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Shri Vile Parle Kelavani Mandal's
SHRI BHAGUBHAI MAFATLAL POLYTECHNIC
AUTONOMOUS SEMESTER EXAMINATION APRIL/MAY, 2018

TIME ALLOWED: 03 HOURS
MAXIMUM MARKS: 100
COURSE: APPLIED MECHANICS

SEAT NO. _____
SEMESTER: Ist
PROGRAMME: Civil Engg.
CODE: 160001

INSTRUCTIONS:

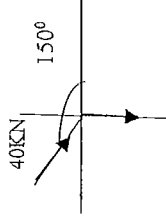
- (1) Answer to the two sections must be written in separate answer books.
- (2) Attempt all questions.
- (3) Illustrate your answer with neat sketches, wherever necessary.
- (4) Use of Mathematical and Steam tables and pocket calculator (non-prog.) is permissible.
- (5) Figures to the right indicate full marks.
- (6) Assume suitable additional data, if necessary.
- (7) Student should read the name and code of the subject and confirm that the question paper received is as per subject registered.

SECTION-I

Q.1

Attempt ANY SIX of the following.

- (1) Define. Rigid body, statics.
 - (2) State parallelogram law of forces.
 - (3) State Lami's theorem
 - (4) Differentiate between Resultant & Equilibrant.
 - (5) Resolve a force of 80 KN along two directions making angles 30° & 20° with it on opposite sides.
 - (6) What is varignon's theorem of moment?
 - (7) Resolve a force of 40KN inclined at 150° with axis as shown in fig.
- (18)

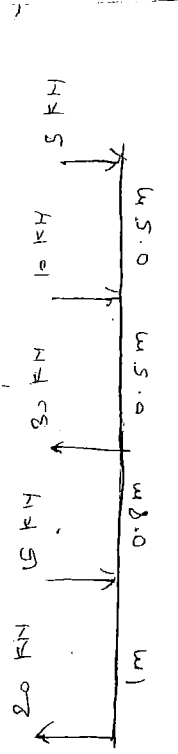


- (8) Differentiate between Mass and Weight.

Q.2

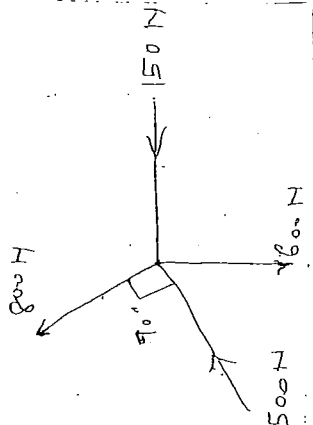
Attempt ANY FOUR of the following.

- (a) Find the resultant & point of application of resultant for force system as shown in fig.



- (b) State properties of couple.
- (c) What are the different types of loads & end support of beam?
- (d) The sum of two forces is 9N. Their resultant which is perpendicular to the smaller force is of 6N. Find magnitude of the force.
- (e) Find the angle between two equal forces P, if their resultant is also equal to P.

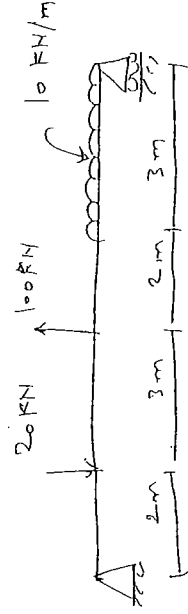
(f) Find the resultant of all the forces as shown in fig.



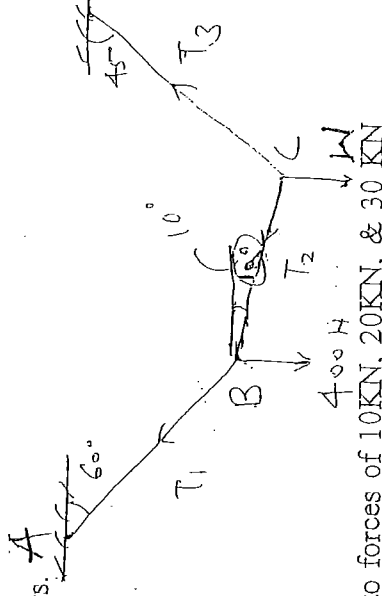
Q.3

Attempt ANY TWO of the following. (16)

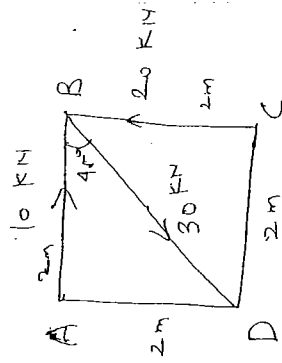
(a) For the beam shown in fig. calculate support reactions using analytical method.



(b) Find the weight 'W' & tension in the strings. A



(c) A square ABCD of 2m side is subjected to forces of 10kN, 20kN, & 30 kN along AB, CB, & BD. Find magnitude, direction & position of the resultant with respect to A.



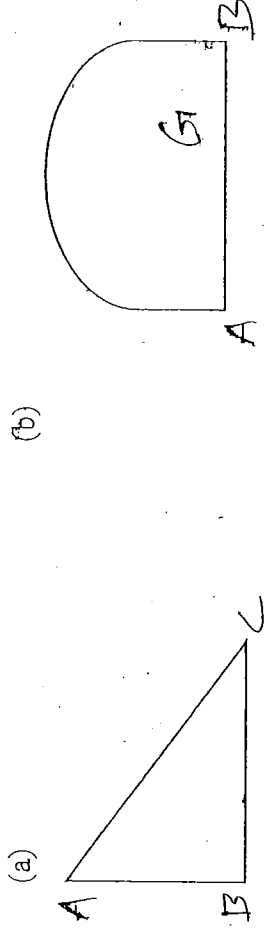
SECTION-II

Q.4 Attempt ANY SIX of the following.

(18)

- (1) State law of polygon of forces.
- (2) Define angle of repose.
- (3) Define centre of gravity.
- (4) Define - Mechanical Advantage & Efficiency of Machine.

- (5) Find formula for centroid of following fig. with usual notations.



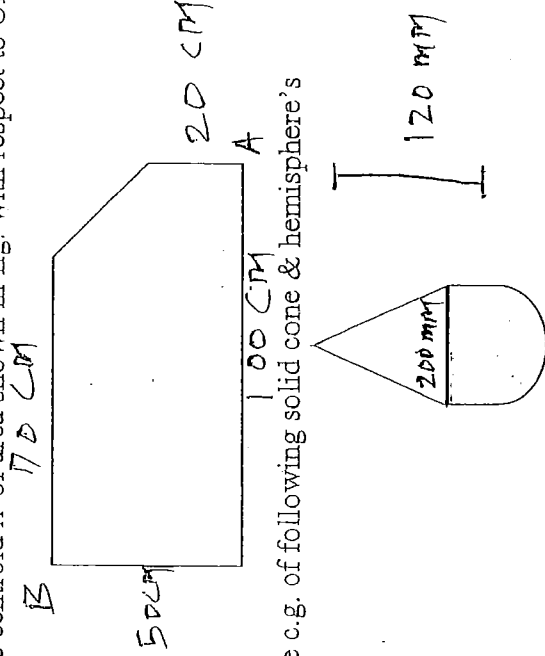
- (6) What is law of machine?
 (7) A body of weight 2000N rests in a horizontal plane. If the coefficient of friction is 0.4, find the horizontal force required to be applied parallel to the plane to move the body.
 (8) The velocity ratio of certain machine is 50. Determine the effort required to lift a load of 1500N if the efficiency of machine is 40%.

Q.5

Attempt ANY FOUR of the following.

(16)

- (a) A body weighing 150N is resting on a rough horizontal plane & can be just moved by a force of 50N applied horizontally. Find the coefficient of friction. Also find magnitude & direction of the resultant reaction.
 (b) In a machine an effort of 15N can lift a load of 300N & an effort of 25N can lift a load of 500N. Find law of machine.
 (c) Find the centroid \bar{X} of area shown in fig. with respect to OB line.



- (d) Find the c.g. of following solid cone & hemisphere's

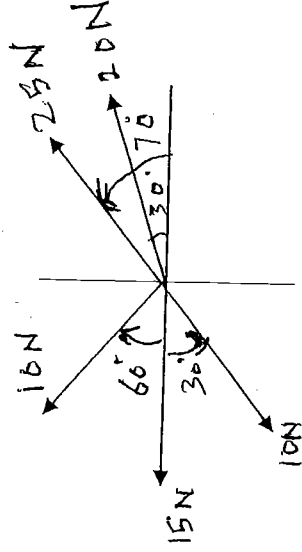
- (e) What are the advantages & disadvantages of friction?
 (f) In differential axle & wheel the diameter of wheel is 400mm & the dia of axis are 100mm & 80mm. If an effort of 50N can lift a load of 1500N. Find V.R. & efficiency of machine.

Q.6

Attempt ANY TWO of the following.

(16)

- (1) Find graphically the resultant of concurrent force system shown in fig.



- (2) Following observations were made in an experiment as simple machine with V.R. = 60 Find law of machine & efficiency at load of 300N. Draw a graph.

Load	Effort
100N	10N
200N	14N

- (3) A ladder of weight 400N & length 10m is supported on smooth wall with its lower end 4m from the wall. The coefficient of friction between the floor & the ladder is 0.3. Show the forces acting on the ladder & find frictional force at floor.

Shri Vile Parle Kelavani Mandal's
SHRI BHAGUBHAI MAFATLAL POLYTECHNIC
AUTONOMOUS SEMESTER EXAMINATION APRIL/MAY-2018

TIME ALLOWED: 03 HOURS
MAXIMUM MARKS: 100
COURSE: BASIC MATHEMATICS

SEAT NO. _____
SEMESTER: I
PROGRAMME: ALL
CODE: 160002

INSTRUCTIONS:

- (1) Answer to the two sections must be written in separate answer books.
- (2) Attempt ALL questions from Section-I and Section-II.
- (3) All questions are compulsory.
- (4) Illustrate your answers with neat sketches, wherever necessary.
- (5) Use of Mathematical and Steam tables and pocket calculator (non-programmable) is permissible.
- (6) Figures to the right indicate full marks.
- (7) Assume suitable additional data, if necessary.

