [8]

Q4. Write a short note on following. (Any four)   [16]
   1) Types of maintenance.
   2) Production planning & Control
   3) Factors affecting the plant layout
   4) Various Factor affecting Productivity
   5) History of Industrial Engg.

Q5.
   a) Define method study. Explain the steps involved in method study.   [8]
   b) State different Charts used in Method Study. Explain any two charts in detail
      along with example.   [10]

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

Q6.
   a) Explain the role of motion and picture analysis in method study.   [6]
   b) Importance of Bi-mechanical Cycle in Ergonomics   [6]
   c) Explain the importance of ergonomics in Indian industry   [6]

<div align="center">SECTION-II</div>

Q7.   a) Define Time Study Explain steps involve in it?   [8]
      b) Following observation are taken during stop watch time study(min)   [10]

Cycle Element	1	2	3	4	5
1	0.15	0.13	0.12	0.20	0.22
2	0.60	0.60	0.59	0.61	0.56
3	0.33	0.25	0.36	0.38	0.32
4	0.52	0.49	0.55	0.49	0.49
5	0.23	0.26	0.26	0.23	0.27

      Performance Rating was 100 Calculate the following.
Calculate Standard Time fatigue and another allowance as 15% of normal time
   1) Element no 2 and 4 are machine element.
   2) Calculate rate of production per shift of 8 hrs with 30min break.

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

Q8. Write a short note on following (any three)   [18]
   1) Allowances used in Time Study.
   2) MOST
   3) Basic Motion Time study
   4) Criticism in time study

Q9.
  a) Define Motivation List out the different theories of Motivation explain in detail any one along with example. [10]
  b) Write a short note on Human Needs. [6]

                                      OR

Q10. Write a short note on the following (any four) [16]
  a) Role of Motivation theories in Manufacturing Industry
  b) Styles of leadership
  c) Role of leader in Indian Industry.
  d) Qualities of Good Entrepreneur

Q11.
  Explain the concept of job evaluation and Merit Rating [8]
   along with Example.
  Explain the various function of HR department. [8]

                                      OR

Q12.
  a) With reference following data [8]
    1) Fixed cost = Rs 40,000
    2) Variable Cost = Rs 2/- Unit
    3) Selling Price = Rs=10/- Unit Calculate the following
        i.   Break-even Point
        ii.   Profit When Sales are Rs 1,00,000/-
        iii. Sales when it is desirable to earn profit of Rs. 30,00/-
           Also Draw the break even Chart.
  b) Explain the following in detail. [8]
    1) Various Types of Costs.
    2) Source of Finance.

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

   (ii) $(D^4 - m^4) y = sinmx$

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

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

(b)If $\dfrac{dx}{dt} - w\, y = a\cos pt$
        (5)

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

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

1

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

OR

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

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

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

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

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

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

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

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

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

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

$$= 0 \quad x > 1$$

OR

Q.4

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

2

(i) $\dfrac{1}{\left(S^2+4\right)^2}$ (ii) $\dfrac{S^2+2}{S\left(S^2+4\right)}$ (iii) $\cot^{-1}(S-1)$

(b) Evaluate by using Laplace transform   (4)

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

(c) Show that Fourier transform of   (4)

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

Q.5
(a) A tightly streched string with fixed ends at x=o & x=l is initially in a position given

by $y(x,0)=Y_0\sin^3\left(\dfrac{\pi x}{l}\right)$ 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 $\dfrac{\partial^2 y}{\partial t^2}=c^2\dfrac{\partial^2 y}{\partial x^2}$ (8)

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

   (i) u(x,t) is bounded
   (ii) u(0,t)=0
   (iii) u(l,t)=0
   (iv) $u(x,0)=\dfrac{u_0 x}{l}\ o\le x\le l$

<center>OR</center>

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=o

is given by u(x,0)=100 $\sin\left(\dfrac{\pi x}{10}\right)$ $0\le x\le 10$ .while the two edges at x=0 & x=10 as

well as the other short edge are kept at 0^0 C.Find steady state temperature u(x,y).if it

satisfies $\dfrac{\partial^2 u}{\partial x^2}+\dfrac{\partial^2 u}{\partial y^2}=0$ (9)

(b) Use fourier transform to solve   (8)

$$\dfrac{\partial u}{\partial t}=\dfrac{\partial^2 u}{\partial x^2}\qquad 0\le x\le\infty,t>0$$

<center>3</center>

(a)u(0,t)=0 t >0
(b)u(x,0)=1 0<x<1
          =0 n>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, $\mu'_1=2, \mu'_2=20, \mu'_3=40$ and $\mu'_4=50$,
 (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 arithmatic 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.
   $A_1=0.43, z_1=1.48, A_2=0.39, z_2=1.23$ (6)

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)   (6)

(b)With usual notation ,show that   (6)

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

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

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

OR

Q.10

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

  show that $\bar{r}$ has constant direction

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

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

Q.11

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

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

(b)Using divergence theorem,evaluate

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

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

Q.12

(a)Using Green's theorem, show that the area bounded by a simple closed curve C is

given by $\frac{1}{2}\int x\,dy - y\,dx$ Hence find the area of the circle $x=a\cos\theta, y=a\sin\theta$ (5)

(b)For $\bar{F}=4\,xz\,\bar{i}+xy\,z^2\,\bar{j}+3\,z\,\bar{k}$,evaluate $\int\int_{s} \bar{F}.d\,\bar{s}$ 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 $\int\int_{s} curl\,\bar{F}.\hat{n}.ds$ for the surface of a hemisphere $x^2+y^2+z^2=a^2$ above the

xoy plane,where $F=(x^2+y-4)\bar{i}+3xy\,\bar{j}+(2xz+z^2)\bar{k}$ (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 1 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 Ω/phase and a synchronous reactance of 4.3 Ω/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 Ra=0.2 ohms and Field resistance Rsh=250ohms. Calculate the speed when motor is taking a Current of 51 amps. Assume constant flux.   6

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

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

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

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

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 section of the drive (give suitable
examples)   6

c) State any four advantages of ELECTRICAL drives   4

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

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:]   **[Total No. of Printed Pages :4]**
[Time : 3 Hours]   **[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/m^2

    c) Explain briefly the following   [5]
        i) Surface tension
        ii) Capillarity
        iii) Vapour pressure
        iv) Cavitation
        v) Cohesion and adhesion

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 Langragian methods of [6]
representing fluid flow.

b) In a fluid, the velocity field is given by [10]
v=(3x+2y)i+(2z+3x^2)j+(2t-3z)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, due 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]   [Total No. of Printed Pages :6]

[Time : 3 Hours]   [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 Χ 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 δ =0.7 mm. Determine the maximum load P if modulus of

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


Qu. 1. (b) Fig. 1
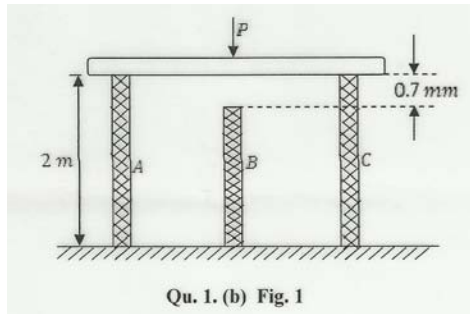
10

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/m³, hanging freely and subjected to an axial pull of 50kN at its lower end. Assume E = 210 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/m², determine the diameter of the rods. Also calculate vertical displacement of point C. E = 200 GPa.   8
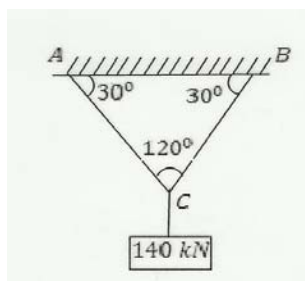
UNIT-II