SECTION-I

Q.1 Attempt Any Six (18)

- (a) Evaluate : $\frac{1}{\log_3 6} + \frac{1}{\log_8 6} + \frac{1}{\log_9 6}$
- (b) Find k if $\begin{vmatrix} 2 & -k & 7 \\ 3 & -4 & 13 \\ 8 & -11 & 33 \end{vmatrix} = 0$
- (c) Find x and y satisfying the matrix equation $\begin{bmatrix} 1 & 2 \\ 3 & 2 \end{bmatrix} \begin{bmatrix} x & y \\ 3 & -1 \end{bmatrix} = \begin{bmatrix} 7 & 0 \\ 9 & 4 \end{bmatrix}$
- (d) Use binomial theorem. Find approximate value of $\sqrt{30}$
- (e) Resolve into partial fractions $\frac{5x+1}{x^2+x-2}$
- (f) Find the 5th term of $(x+2y)^8$
- (g) If $A = \begin{bmatrix} 2 & 5 \\ 6 & 7 \end{bmatrix}$ find $A^2 + 4A + 2I$ where I is unit matrix
- (h) Find x if $\log_2(x^2 - 6x + 40) = 5$

Q.2 Attempt Any Four (16)

- (a) Resolve into partial fractions $\frac{2x+3}{x^2(x-1)}$
- (b) Find the middle terms in the expansion of $\left[3x - \frac{x^3}{6} \right]^9$
- (c) Solve the equation by using determinant method $x + y + z = 3$; $x - y + z = 1$, $x + y - 2z = 0$
- (d) If $A = \begin{bmatrix} 2 & -1 & 1 \\ 3 & -4 & 0 \end{bmatrix}$ and $B = \begin{bmatrix} 0 & 2 \\ -3 & 1 \\ 4 & -1 \end{bmatrix}$ Is the matrix AB non-singular?
- (e) Using properties of determinant show that $\begin{vmatrix} 1 & a & b+c \\ 1 & b & c+a \\ 1 & c & a+b \end{vmatrix} = 0$
- (f) Find K if $(1 + \sqrt{3})^4 + (1 - \sqrt{3})^4 = K$

Q.3

Attempt Any Two

(16)

(a) Solve by matrix method

$$2x + 3y - z = -3, \quad 5x + y + 3z = 10, \quad 4x + 3y - 2z = -3$$

(b) The term independent of x in the expansion of $\left(x^3 + \frac{m}{x^8}\right)^{11}$ is 1320. Find m

(c) Resolve into partial fractions $\frac{x^2+23x}{(x+3)(x^2+1)}$

Q.4

Attempt Any Six of the following

(18)

(a) Prove that $\tan^{-1}\left(\frac{3}{4}\right) + \tan^{-1}\left(\frac{3}{5}\right) - \tan^{-1}\left(\frac{8}{19}\right) = \frac{\pi}{4}$

(b) Find the slope of the line $\frac{x}{6} + \frac{y}{4} = \frac{1}{3}$

(c) Find the equation of the circle having radius 2 and touching the y -axis at $(0, -3)$

(d) Find the equations of the tangent to the circle $x^2 + y^2 + 6x + 7 = 0$ at $(-2, 1)$

(e) Find the centre and radius of the circle $2x^2 + 2y^2 - 6x + 4y - 3 = 0$

(f) Find the value of K so that the lines $3x - y - 2 = 0$, $5x + ky - 3 = 0$ and $2x + y - 3 = 0$ are concurrent.

(g) Find the acute angle between the line $2x + y - 1 = 0$ and $3x + y + 4 = 0$

(h) Prove that $1 + \tan \theta \cdot \tan 2\theta = \sec 2\theta$

Q.5

Attempt Any Four of the following

(16)

(a) Find the distance between the lines $5x - 12y + 1 = 0$ and $10x = 24y + 1$

(b) Find the equations of the circle which passes through the points $(1, -2)$ and $(4, 3)$ and which has its centre on the line $3x + 4y = 7$

(c) Find the equations of the tangent at the point $(4, 5)$ on the circle $x^2 + y^2 - 4x + 2y - 35 = 0$

(d) In $\triangle ABC$, if $a = 25$ cm, $b = 52$ cm and $c = 63$ cm. Find $\sin A$.

(e) In triangle ABC , if $A + B + C = \pi$, then prove that

$$\sin 2A + \sin 2B + \sin 2C = 4 \sin A \cdot \sin B \cdot \sin C$$

(f) Find the equations of the line passing through $(-1, 1)$ and making an angle 45° with the line $2x + 3y = 6$

Q.6

Attempt Any Two of the following

(16)

(a) Prove that $\cos^2 A + \cos^2 B - \cos^2 C = 1 - 2 \sin A \cdot \sin B \cdot \cos C +$

(b) Find the equation of the perpendicular bisector of the line segment AB , where $A = (3, -4)$ and $B = (-4, 3)$

(c) Find the equations of the tangents to the circle $x^2 + y^2 - 6x - 4y + 5 = 0$, which makes an angle of 45° with the x -axis.

TIME ALLOWED: 03 HOURS
MAXIMUM MARKS: 100
COURSE: COMMUNICATION SKILL
SEAT NO. _____
SEMESTER: I/II
PROGRAMME: ALL
CODE: 160003

INSTRUCTIONS:

- (1) Answer to the two sections must be written in separate answer books.
- (2) Attempt ALL questions from Section-I and Section-II.
- (3) Use of Mathematical and Steam tables and pocket calculator (non-programmable) is permissible.
- (4) Illustrate your answers with neat sketches, wherever necessary.
- (5) Figures to the right indicate full marks.
- (6) Assume suitable additional data, if necessary.
- (7) The student should read the name and code of the subject and confirm that the question paper received is as per subject registered.

SECTION-I

- Q.1. Answer the following (Any Six) (18)**
- (a) How does the selection of media plays an important role in the process of communication? (18)
 - (b) State two characteristics of communication.
 - (c) "Grapevine is closely related to the morale of the employees working in an organisation." Justify this statement with suitable examples.
 - (d) "Communication is life-blood of any organisation" Justify the statement with the help of suitable examples.
 - (e) Which type of communication is happening in the following situation? Explain its advantages
"The production manager of a company is communicating to the purchase manager of the same company."
 - (f) What is sympathetic listening? Give an example.
 - (g) "Positive feedback motivates the sender." How far do you agree with the given statement? Explain with an example.
 - (h) How can the speaking skill be improved? (write any two techniques) (16)
- Q.2. Attempt (any Four) of the following.**
- (a) Do as directed
(i) _____ he is not eligible, he got the position (insert suitable conjunction)
(ii) The river is _____ the bridge (Insert suitable preposition)
(iii) Ganga is a holy river. (Under line noun & state its type)
(iv) Bombay is the most crowded city of India (change the degree)
 - (b) Fill in the blanks with correct form of (tense) of the verb given in bracket.
(i) We _____ (work) on the project since 2011.
(ii) I _____ to her yesterday (speak)
(iii) I _____ (wait) for you at the station.
(iv) Where there _____ (be) a will, there _____ (be) away.
 - (c) (i) Write antonyms of :- (a) Transparent (b) Confident
(ii) Write synonyms of :- (a) Guidance (b) Fragrance
 - (d) Give two examples of each:- (a) Clipping (b) Compounding
 - (e) Insert suitable heteronym-
(i) (a) He gave her a beautiful _____
(b) _____ me later, I will be at home.
(ii) (a) It's hot , so let's sit in the _____
(b) That _____ of red does not suit her.
 - (f) Give examples of:- i) Capitonyms ii) Homophons (16)
- Q.3. Answer the following:- (any Two)**
- (a) What are the underlying causes that results in similarities or differences between systems of human and animal communication?
 - (b) Write in detail any four types of reading.
 - (c) Differentiate between listening & hearing.

SECTION-II

Q.4. Answer the following (any Six)

(18)

- (a) Define essay. Explain any two types of essay.
- (b) Explain any three Cs of letter writing.
- (c) Explain the importance of business letters in business.
- (d) Nothing succeeds like a success. (Identify the tense and rewrite in simple future tense)
- (e) Give two examples of –
(i) Backformation (ii) Conversion
- (f) Give two example of present perfect tense.
- (g) Use 'a', 'am', 'the' as articles in your own single sentence.
- (h) Make verb (i) Private (ii) Note

Q.5.

(16)

- Answer the following (any Four)**
- (a) Write you resume without disclosing your identify?
 - (b) As a store keeper of you organization place an order for office furniture with Décor furniture Bandra (west)
 - (c) Oxford international school requires first class B.Com graduate for the post of Accountant, Write an application to the Headmaster of school for the said post.
 - (d) Recently you purchased some electronics from shop located in your area, in spite of requesting many times the shopkeeper gives you bill without GST No. Write complaint letter to sale & tax inspector of your area to take strong action against shopkeeper.
 - (e) Give the list of Diphthongs.
 - (f) State Four qualities of report.

Q.6.

(16)

- Answer the following (any Two)**
- (a) As a chief construction engineer, investigate the reasons and submit you report on leakages from ceiling in newly constructed building.
 - (b) Write an essay on any one –
(i) Importance of value education (ii) India – an emerging superpower
 - (c) Read the unseen passage and answer the questions.

A man or woman makes a direct contact with society in two ways: as a member of some familial, professional or religious group, or as a member of a crowd. Groups are incapable of being as moral and intelligent as the individuals who form them: a crowd is chaotic, has no purpose of its own, and is capable of anything except intelligent action and realistic thinking.

Assembled in a crowd, people loose their power of reasoning and their capacity for moral choice. Their suggestibility is increased to the point where they cease to have any judgement or a will of their own. They become very excitable; they loose all sense of individual or collective responsibility. They are subjected to sudden excesses of rage, enthusiasm and panic. In a word, a man in a crowd behaves as though he had swallowed a large dose of some powerful intoxicant. He is a victim of what I have called 'herd poisoning'. Herd poison is an active, extravagant drug. The crowd intoxicated individual escapes from responsibility, intelligence and morality into a kind of frantic, animal mindlessness.