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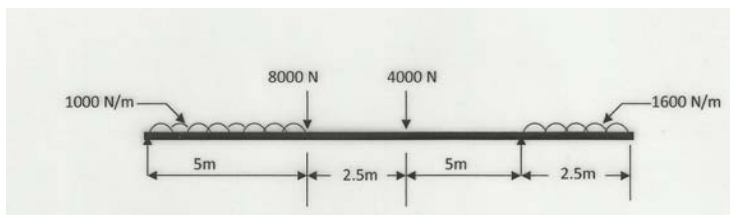
b) Find the reaction at the fixed end of the cantilever loaded as shown in **Fig.3.**
Also draw the shear force diagram and bending moment diagram for the beam.   8
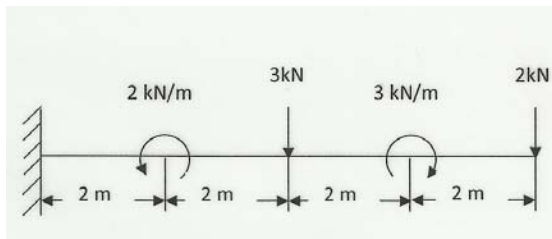
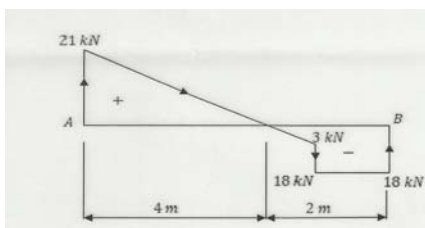
OR

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 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 and the second is a circular tube of outer diameter D1 and inner diameter D2.   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
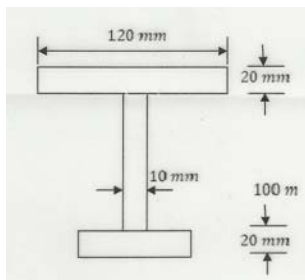
SECTION-II

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 300MPa 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 x 10^5 N/mm². 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/mm². Find also the length of the shaft, if the twist must not exceed 1° over the entire length. Take c=8 X 104 N/mm².

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 4kN 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 GPa and I= 400 x 10^6 mm⁴.

8

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

8

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

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]-135
S. E. (Prod/Prod S/w) Examination - 2013
(Theory Of Machines) (2008 Pattern)

[Time: *4* **Hours]**   **[Max. Marks: 100]**

Instruction 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*

SECTION -I

Q.1   A   Describe briefly the function of Elliptical Trammel.   [4]

      B   What is kutzback'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]

OR

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

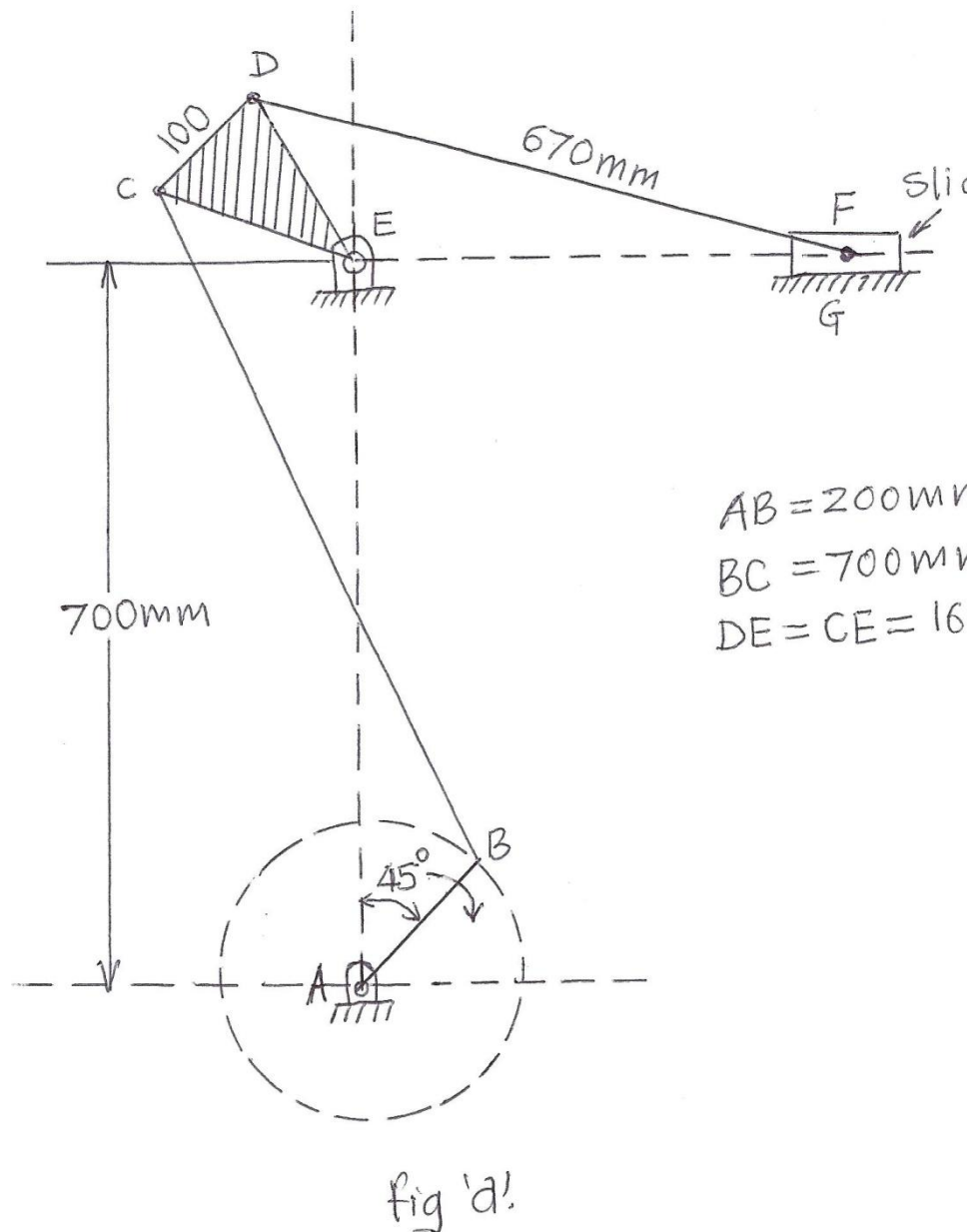   B   Name the two different types of steering Gear mechanism. What are their merits and demerits?   [4]

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

Q.3 A Explain the procedure to decide direction of coriolis [4]
component of Acceleration.

B Describe the method of drawing the velocity & acceleration [6]
diagram for a slider-crank mechanism

C The length of the crank & connecting rod of a reciprocating [8]
engine are 100mm and 400mm respectively. The crank is
rotating at a uniform speed of 240 rpm. Using klein's
construction

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 [4]
about point a with angular velocity 'w' and angular
acceleration '∝' Describe the method of drawing the
acceleration diagram and find the total acceleration of 'B'
w.r.to 'A'

B The crank AB of the mechanism shown in fig 'a' is rotating [14
with a speed of 30rpm

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

fig 'a'

The figure shows the following labels and dimensions:
- D, C, 100, E (with hatched triangle CDE region)
- 670mm (line from D to F)
- F, Slic (slider at right)
- G
- 700mm (vertical dimension)
- 45°, B, A
- AB = 200 mr
- BC = 700 mr
- DE = CE = 16

Q. 5   A   How is tribology useful in the conservation of energy?   [5]

B   Instead of providing lubrication between two rubbing   [5]
surfaces, is it advisable to improve the surface finish of the
two surfaces to reduce friction?

C   What is friction instability and how it is related to stick slip   [6]
process?

Q. 6   A   What are the science-subject whose knowledge is required   [4]
            for tribology?

       B   How does lubrication help in reducing the coefficient of   [4]
            friction?

       C   What are the main criteria for classification of wear and   [6]
            what are various types of wear?

       D   With increase in temperature why does the viscosity of   [2]
            lubricant decreases?