- 1] Which idea is predominantly expressed in this passage? (01)
- 2] Mention the two ways in which a man or woman makes direct contact with society. (02)
- 3] What is "Herd Poison"? (01)
- 4] How does the author describe the chaotic behavior of man? (01)
- 5] Mention two extreme behavioural patterns of man. (01)
- 6] With whom is a man in a crowd compared? Why? (02)

TIME ALLOWED: 03 HOURS
 MAXIMUM MARKS: 100
 COURSE: ENGINEERING MATHEMATICS

SEAT NO. _____
 SEMESTER: II
 PROGRAMME: ALL
 CODE: 160008

INSTRUCTIONS:

- (1) Answer to the two sections must be written in separate answer books.
- (2) Attempt all questions each from Section I & Section II.
- (3) Illustrate your answer with neat sketches, wherever necessary.
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SECTION-I

Q.1 **Attempt Any Six out of Eight** **(18)**

- (a) If $f(x) = x^2 - 3x + 2$, find $f(1) + f(3)$
- (b) If $f(x) = 2x + 5$, $g(x) = x^2 - x$ find fog
- (c) Evaluate $\lim_{x \rightarrow 2} \frac{x^{10} - 1024}{x^5 - 32}$
- (d) If $f(x) = 4x^4 + 3 \cos x + x \cdot \sin x + 1$
- (e) Evaluate : $\lim_{x \rightarrow 2} \frac{x-2}{\sqrt{x}-\sqrt{2}}$
- (f) Evaluate: $\lim_{x \rightarrow a} \frac{x^{10} - a^{10}}{x - a}$
- (g) Evaluate : $\lim_{\theta \rightarrow \pi/2} \frac{1 - \sin^3 \theta}{\cos^2 \theta}$
- (h) Evaluate : $\lim_{x \rightarrow 0} \frac{e^{7x} - 1}{e^{3x} - 1}$

Q.2 **Attempt Any Four out of Six** **(16)**

- (a) If $Y = e^x - \frac{1}{x} + \log_e x$ find $\frac{dy}{dx}$
- (b) If $f(x) = \frac{x+2}{4x-3}$ and $t = \frac{2+3x}{4x-1}$ show that $f(x) = x$
- (c) Determine $\frac{dy}{dx}$ if $Y = \frac{x^2+3}{x^2-2}$
- (d) Differentiate w.r.to $x : x \cdot \sin^{-1} x + \sqrt{1-x^2}$
- (e) Differentiate w.r.to $x : \log_e(\sec x + \tan x)$
- (f) Differentiate w.r.to $x : \sin^{-1}(2x \cdot \sqrt{1-x^2})$

Q.3 **Attempt Any Two out of Three** **(16)**

- (a) If $Y = 2\cos(\log x) + 3 \sin(\log x)$, prove that $x^2 \cdot \frac{d^2y}{dx^2} + x \cdot \frac{dy}{dx} + y = 0$
- (b) Differentiate $\tan^{-1} \left[\frac{2x}{1-x^2} \right]$ w.r. to $\cos^{-1} \left[\frac{1-x^2}{1+x^2} \right]$
- (c) If $x = \tan^{-1} \left[\frac{2t}{1-t^2} \right]$ $y = \tan^{-1} \left(\frac{3t-t^3}{1-3t^2} \right)$ find $\frac{dy}{dx}$

SECTION-II

Q.4

(18)

Attempt Any Six out of the following

- (a) If $z = 1 + 2i$ find the value of $z^2 - 2z + 6$
- (b) Find modulus and amplitude of $1 - i\sqrt{3}$
- (c) Find the gradient of the curve $y = \sqrt{x^3}$ at $x = 4$
- (d) Find the radius of curvature of the curve $y = x^3$ at $(2, 8)$
- (e) Convert exponential form into Cartesian form $6.e^{\frac{5\pi}{6}}$
- (f) If $\vec{a} = 2\hat{i} + \hat{j} + \hat{k}$, $\vec{b} = \hat{i} - \hat{j} - \hat{k}$, $\vec{c} = 2\hat{i} - 2\hat{j} - \hat{k}$ Find $\vec{a} \cdot (\vec{b} \times \vec{c})$
- (g) Find the angle between the vectors $\hat{i} + 2\hat{j} + 2\hat{k}$ and $\hat{i} - 2\hat{j} + 2\hat{k}$
- (h) Determine the area of the parallelogram formed by the two vectors $3\hat{i} + 2\hat{j}$ and $2\hat{j} + 4\hat{k}$

Q.5

(16)

Attempt Any Four of the following

- (a) Find all value of $(1 + i\sqrt{3})^{1/3}$
- (b) Using Euler's formula prove that $\cosh^2 x - \sinh^2 x = 1$
- (c) If magnitude of force 3 units acts in the direction $2\hat{i} + 3\hat{j} + 6\hat{k}$ at the point $(1, 1, 1)$. Find moment of force about the point $(-1, 2, 3)$
- (d) Find volume of the parallelepiped of having edges vectors $\hat{i} - \hat{j} + \hat{k}$, $2\hat{j} + 3\hat{k}$, $4\hat{i} + 8\hat{k}$
- (e) Find the equation of the tangent to the curve $Y = 9x^2 - 12x + 7$ which is parallel to the x axis.
- (f) A bullet fired into block of wood penetrates according to the lane $S = 18t - t^3/6$. How far does it penetrate?

Q.6

(16)

Attempt Any Two out of Three

- (a) If $x + iy = \sin(A + iB)$ prove that
(i) $\frac{x^2}{\cosh^2 B} + \frac{y^2}{\sinh^2 B} = 1$ (ii) $\frac{x^2}{\sin^2 A} + \frac{y^2}{\cos^2 A} = 1$
 - (b) Find the maximum and minimum values of the function $Y = 2x^3 - 3x^2 - 36x + 10$
 - (c) The slope of the curve $2y^3 = ax^2 + b$ at $(1, -1)$ is same as the slope of $x + y = 0$. Find a, b.
-

TIME ALLOWED: 03 HOURS
 MAXIMUM MARKS: 100
 COURSE: ENGINEERING DRAWING-I

SEAT NO. _____
 SEMESTER: I
 PROGRAM: MECHANICAL
 CODE: 160200

INSTRUCTIONS:

- (1) Answer to the two sections must be written in separate answer books.
- (2) Attempt ALL questions from Section-I and Section-II.
- (3) All questions are compulsory.
- (4) Illustrate your answers with neat sketches, wherever necessary.
- (5) Use of Mathematical and Steam tables and pocket calculator (non-programmable) is permissible.
- (6) Figures to the right indicate full marks.
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SECTION-I

- Q.1** (a) Find the distance between the Foci of an ellipse of major axis= 80 mm and minor axis- 40 mm and plot curve by "arcs of circle" method. (08)
- (b) Construct a hyperbola when the distance of the focus from the directrix is equal to 50 mm and the eccentricity is $\frac{4}{3}$. Draw the curve. (07)

- Q.2** Fig. 1 shows a shaft support. Draw by first Angle method the following views:

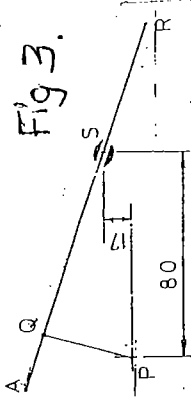
- (i) Front View from direction- A (06)
 - (ii) Top view (06)
 - (iii) Side view in the direction is (06)
- Give dimensions uniforming on three views. Show symbol. (02)

OR

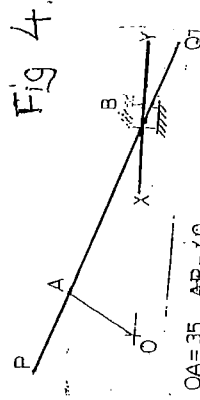
Draw by First Angle Method the following views (Fig.2)

- (i) Front view in the direction- X (06)
 - (ii) Top view (06)
 - (iii) Left hand side view (06)
- Given dimension on three views. Show symbol (02)

- Q.3** (a) Crank PQ rotates about Point P. A link AR is pin joined at Q the crank, and is constrained through S. Draw the loci of ends A and R of the link (Fig.3) (15)



- OR**
- (b) Trace the loci of the points P and Q on the connecting link AB and its extension for one rotation of crank OA in the offset crank mechanism (Fig.4) (15)



OA=35 AP=40
 AB=120 BQ=40

SECTION-II

Q.4 Top View and Front View of an object are shown in **Fig. No.5**. Draw an isometric view taking 'O' as origin. Use natural scale. (20)

Q.5 Attempt Any one of the following (10)

- (a) An inelastic string 125.68 mm long has its one end attached to the circumference of a circular disc of 40 mm diameter. Trace the locus of the free end of the string, if it is completely wound around the disc, keeping it always tight. Name the curve.
- (b) Draw helix on a cylinder of 60 mm diameter of two turns, given pitch equal to 60 mm

Q.6 Attempt Any One of the following (20)

(a) **Fig. No.6** shows pictorial view of an object. Draw the following views by first angle method of projection.

- (i) Sectional front view along A-A (06)
- (ii) Top View (06)
- (iii) Side View from Left (06)
- (iv) Give dimensions, scale, symbols (02)

(b) **Fig. No.7** shows pictorial view of an object. Draw the following views by First Angle Method of Projections

- (i) Sectional Front View along A-A (06)
- (ii) Top View (06)
- (iii) Side View from left (06)
- (iv) Give dimensions, scale, symbols (02)

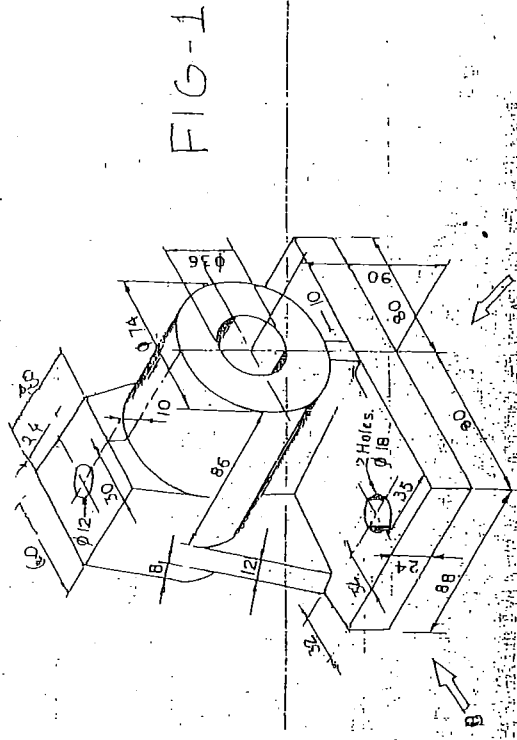


FIG-1

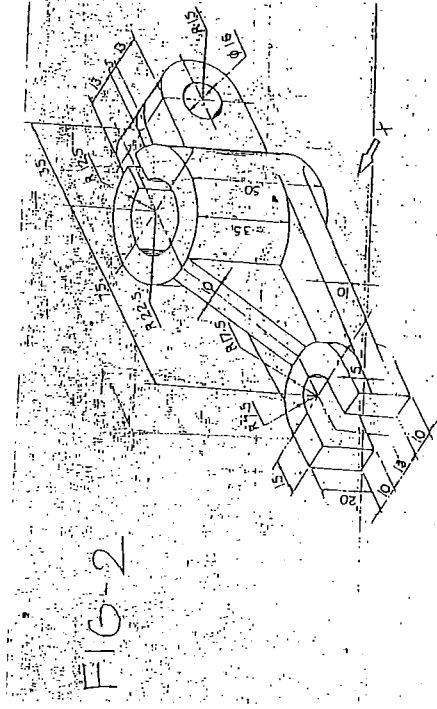


FIG-2

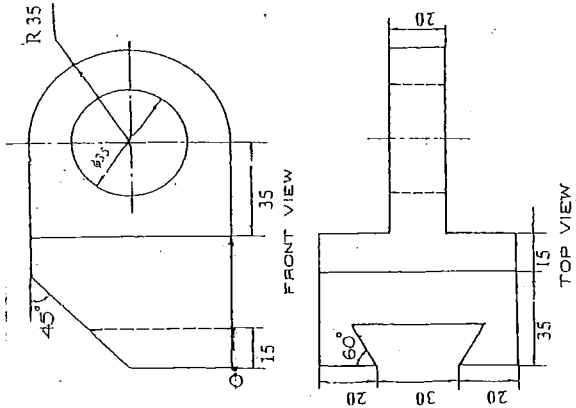


Fig. No.5 Q 4 Section II

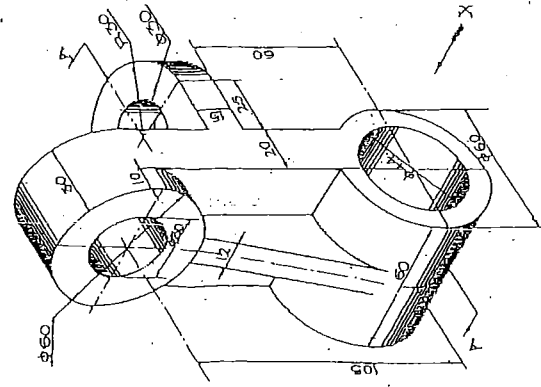


Fig. No.6 Q 6 a) Section II

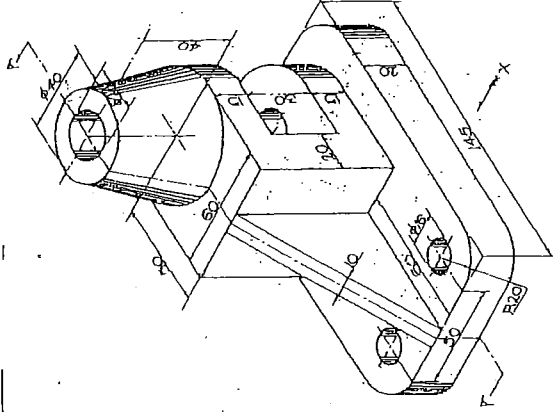


Fig. No.7 Q 6 b) Section II



Shri Vile Parle Kelavani Mandal's
SHRI BHAGUBHAI MAFATLAL POLYTECHNIC
AUTONOMOUS SEMESTER EXAMINATION APRIL/MAY- 2018

SEAT NO. _____
TIME ALLOWED: 03 HOURS SEMESTER: II
MAXIMUM MARKS: 100 PROGRAMME: MECHANICAL ENGG.
COURSE: ENGG DRAWING -II CODE: 160201

INSTRUCTIONS:

- (1) Answer to the two sections must be written in separate answer books.
- (2) Attempt All questions.
- (3) All Questions are compulsory.
- (4) Use of Mathematical and Steam tables and pocket calculator (non-programmable) is permissible.
- (5) Illustrate your answers with neat sketches, wherever necessary.
- (6) Figures to the right indicate full marks.
- (7) Assume suitable additional data, if necessary.
- (8) The student should read the name and code of the subject and confirm that the question paper received is as per subject registered.

SECTION - I

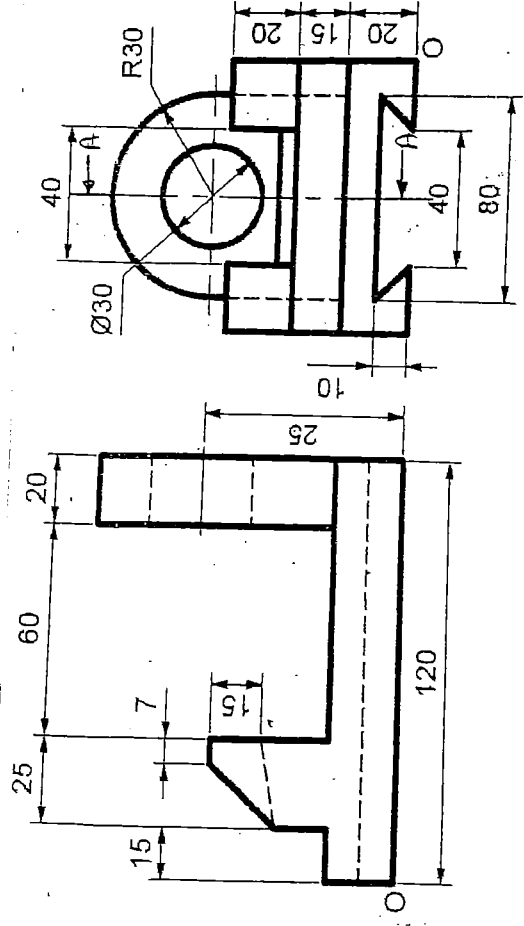
- Q.1** Attempt any One of the following (20)
- Figure No.1 shows F.V. & L.H.S.V. of an object. Draw the following view by 1st angle method. (09)
- i) Sectional F.V. along A-A (04)
 - ii) L.H.S. view (05)
 - iii) Top view (02)
 - iv) Give dimension, scale, symbol
- OR**
- (b) Figure No 2 shows F.V. & T.V. of an object. Draw the following views by first angle method of projection. (09)
- i) Sectional F.V. along B-B (05)
 - ii) L.H.S. view (04)
 - iii) Top View (02)
 - iv) Give dimension, scale & symbol

- Q.2** Attempt the following. (08)
- (a) A line AB, 60mm long is inclined at an angle of 30° to the H.P. its end point 'A' is 20mm above the H.P. and on the V.P. End B of the line is 50mm in front of the V.P. Draw the projections of the line AB assuming it to be in the first quadrant. (07)
- (b) The top view of a 80mm long line CD measures 68mm, while the length of its front view is 54mm. Its one end C is in H.P. & 15mm in front of V.P. Draw the projections of CD and determine its inclination with HP & VP.

- Q.3 Attempt any Five of the following by free hand sketch, mention the proportional dimension on it (15)
- (a) Acme thread & Buttress thread
 - (b) Cap Nut
 - (c) Wing Nut
 - (d) Counter sunk headed bolt
 - (e) Collar stud
 - (f) Sawn Nut
 - (g) Cup Headed Bolt

SECTION-II

- Q.4 (a) A cone of 60mm diameter & 80mm height of axis is resting on one of its point on the circumference of the base circle such that axis is inclined at 45° to HP & Top view of axis is makes 30° with VP Draw the projection of the cone. Consider the apex away from the observer. (20)
- OR
- A hexagonal pyramid of 40mm sides & 70mm height of axis is resting on its corner of base on H.P. such that edge through the corner makes 45° with H.P. & plane counting edge & axis makes 30° with V.P. Draw the projection of the pyramid.
- Q.5 (a) A circular plate of 60mm diameter is resting on one of its points on HP such that diameter through that point is inclined at 45° to HP & top view of the diameter is inclined as 30° to V.P. Draw the projection. (07)
- (b) A Rectangular plate of 60 x 100 has its short side on HP & surface is inclined at 45° to HP where as the side on HP is parallel to V.P. Draw the projection. (08)
- Q.6 Sketch the following by free hand (Any Three) (15)
- (a) Long & short break in pipe and M.S. and brass material symbol.
 - (b) Ball & roller bearing.
 - (c) Counter sunk & counter bore
 - (d) Half & removed section
&
Offset & partial section.

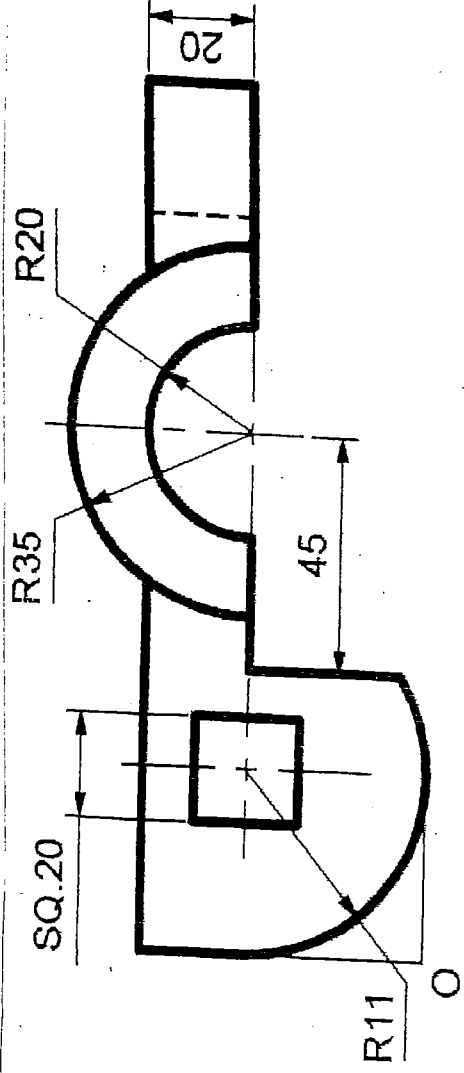


L.H.S.V.