SECTION II

Q. 7   A   Why the slack side of the belt of a horizontal belt drive is   [4]
            preferable to place on the top side?

       B   A cross-belt drive is to transmit at 7.5 kw at 1000 rpm of   [8]
            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.

       C   Define and explain slip and creep of belt   [4]

OR

Q. 8   A   Distinguish between initial tension & centrifugal tension in   [4]
            a belt

       B   Determine the maximum power that can be transmitted   [8]
            using a belt of 100mm×10mm with an angle of lap of 160°.
            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   [4]
chain and belt drive?

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

B   Differentiate between brakes and dynamometer.   [4]

C   A band and block brake has 14 blocks. Each block subtends   [6]
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.

Wooden blocks
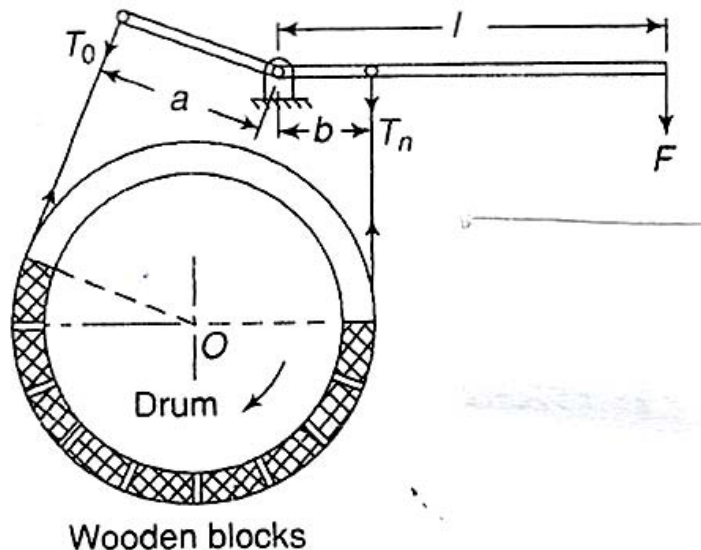
OR

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

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 [8] 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 brak 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
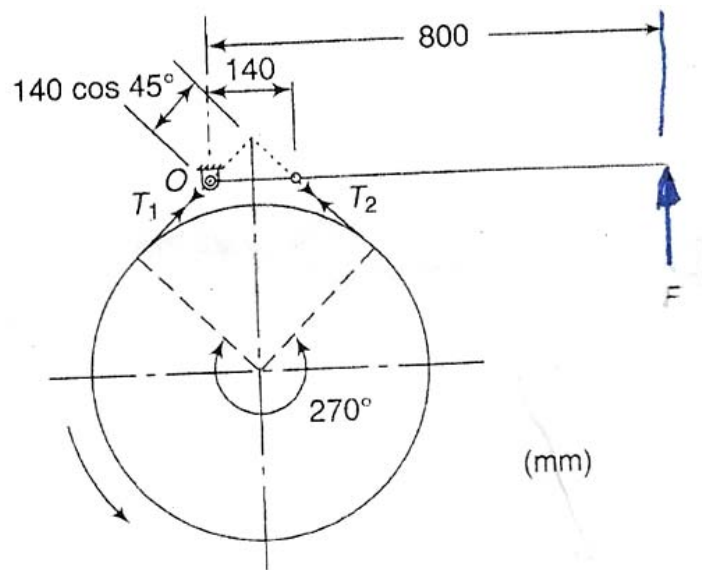
Q. 11 A The length of crank and connecting rod of a horizontal [9] reciprocating engine are 200mm and 1.0m respectively. The crank is rotating at 200rpm. When the crank has turned 30° from the inner dead centre, find analytically: i) Acceleration of the piston ii) velocity of the piston iii) Angular 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]

UNIVERSITY OF PUNE
[4362]-141
S. E.(Prod S/w)Examination - 2013
MANUFACTURING PROCESS
(2008 Pattern)

[Total No. of Questions:]   [Total No. of Printed Pages :4]

[Time : 3 Hours]   [Max. Marks : 100]

*(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 logarithmic tables, slide rule, Mollier charts, electronics pocket calculator is allowed.