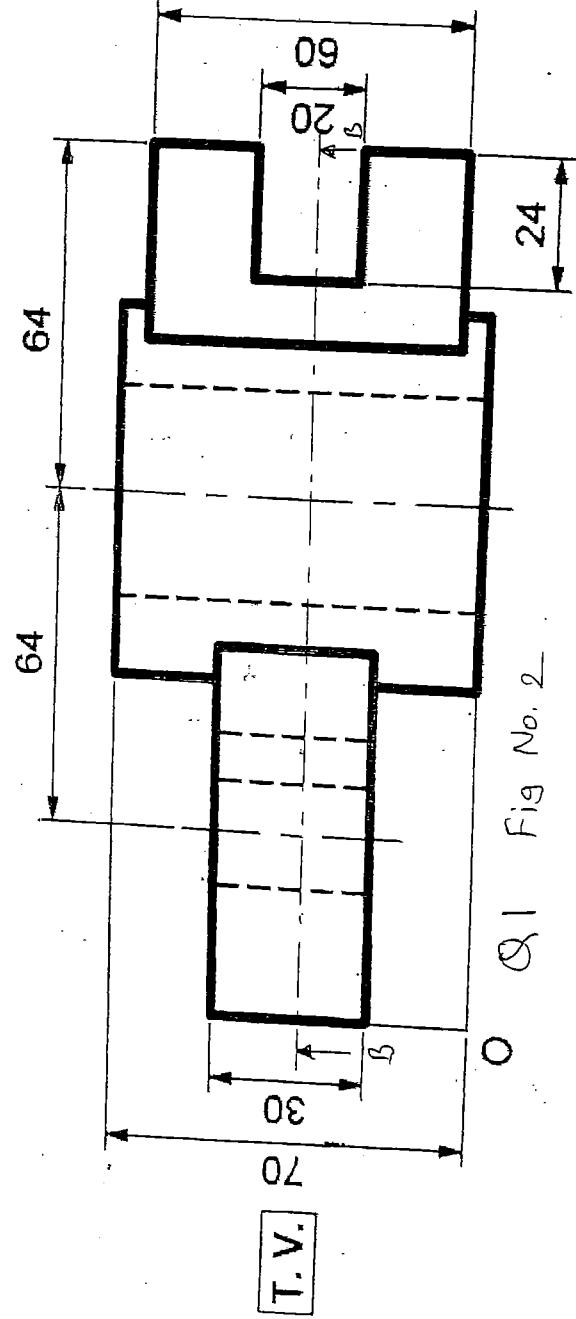
F.V.

Q1

Fig No 1.



F.V.



T.V.

Q1 Fig No. 2



Shri Vile Parle Kelavani Mandal's
SHRI BHAGUBHAI MAFATLAL POLYTECHNIC
AUTONOMOUS SEMESTER EXAMINATION APRIL/MAY-2018

TIME ALLOWED: 03 HOURS
MAXIMUM MARKS: 100
COURSE: MANUFACTURING PROCESS & MATERIALS

SEAT NO. _____
SEMESTER: II
PROGRAMME: MECHANICAL ENGG
CODE: 160203

INSTRUCTIONS:

- (1) Answer to the two sections must be written in separate answer books.
- (2) Attempt ALL questions from Section-I and Section-II.
- (3) All questions are compulsory.
- (4) Illustrate your answers with neat sketches, wherever necessary.
- (5) Use of Mathematical and Steam tables and pocket calculator (non-prog.) is permissible.
- (6) Figures to the right indicate full marks.
- (7) Assume suitable additional data, if necessary.

SECTION-I

Q.1 **Answer Any Six out of following** **(18)**

- (a) Define following (i) Core print (ii) Parting Surface (iii) Gating System.
- (b) Define welding and give its classification.
- (c) How do you inspect castings? Explain.
- (d) What is hot working? Why it is necessary?
- (e) Explain limitations of Gravity die and pressure die casting.
- (f) Define Resistance Welding.
- (g) Describe squeezing with a neat sketch.
- (h) Explain skeleton pattern with diagram.

Q.2 **Attempt Any Four out of following** **(16)**

- (a) Discuss merits and demerits of wood aluminium and plastic as pattern making material.
- (b) Describe submerged Arc Welding.
- (c) Compare between cold working and hot working.
- (d) List steps in sand moulding process.
- (e) Give CO₂ moulding process advantages and limitation.
- (f) Describe seam welding with a neat sketch.

Q.3 **Attempt Any Two out of following** **(16)**

- (a) Explain in detail shell moulding.
- (b) Explain in detail Tungsten Inert Gas Arc Welding stating its advantages and disadvantages.
- (c) Explain :
 - (i) Cupola furnace gives its advantages and limitations.
 - (ii) Recrystallization Temperature in Hot working process.

SECTION-II

- Q.4** **Attempt Any Six out of following** (18)
- (a) Give properties chemical, composition of muntz metal.
 - (b) State the objective of Hardening Process.
 - (c) Draw binary solid solution cooling curve.
 - (d) List the factors affecting the selection of material.
 - (e) Compare destructive and non-destructive testing.
 - (f) Write composition properties of low carbon steel.
 - (g) Describe the effect of alloying element such as carbon, chromium on steel.
 - (h) Define material. Give material classification with example.

- Q.5** **Answer Any four out of following** (16)
- (a) Write short note on TTT curve.
 - (b) List the advantages of non-ferrous metal over ferrous metals.
 - (c) Describe castability and weld ability of metal.
 - (d) Describe properties chemical composition of gun metal and phosphor bronze.
 - (e) Explain radiography non-destructive testing method with a neat sketch.
 - (f) Explain Annealing process with a neat sketch.

- Q.6** **Attempt Any Two out of following** (16)
- (a) Draw with a neat sketch Iron carbon equilibrium diagram.
 - (b) Explain powder metallurgy in detail
 - (c) Explain principle, operation and application of flame hardening.

Shri Vile Parle Kelavani Mandal's
SHRI BHAGUBHAI MAFATLAL POLYTECHNIC
AUTONOMOUS SEMESTER EXAMINATION APRIL/MAY-2018

TIME ALLOWED: 03 HOURS
MAXIMUM MARKS: 100
COURSE: THEORY OF MACHINES

SEAT NO. _____
SEMESTER: III
PROGRAMME: MECHANICAL ENGG
CODE: 160204

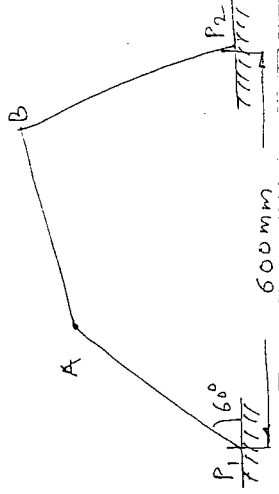
INSTRUCTIONS:

- (1) Answer to the two sections must be written in separate answer books.
- (2) Attempt **ALL** questions from Section-I and Section-II.
- (3) All questions are compulsory.
- (4) Illustrate your answers with neat sketches, wherever necessary.
- (5) Use of Mathematical and Steam tables and pocket calculator (non-programmable) is permissible.
- (6) Figures to the right indicate full marks.
- (7) Assume suitable additional data, if necessary.

SECTION-I

Q.1 The dimensions and configuration of the four bar mechanism, shown in fig. are as follows: (16)

$P_1A = 300$ mm, $P_2B = 360$ mm, $AB = 360$ mm, $P_1P_2 = 600$ mm
The angle $AP_1P_2 = 60^\circ$. The crank P_1A has an angular velocity of 10 rad/s and an angular acceleration of 30 rad/s^2 , both clockwise. Determine the angular velocities and angular accelerations of P_2B and AB and the velocity and acceleration of Point B.



Q.2 **Attempt Any Two** (14)

- (a) Draw and explain the working of Scotch Yoke mechanism and elliptical trammel.
- (b) Write any four applications of reverted gear train. Also write the speed ratio formula for reverted gear train.
- (c) Sketch and explain different types of cam and followers.

Q.3 **Attempt Any Two** (20)

- (a) Draw the profile of a cam imparting following motion of a roller follower
Stroke length = 42 mm Roller diameter = 14 mm
Base circle diameter = 60 mm Angle of rise = 120°
Angle of dwell = 60° Angle of return = 180°
The follower rises with SHM and return with uniform acceleration and retardation.

PTO.

- (b) In a reverted epicyclic gear train, the arm A carries two gear B and C and a compound gear D-E. The gear B meshes with gear E and the gear C meshes with gear D. The number of teeth on gears B, C and D are 75, 30 and 90 respectively. Find the speed and direction of gear C when gear B is fixed and the arm A makes 100 rpm clockwise.
- (c) (i) Draw neat labelled sketch of spur gear terminology.
(ii) Explain successfully constrained pair and forced closed pair. Give example.

SECTION-II

Q.4

Answer Any Three out of Five

(18)

- (a) Explain the phenomenon slip and creep in belt drives.
(b) Explain the construction and working of internal expanding shoe brake.
(c) Write down the difference between Governor and flywheel.
(d) What is friction bearing?
(e) Differentiate between gear and belt drive.

Q.5

Attempt Any Two out of Three

(12)

- (a) A shaft has a number of collars integral with it. The external diameter of the collars is 400 mm and the shaft diameter is 250 mm. If the intensity of the pressure is 0.35 N/mm^2 (uniform) and the co-efficient of friction is 0.05. Estimate
(i) Power absorbed when the shaft runs at 105 rpm carrying a load of 150 KN and
(ii) Number of collars require
(b) Explain the construction and working of centrifugal clutch.
(c) Explain the construction and working of any one type of governor.

Q.6

Attempt Any Two out of Three

(20)

- (a) A pulley used to transmit power by means of ropes has a diameter of 3.6 meters and has 15 grooves of 45° angle. The angle of contact is 170° and the coefficient of friction between the ropes and the groove sides is 0.28. The maximum possible tension in the ropes is 960 N and the mass of the rope is 1.5 kg per meter length. What is the speed of pulley in r.p.m. and the power transmitted if the condition of maximum power prevail?
(b) A band brake acts on the $3/4^{\text{th}}$ of circumference of a drum of 450 mm diameter which is keyed to the shaft. The band brake provides a braking torque of 225 N.m. One end of the band is attached to a fulcrum pin of the lever and the other end to a pin 100 mm from the fulcrum. If the operating force is applied at 500 mm from the fulcrum and the coefficient of friction is 0.25. find the operating force when the drum rotates in the
(i) anticlockwise direction (ii) clockwise direction
(c) A multi-disc clutch has three discs on the driving shaft and two on the driven shaft. The outside diameter of the contact surfaces is 240 mm and inside diameter 120 mm. Assuming uniform wear and coefficient of friction as 0.3. Find the maximum axial intensity of pressure between the discs for transmitting 25 KW at 1575 rpm.