(6) Assume suitable data, if necessary.

SECTION-I

UNIT NO.01

Q1   a) What is pattern? Describe different allowances provided on pattern in short.   [7]

b) Explain in short following characteristics of moulding sand.   [4]

i) Refractoriness   ii) Permeability

c) What is AFS grain fineness of foundry sands.   [7]

OR

Q2   a) What do you understand from the term "Gating system"? what are the   [4]

main requirements expected of an ideal gating system?

b) What are the common methods used for cleaning the surface of [6]
casting?

c) Describe the **Shell Moulding** process with neat sketch? Also state [8]
its advantages, limitations & applications.

UNIT NO.02

Q3   a) Describe press forging? How does it differ from the dropforging? [6]

b) Describe the process of cold spinning stating its advantages and [6]
specific uses.

c) Explain only operation principle of HERF (High Energy Rate of [4]
Forming) process with the help of neat sketch.

OR

Q4   a) Compare three high rolling and planetary rolling mill with respect to [6]
Its diagram, applications, nature of construction and material of roller.

b) Differentiate between the hot working & cold working process with [4]
respect to following:

Surface finish, Grain structure, Strength, Dimensional accuracy.

c) Neatly draw the process to "draw wire" and explain. [6]

UNIT NO.03

Q5　a) Explain with neat sketch 'Laser beam welding' and give its　　[8]

applications, advantages and limitations.

b) Explain with neat sketch 'Submerged arc welding' process, stating　　[8]

advantages, limitations and area of applications.

OR

Q6　a) Differentiate between the following processes　　　　　　　　[8]

i)　　Forehand and backhand gas welding techniques.

ii)　　Spot welding and seam welding.

b) Explain with neat sketch 'Thermit Welding' process. State its　　[8]

advantages and limitations.

SECTION-II

UNIT NO.04

Q7　a) Draw a neat sketch of thread cutting setup on lathe. Briefly describe　　[6]

it. What is multistart thread?

b) How do you specify a lathe machine? "Box section casting is best　　[6]

for lathe bed" comment.

c) Explain the following operations on lathe with sketch.　　　　　　[6]

i)　　Eccentric turning

ii)　　Knurling

iii)   Facing

OR

Q8   a) Write a short notes on: i) Taper Turning attachment   [6]

ii) Steady and Follower rest

b) Explain back gear mechanism with suitable sketch.   [6]

c) A hollow workpiece of 60mm outside diameter and 150mm length   [6]

is held on a mandrel between centres and turned all over in 4 passes. If

the approach length=20mm, Over travel=12mm, average feed=0.8mm

/rev, cutting speed=30meter/min. calculate the machining time.

UNIT NO.05

Q9   a) Sketch & describe in brief a 'Sensitive drilling machine'.   [6]

b) Describe the following terms related to twist drill   [4]

i) Flank   ii) Flutes   iii) Land   iv) Web

c) Explain with neat sketch following milling operations   [6]

i) Straddle milling ii) Gang milling iii) Form milling

OR

Q10   a) Calculate the machining time for drilling 4 holes of 16 mm diameter   [6]

each on a flange from the following data:

Flange thickness=30mm

Cutting speed=22mpm

Feed=0.2mm/rev

b) Differentiate between 'Up & Down Milling' methods of milling. [4]

c) Sketch and explain working mechanism of universal dividing head [6]
of milling machine.

UNIT NO.06

Q11 a) With reference to grinding explain [6]

i) Wheel speed ii) Work speed iii) Depth of cut

b) Name the different types of bonds used in the manufacturing of [6]

abrasive wheel? Describe any one in detail stating its advantages and

disadvantages.

c) The following letters are printed on grinding wheel [4]

W A 54 R 4 V 17

Explain the meaning of each letter mentioned in the above specification

of grinding wheel.