Shri Vile Parle Kelavani Mandal's
SHRI BHAGUBHAI MAFATLAL POLYTECHNIC
AUTONOMOUS SEMESTER EXAMINATION APRIL/MAY- 2018

TIME ALLOWED: 03 HOURS
MAXIMUM MARKS: 100
COURSE: FLUID MECH & HYD M/CS

SEAT NO. _____
SEMESTER: III
PROGRAMME: MECHANICAL ENGG.
CODE: 160205

INSTRUCTIONS:

- (1) Answer to the two sections must be written in separate answer books.
- (2) Attempt All questions.
- (3) All Questions are compulsory.
- (4) Use of Mathematical and Steam tables and pocket calculator (non-programmable) is permissible.
- (5) Illustrate your answers with neat sketches, wherever necessary.
- (6) Figures to the right indicate full marks.
- (7) Assume suitable additional data, if necessary.
- (8) The student should read the name and code of the subject and confirm that the question paper received is as per subject registered.

SECTION - I

- Q.1 Solve any SIX out of EIGHT (18)
- (a) Define specific weight & specific gravity for the fluid. Calculate specific weight & specific gravity for the petrol which weight 36000N occupying 5m^3 .
 - (b) Explain the significance of vapour pressure as related to the working of hydraulic machines.
 - (c) Explain the concept of absolute pressure, gauge pressure & atmospheric pressure with a neat sketch.
 - (d) State the various types of fluid flows. Explain any one in detail.
 - (e) State Bernoulli's theorem. Write down Bernoulli's equation and state the meaning of each term used in it.
 - (f) State laws of fluid friction for turbulent flow.
 - (g) List all the minor losses of head along with their mathematical expression & necessary sketches their mathematical expression & necessary sketches for a fluid flowing through pipe.
 - (h) Obtain an equation to find force of impact of jet which strikes on a flat plate at right angles which is fixed.

- Q.2 Attempt any FOUR out of SIX (16)
- (a) Classify devices used for measuring pressure of fluid. Explain the device used for the calibration of other pressure gauge.
 - (b) State and prove Pascal's law. Also state any two applications of Pascal's law.
 - (c) Derive an expression for Darcy's formula for loss of head due to friction for a fluid flowing through the pipe.
 - (d) A jet of water of diameter 75mm moving with velocity of 25m/s strikes a fixed plate in such a way that angle between jet and plate is 60° . Find the force exerted by jet on the plate
i) in the direction normal to plate ii) in the direction of jet.

1/3
160205

- (e) When a sudden contraction is introduced in a horizontal pipeline from 40cm to 20cm, the pressure of water changes from $1 \times 10^5 \text{ N/m}^2$ to $8 \times 10^4 \text{ N/m}^2$. Calculate the rate of flow. Assume C_c of jet = 0.62.
- (f) Draw inlet & outlet velocity triangles for the moving curved vane, when the jet strikes tangentially at one of its tip. Also give the expressions for force exerted by jet & work done by jet on the vane in the direction of motion

Q.3

Attempt any TWO out of THREE

(16)

- (a) The pressure of fluid of specific gravity 0.8 flowing in a horizontal pipeline is determined with a simple U-tube manometer. The level of mercury surface in the right limb open to atmosphere is 90mm above the centre of pipe. The level of mercury in the left limb, which is connected to pipe is 65mm below centre of pipe. Determine pressure of fluid in the pipe in i) m of water (gauge) ii) m of water (absolute) iii) N/m^2 (gauge) iv) N/m^2 (absolute)
- (b) A circular plate of 6m diameter is immersed in a fluid with specific gravity 0.8 in such a way that its maximum & minimum depth from surface of fluid is 3m & 9m respectively. Determine the total pressure on the plate & the position of centre of pressure.
- (c) A venturimeter with inlet diameter of 200mm and throat diameter of 100mm is installed in a horizontal pipe to measure flow of water. The pressure at the inlet is $24 \times 10^4 \text{ N/m}^2$ and that at the throat is $3 \times 10^4 \text{ N/m}^2$. Calculate discharge through the pipe and velocity of water at the throat if $C_d = 0.97$

SECTION-II

Q.4

Attempt any SIX of the following.

(18)

- (a) State the function of the following parts of the pelton wheel
i) casing ii) Nozzle
- (b) How do you classify water turbines based on direction of water flow? Give examples.
- (c) What is difference between centrifugal pump and reciprocating pump?
- (d) Draw a neat sketch of a centrifugal pump and name the parts.
- (e) What is meant by cavitation and what are the effects of cavitation in pumps?
- (f) In a turbine the relative velocity and velocity of flow at inlet equal and in same direction under what conditions this can occur?
- (g) A turbine develops 600KW power. The net head available is 40m. If the overall efficiency of the turbine is 0.8 What is the discharge through the turbine?
- (h) Explain monomeric and overall efficiency

Q.5

Attempt any FOUR

(16)

- (a) Classify hydraulic turbines.
- (b) Explain the working of double acting.
- (c) Write a short note on testing of centrifugal pump.
- (d) The impeller of a centrifugal pump has outer diameter of 40cm and inner diameter of 20cm. The blade angle at the outlet is 30° the speed of the impeller is 1450 rpm. The velocity of flow at inlet and outlet is same at 2.2m/s. If the manometric efficiency is 75% find the head developed?
- (e) Explain the function of draft tube.
- (f) What are the criteria for the selection of hydraulic turbines.

Q.6

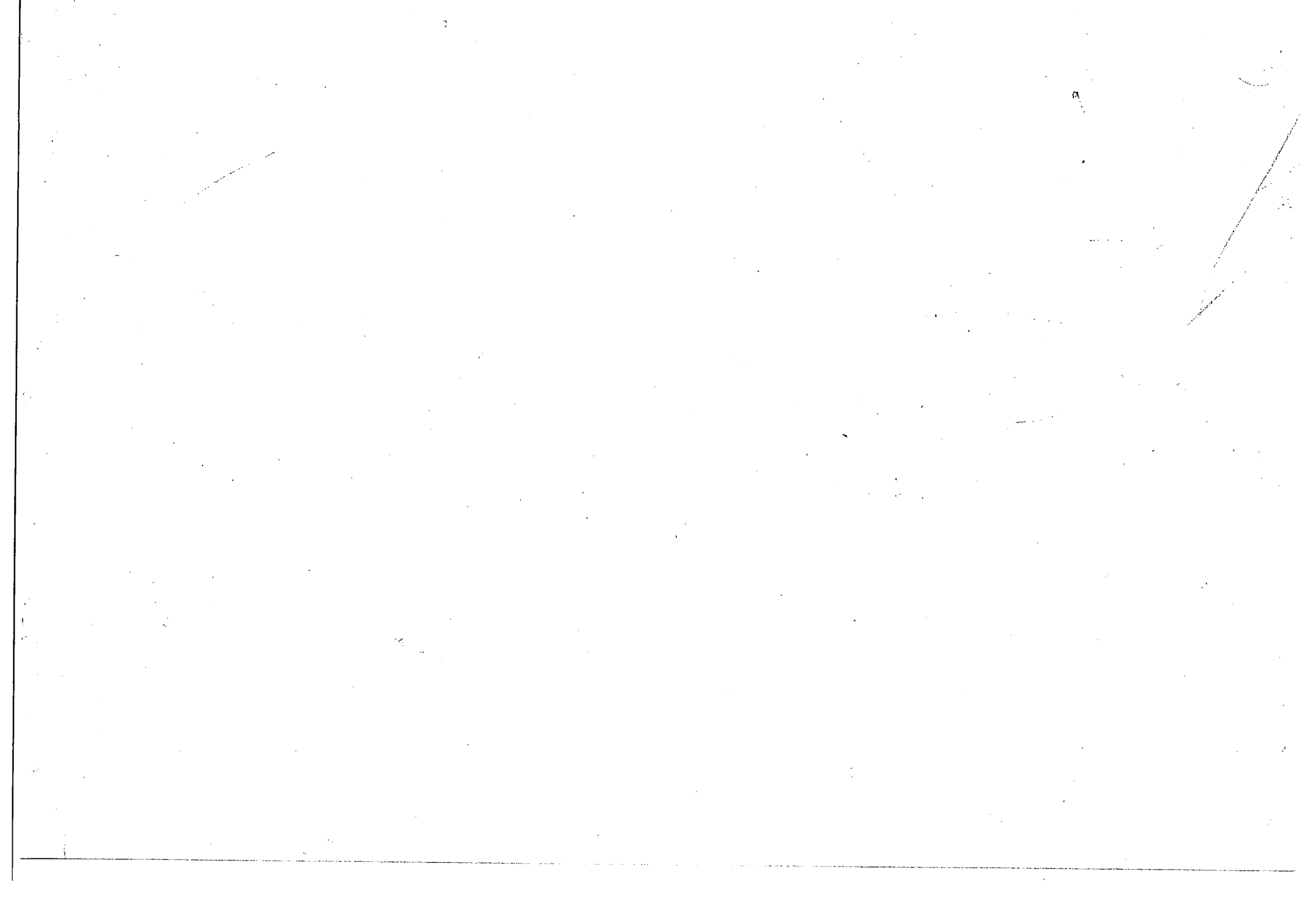
Attempt any TWO out of THREE

(16)

- (a) A Kaplan turbine produces 36 MW under a head of 20m with an overall efficiency of 94%. Ratio of d/D (inner/outer) is $1/3$, flow ratio is $1/2$ and speed ratio is 2. Estimate the diameter of turbine boss and turbine speed.
- (b) Explain the indicator diagram with effect of acceleration and friction head.
- (c) A pelton wheel develops 100000 KW under a head of 7450m when running at 300 rpm. It has two jets. Find the diameter of jet and wheel and also find the discharge. Assume $C_v = 0.98$, Speed ratio = 0.46. Jet diameter is not to exceed $1/6^{\text{th}}$ wheel diameter.

3/3

160205



SECTION - II

Q.4

Attempt any one of the following

(20)

- a) A vertical square prism of base 35 mm side and 80mm long has one of its vertical face inclined at angle 30° to V.P. It is penetrated by another square prism side of base 35mm and axis length 80mm so that its axis parallel to both H.P. and V.P. and bisects the axis of the vertical prism. The faces of the penetrating prism are equally inclined to H.P. Draw the projections of the prisms showing lines of intersection.
- b) A vertical cone base 80mm diameter and axis 100mm long resting on H.P. is penetrated by a horizontal cylinder of 50mm diameter. The axis of cylinder is 30mm above the base of cone and 10mm in front of the axis of cone. Draw the projections showing suitable length of penetrating cylinder.

Q.5

Attempt the following

(10)

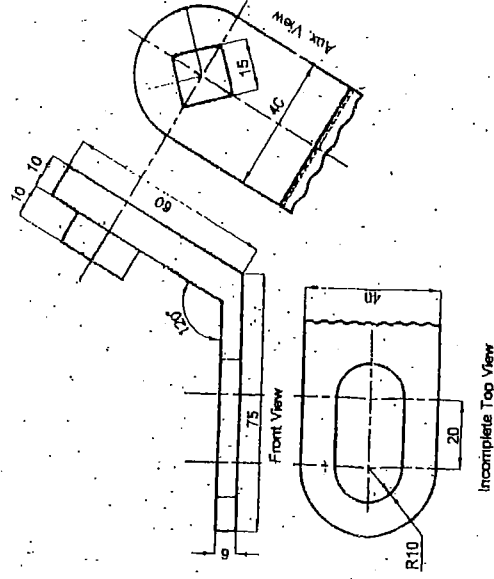
- a) A square prism, base 45mm side and 80mm height, stands vertically on the H.P. with the edges of the base equally inclined to V.P. A cutting plane perpendicular to V.P. and inclined at 60° to H.P. cuts its axis at point 15mm from its top end. Draw front view, sectional top view and true shape of section.
- b) A right circular cone having diameter of base 40mm axis length 60mm resting on its base on H.P. is cut by an AIP inclined at 45° to H.P. and bisecting the axis. Draw the development of lateral surface of cone retaining the portion containing base.

(10)

Q.6

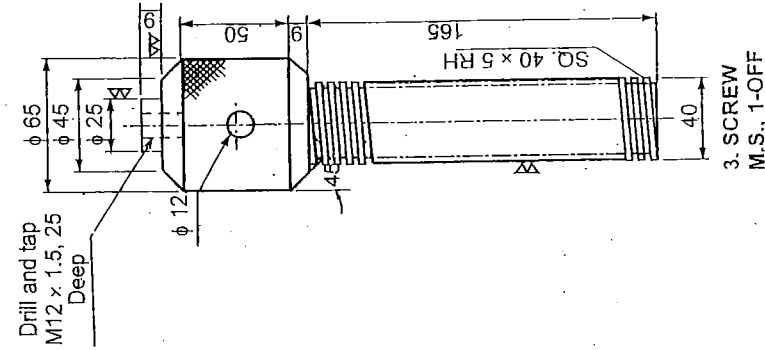
Fig. No.3 shows front view, partial auxiliary view and incomplete top view of the object. Draw the given views and complete the top view.

(10)



Incomplete Top View

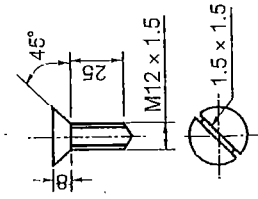
Fig. No.3 Section II Q.6



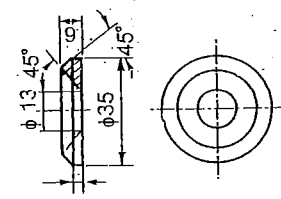
Drill and tap
M12 x 1.5, 25
Deep

TOLERANCE CHART

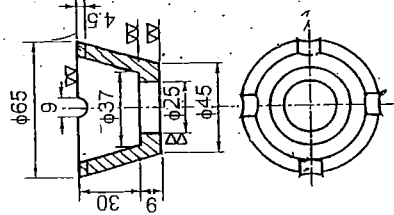
+0.030	+0.039
50H ₇ = +0.000	50h ₆ = +0.020



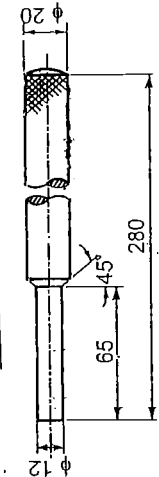
6. SET SCREW
M.S., 1-OFF



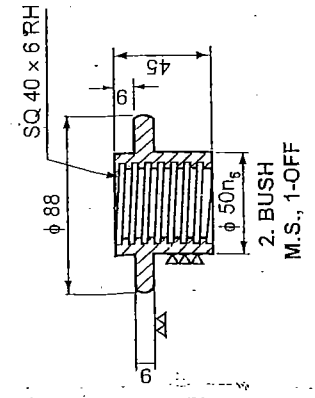
5. WASHER
M.S., 1-OFF



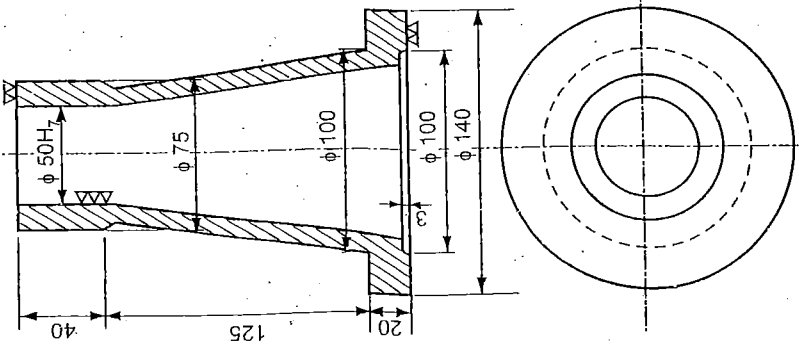
4. CUP
C.I., 1-OFF



7. TOMMY BAR
M.S., 1-OFF



2. BUSH
M.S., 1-OFF



1. BODY
C.I., 1-OFF

Q19 fig 1 screw Jack Details

Shri Vile Parle Kelavani Mandal's
SHRI BHAGUBHAI MAFATLAL POLYTECHNIC
AUTONOMOUS SEMESTER EXAMINATION APR/MAY 2018

SEAT NO. _____

TIME ALLOWED: 03 HOURS

SEMESTER: III

MAXIMUM MARKS: 100

PROGRAMME: MECHANICAL ENGG.

COURSE: THERMAL ENGINEERING.

CODE: 160208

INSTRUCTIONS:

- (1) Answer to the two sections must be written in separate answer books.
- (2) Attempt **ALL** questions from Section-I and Section-II.
- (3) Use of Mathematical and Steam tables and pocket calculator (non-programmable) is permissible.
- (4) Illustrate your answers with neat sketches, wherever necessary.
- (5) Figures to the right indicate full marks.
- (6) Assume suitable additional data, if necessary.
- (7) The student should read the name and code of the subject and confirm that the question paper received is as per subject registered.

SECTION-I

- Q.1. Attempt any Six. (18)**
- (a) State First law of thermodynamics also explain PMMI (Perpetual Motion Machine of 1st kind) (18)
 - (b) Write assumption for air standard cycles.
 - (c) Gas at 12 BAR, 0.15 m³ and 235°C expands up to 1.5 bar isentropically. Find mass and work done during the process.
 - (d) Write the applications of air compressors.
 - (e) With neat sketch explain working of centrifugal rotary air compressor.
 - (f) Draw P-V and T-S diagram of Carnot cycle.
 - (g) Differentiate between extensive and intensive thermodynamics properties.
 - (h) A closed vessel contains 2Kg of gas at 0.7 bar and 25°C. Heat is supplied till the pressure increases to 2 bar. Calculate final temperature of gas and amount of heat supplied. (16)
- Q.2. Attempt any Four. (16)**
- (a) Write advantages and multistaging of air compressor.
 - (b) A certain quantity of air has a volume of 0.028m³ at 1.25 bar and 25°C. It is compressed to 0.0042m³ according to $PV^{1.3} = C$, find the final temperature and work done.
 - (c) Define internal energy, enthalpy entropy and work done.
 - (d) Differentiate between reciprocating and rotary air compressors.
 - (e) Derive $C_p - C_v = R$.
 - (f) A quantity of air has volume of 0.4m³ at 5 bar and 80°C. It is expanded at constant temperature to a pressure of 1 bar. Determine work done and final volume. (16)

- Q.3. Attempt any Two. (16)**
- (a) Derive equation of efficiency of Dual cycle in terms of pressure ratio 'α' cut off ratio 'γ' and compression ratio rc. (16)

PTO..

- (b) An ideal diesel cycle has compression ratio of '16' with lowest pressure and temperature are 1 bar and 30°C respectively. If head added during cycle is 516 KJ/Kg. Determine-
- (i) Pressure and temperature at each salient points.
(ii) Work done in cycle.(iii) Efficiency (iv) Mean effective pressure.
- (c) A single acting reciprocating air compressor has cylinder diameter and stroke of 20cm and 30 cm respectively. The compressor sucks air at 1 bar and 27°C and delivers at '16'bar while running at 150 rpm. Compare the power and final temperature for single stage and two stage and comment on the answer, which one should be better.

Q.4.

SECTION-II

(18)

Attempt any Six.

- (a) State the names of two boiler mountings and two accessories.
(b) Give four applications of steam nozzles.
(c) List four losses in steam turbine.
(d) Draw the different processes of Rankine cycle on T-S diagram. Mention different operations of Rankine cycle.
(e) Differentiate fire and water tube boilers.
(f) Define-
(i) Dryness fraction (ii) Enthalpy of dry steam (iii) Degree of superheat
(g) What are the sources of air leakage into a condenser? Also state its effect.
(h) Explain principal parts of steam engine.

Q.5.

(16)

Attempt any Four.

- (a) Explain nozzle control governing with neat sketch.
(b) Draw temperature entropy diagram for formation of steam and show the following on it.
(i) Saturated liquid line (ii) Wet regions (iii) Critical point (iv) Dryness fraction line.
(c) Explain the construction of impulse turbine with neat sketch.
(d) Define boiler draught and state its necessity. Give its classification.
(e) Classify steam turbine on the basis of
(i) Principle of action (ii) Direction of steam flow.
(iii) Method of governing (iv) Steam pressure
(f) Describe with neat sketch, different forms of surface condenser.