OR

Q12 a) Compare the Honing and Lapping processes with respect to: [6]

i)   Principle of working

ii)   Type of abrasive

iii)   Area of application

iv)   Surface finish

b) What is the centreless grinding? Draw a working setup of 'Centreless   [6]

external grinding process and explain in short.

c) What essential factors will you take into consideration while   [4]

choosing a grinding wheel?

UNIVERSITY OF PUNE
[4362]-143
S. E. (PRODUCTION S/W) Examination 2013
MANUFACTURING ENGINEERING AND METROLOGICAL PRACTICES
(2008 Pattern)

[Total No. of Questions:12] [Total No. of Printed pages :5]
[Time : 3 Hours] [Max. Marks : 100]

Instructions :

(1) *All questions are compulsory.*
(2) *Answers to the two Sections should be written in separate answer-books*
(3) *Neat diagrams must be drawn wherever necessary.*
(5) *Assume suitable data, if necessary.*
(6) *Use of logarithmic tables, slide rule, Molllier charts, electronic pocket calculator and steam tables is allowed.*

SECTION I

Q.1 a) Explain machinability Explain effects of following on machinability [8]

i)Tool Rake Angle (s)

ii)Cutting angles

iii)Nose Radius

iv)Clearance angles.

b) Following data were obtained while turning a work piece on lathe [8]

Cutting speed =25 m/min.

Depth of cut = 0.3 mm /rev

Tool life =100 min

The following tool life equation is given in this operation.

V*T^0.12*f^0.7*d^0.3 =c

if the cutting speed in increased by 25%, what will be the new tool life

OR

1 a)Draw & explain resolution of resultant cutting force developed [8]

by Emst & Merchant Theory.

1 b) Explain in detail [8]

i)Methods of machining

ii)Tool wear types.

Q.2 a) Explain the need of transfer line from manufacturing point of view. [8]

Explain 'line balancing' concept.

2 b)Explain the difference between [8]

i)Capstan & Turret lathe

ii)Single & multispindle automat (draw operational sketch for above)

OR

2 a)Write notes on any two of the following

i)Transfer lines

ii)Planing machine & slotting machine

iii)Saddle type turret lathe '&' Ram type turret lathe.' [16]

Q.3 a) Draw a typical sketch demonstrating geometry of teeth of broaching [8]

tools. What are the effects of rake angle & clearance angle on broaching

operation?

b)What type of materials used for broach [4]

c)Draw a neat sketch of pull type broach used for finishing holes & [6]

show following terminologies used.

i)Pull end

ii)Neck

iii)Front pilot

iv)Cutting teeth

v)Finishing teeth

vi)Rear pilot

OR

Explain any three of the following with neat sketches   [18]

i)Gear hobbing

ii)Gear shaving

iii)Thread milling

iv)Thread tapping

SECTION II

Q.4 a) Elaborate 'FMS introduces flexibility in every facets of manufacturing' [4]

b) Write a manual part program for tuning a raw bar from a work piece   [12]

of following dimensions Work piece :Bar Ø 60 mm dia. with length of 50mm.

Raw bar. machined single bar with Two steps of dia.Ø50 & Ø 25 with step

lengths of 25mm each.

OR

Q4   For machining centre explain the following.   [16]

i) Principles, working & advantages

ii)Applications & part programming

Q.5 a) A shell of 80 mm diameter & 70mm deep is to be drawn from steel   [8]

sheet drawing quality, 0.8mm thick. The yield strength is 300 Mpa. calculate

i)Blank diameter

ii)Punch diameter for first draw

iii)Drawing Force

b) Explain the following   [8]

i)Progressive die

ii)Compound die

OR

5   a)Explain with suitable sketch, the drawing operation. indicate the   [8]

mathematical expression for Blank size & drawing force calculations

b) For sheet metal process explain (any two)   [6]

i) Centre of pressure

ii) Scrap strip layout

iii) Methods of reducing forces.

c) Define following terms (any two)   [2]

i)Notching

ii) Trimming

iii) Nibbling

Q.6 a) List at least four types of drill bushes for drilling jig   [4]

b) Explain the procedure of error analysis for locating the workpiece   [6]

in jigs &fixtures for dimensional & geometrical errors.

c) Explain following elements of jigs (any two)   [8]

i) Locating device

ii) Clamping device

iii) Tool guide.

OR

6   a) Draw only sketch for following (any four)   [12]

i)Box type jig

ii)Setting block used for milling fixture

iii)Fool proofing for jig &/or fixture.

iv)Use of dowel pins

v)Channel type jig

vi)Cam operated clamps

b) Describe factors considered for designing jig & fixture.   [6]

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

Total No. of Questions :   **[Total No. of Printed Pages :3]**
[Time: 3 Hours]   **[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   [8]
    n-channel MOSFET.

Q3. a) Draw and explain 4-bit bidirectional shift register.   [8]

  b) Explain log Amplifier using op-amp.   [8]

OR

1

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

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

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

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

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 [8]
LVDT.

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 liner [4]
differential equation.

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

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 [8]
system to step input. Comment on overshoot.

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.

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UNIVERSITY OF PUNE
[4364]-137
B. E. (Electronics) Examination - 2013
DIGITAL IMAGE PROCESSING(Elective II)
(2003 Course)

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[Time: 3 Hours]   **[Max. Marks: 100]**

Instructions:

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

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SECTION -I

</div>

Q.1   A   Draw the block diagram of typical image processing system and explain function of each block.   8

      B   Explain the basic relationship between the pixels.   8

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

Q.2   A   What do you understand by simple image model? Explain the effect of sampling and quantization levels in the quality of digital image.   8

      B   Draw and explain gray level human vision model.   8

Q. 3   A   Explain the need of color models. Compare YIQ and HIS color models.   8

      B   Explain DCT in detail stating its application in the field of image processing. Also state how Walsh Hadamard transform is different from DCT.   8

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

Q. 4   A   Explain 2-D Fourier Transform and its following properties   8
           i)   Translation
           ii)   Scaling
           iii)   Convolution

      B   Discuss the following properties of image transforms   8

           i)   Energy compaction
           ii)   Decorrelation

iii) Symmetry
iv) Separabilty

Q. 5   A   What is the difference between histogram equalization and histogram matching? Explain histogram matching in detail.   10

B   Explain in short following image enhancement technique and mention its application.   8
     i) Intensity level slicing
     ii) Negative of an image
     iii) Power law transformation
     iv) Contrast stretching

OR

Q. 6   A   Explain the different techniques for sharpening of an image in Spatial domain   8

B   Explain median filtering? Give its applications. Compare median filtering with averaging filter with an example   10

SECTION II

Q. 7   A   Image matrix for 4 bit/pixel image is given as follows: 8

$$\begin{bmatrix} 15 & 15 & 10 & 8 \\ 15 & 10 & 8 & 8 \\ 15 & 10 & 8 & 8 \\ 10 & 8 & 8 & 8 \end{bmatrix}$$

Find:
     i) Huffman code for gray levels in the image
     ii) Average length of code words
     iii) Efficiency

B   Explain lossy predictive coding technique for image compression.   8

OR

Q. 8   A   Explain image compression using JPEG.   8

B   What are the various data redundancies identified in an image? Explain   8

Q. 9   A   Compare the performance of first and second order derivative with respect to an image? Which one would you prefer for detecting edges? Why?   8

B   What is boundary representation? Explain how chain codes are used for boundary representation.   8

Q. 10   A   What is Hough transform? How it is used for edge linking?   8

        B   What is a skeleton of an image? Explain the algorithm to obtain skeleton   8
            of an object in a digital image.

Q. 11   A   Explain with block diagram all the steps of fingerprint recognition. State   10
            the assumptions made.
        B   Draw and explain the model of image degradation and restoration.   8
            Discuss the various methods of estimating the degradation function.
                                        OR
Q. 12   A   Explain the difference between image enhancement and restoration? List   10
            and in short explain the various algorithms used for the processing in case
            of restoration.
        B   Explain with block diagram all the steps of character recognition.   8