Q.6.

(16)

Attempt any Two.

- (a) State principle and explain in detail working of reciprocating steam engine with neat sketch.
(b) Draw labelled sketch of Babcock and Wilcox boiler. Explain its working.
(c) A steam enters an impulse turbine wheel having nozzle angle 20° at a velocity of 450 m/s. The exit angle of moving blade is 20° and the relative velocity of steam may be assumed constant over the moving blades. If the blade speed is 180 m/s. Calculate-
(i) Blade angle at inlet (ii) Work done per kg of steam.
(iii) Power developed if the steam flow rate is 1.6 kg/sec.

Shri Vile Parle Kelavani Mandal's
SHRI BHAGUBHAI MAFATLAL POLYTECHNIC
AUTONOMOUS SEMESTER EXAMINATION APRIL/MAY -2018

SEAT NO. _____
SEMESTER: III
PROGRAMME: ME/PL/CH

TIME ALLOWED: 03 HOURS
MAXIMUM MARKS: 100

COURSE: BASICS OF ELECTRICAL & ELECTRONICS CODE: 160015

INSTRUCTIONS:

- (1) Answer to the two sections must be written in separate answer books.
- (2) All questions are compulsory.
- (3) Illustrate your answer with neat sketches, wherever necessary.
- (4) Use of pocket calculator (non-programmable) is permissible.
- (5) Figures to the right indicate full marks.
- (6) Assume suitable additional data, if necessary.
- (7) Student should read the name and code of the subject and confirm that the question paper received is as per subject registered.

SECTION-I

Q.1 Write ANY SIX out of EIGHT (18)

- a) Define the following:
 - i) Electric potential
 - iii) Fleming's Right Hand Rule
 - ii) Electric Energy
- b) A circuit draws current of 10A at voltage of 200V & it's p.f. is 0.8 lagging.
Calculate : i) Apparent Power ii) True Power iii) Reactive Power
- c) Write down applications for DC series motor, DC shunt motor & DC compound motor (2 applications for each)
- d) Draw the characteristics of DC series motor.
- e) Explain in brief construction of core type transformer.
- f) Enlist the applications of 3 phase induction motors.
- g) Compare between rope drive and belt drive.
- h) State the advantages of electrical heating

Q.2 Write ANY FOUR out of SIX. (16)

- a) Write down voltage & current equations for the star connection circuit & delta connection circuit, with the help of diagram.
- b) Explain the working principle of DC motor.
- c) Derive the EMF equation for 1 Phase transformer.
- d) A 3300/250V, 50 Hz, 1 - ϕ transformer is built on a core having an effective cross sectional area of 125 cm² and 70 turns on the Low Voltage Winding.
Calculate: i) No. of turns on High Voltage winding.
ii) Value of Maximum Flux Density.
- e) Why does a 1 - Phase Induction Motor requires starting torque to run? Explain
- f) State the differences between an Individual drive & Group drive.

- Q.3** **Write ANY TWO out of THREE** **(16)**
- Write down the speed control methods of 3 Phase Induction motor. Explain any 2 methods in brief.
 - With the help of block diagram. Explain electrical drive system. Also write down the advantages of electrical drives.
 - Explain in brief types of electrical heating system.

SECTION – II

- Q.4** **Attempt ANY SIX of the following.** **(18)**
- Draw symbols of SCR, DIAC & TRIAC.
 - Name the different photo devices used in Electronic circuits & give their functions.
 - State necessity of filter circuit.
 - Draw the neat diagram of bridge type rectifier circuit.
 - Define transducer and give its classification.
 - With the help of diagram, explain process of measurement of pressure using Bourdon Tube.
 - Describe in brief working of LVDT for displacement measurement.
 - Enlist various applications of microprocessor & microcontroller in mechanical & chemical industries.

- Q.5** **Attempt ANY FOUR of the following.** **(16)**
- Draw neat diagram of 4:1 multiplexer & explain how it selects a data line with the help of truth table.
 - Describe working of R-C phase shift oscillator with the help of suitable diagram.
 - Compare full wave centre trapped rectifier with half wave rectifier. (Any Four Points)
 - Draw the symbol & connection diagram to explain working of seven segment display.
 - Explain construction & V-I characteristic of DIAC.
 - What do you understand by colour coding of resistors? State the meaning of first, second, third and fourth colour band.

- Q.6** **Attempt ANY TWO of the following.** **(16)**
- i) Define conductor, semiconductor & insulator giving example of each.
ii) Draw the input and output characteristics of BJT in C-E configuration.
 - State the necessity of amplifier. Draw the circuit diagram of single stage transistor amplifier stating its working. Also obtain the input & output waveforms along with its frequency response.
 - Draw the symbol & truth table as well as write the Boolean expression for following logic gates.
i) OR ii) NOR iii) AND iv) NAND

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AUTONOMOUS SEMESTER EXAMINATION APRIL/MAY- 2018

TIME ALLOWED: 03 HOURS
MAXIMUM MARKS: 100
COURSE: AUTOMATION

SEAT NO. _____
SEMESTER: IV
PROGRAMME: MECH. ENGG.
CODE: 160210

INSTRUCTIONS:

- (1) Answer to the two sections must be written in separate answer books.
- (2) Attempt **all** questions.
- (3) All Questions are compulsory.
- (4) Use of Mathematical and Steam tables and pocket calculator (non-programmable) is permissible.
- (5) Illustrate your answers with neat sketches, wherever necessary.
- (6) Figures to the right indicate full marks.
- (7) Assume suitable additional data, if necessary.
- (8) The student should read the name and code of the subject and confirm that the question paper received is as per subject registered.

SECTION - I

- Q.1** **Solve any SIX** **(18)**
- (a) State reasons for Automation.
 - (b) Draw rotary indexing machine.
 - (c) Define accuracy and precision.
 - (d) Explain working of tachometer.
 - (e) Classify sensors used in Automation.
 - (f) Explain single station operation.
 - (g) Differentiate AC servomotors and DC servomotors.
 - (h) State six disadvantages of automation.
- Q.2** **Attempt any FOUR** **(16)**
- (a) Define fixed Automation & flexible automation.
 - (b) Explain buffer storage with diagram.
 - (c) Explain working of transfer machine.
 - (d) Explain Cartesian co-ordinate system used in Robotics.
 - (e) State four advantages and four applications of robotics.
 - (f) *Explain any one robot control system*
- Q.3** **Attempt any TWO** **(16)**
- (a) Explain Automation strategies. State its advantages.
 - (b) Explain Automated assembly systems.
 - (c) Explain any two end effectors and two sensors used in Robotics.

SECTION-II

Q.4

Attempt any SIX

(18)

- (a) What do you mean by PLC? Explain its configuration.
- (b) What is AGV system? Classify the AGV system.
- (c) Explain automated inspection principle and methods.
- (d) Write short note on
 - i) counters
 - ii) master control relays
- (e) Write sensor output classification.
- (f) Describe Quantitative analysis of system.
- (g) Explain radio frequency system.
- (h) What is proximity sensors? State its application.

Q.5

Attempt any FOUR

(16)

- (a) Explain system block diagram of PLC.
- (b) Differentiate between limit switch and proximity switch.
- (c) What is carousel storage system? Explain its configuration and control features and applications.
- (d) Explain traffic control and safety term in automated material handling and storage systems.
- (e) Write short note on :
 - i) Magnetic stripe
 - ii) Optical character Recognition.
- (f) Describe flexible inspection systems and probes.

Q.6

Attempt any TWO out of THREE

(16)

- (a) Explain bar code technology.
- (b) Describe wiring techniques in PLC. Explain following points in it.
 - a) PLC power connection
 - b) input wiring
 - c) output wiring
 - d) relays output
- (c) Explain with neat sketch Automated storage / Retrieval system.

Shri Vile Parle Kelavani Mandal's
SHRI BHAGUBHAI MAFATLAL POLYTECHNIC
AUTONOMOUS SEMESTER EXAMINATION APRIL/MAY- 2018

TIME ALLOWED: 03 HOURS
MAXIMUM MARKS: 100
COURSE: POWER ENGINEERING

SEAT NO. _____
SEMESTER: IV
PROGRAMME: MECHANICAL ENGG.
CODE: 160211

INSTRUCTIONS:

- (1) Answer to the two sections must be written in separate answer Books.
- (2) All questions are compulsory.
- (3) Illustrate your answer with neat sketches, wherever necessary.
- (4) Use of Mathematical and Steam tables and pocket calculator (non-programmable) is permissible.
- (5) Figures to the right indicate full marks.
- (6) Assume suitable additional data, if necessary.
- (7) Student should read the name and code of the subject and confirm that the question paper received is as per subject registered.

SECTION-I

Q.1

Solve Any Six of the following

- (a) Draw neat sketch of 2 stroke engine.
 - (b) Write the factors that differs actual indicator diagram from theoretical indicator diagram.
 - (c) Explain the effect of detonation in Spark Ignition engine.
 - (d) Write the application of Internal Combustion engine.
 - (e) Define dead centre and volumetric efficiency.
 - (f) Why a proper firing order is required to design?
 - (g) Explain individual pump solid injection system.
 - (h) Define indicated mean effective pressure and volumetric efficiency.
- (18)**

Q.2

Solve Any Four of the following.

- (a) Classify Internal Combustion engine.
 - (b) Explain the factors affection valve timing diagram.
 - (c) Compare Spark Ignition and Compression Ignition engine (write 6 main point)
 - (d) Explain magneto ignition system with neat sketch.
 - (e) Explain construction and working of air injection system.
 - (f) A following data were recorded during a 1 hour test on 2 stroke cycle oil engine
Brake power 150 KW fuel consumption 36 kg/hr Calorific value of fuel 42500 KJ/kg. mass of cooling water 470 kg/hr. Temperature of jacket cooling water 28°C mass flow rate of exhaust gases 500 kg/hr. temperature of exhaust gases 400°C and specific heat of exhaust gases 1 KJ/kg k. Prepare heat balance sheet.
- (16)**

Q.3

Attempt Any Two of the following

- (a) A 4 stroke 4 cylinder piston engine develops 7.5 KW brake power at 2500 rpm.
The mean effective pressure on each piston is 8 bar and the mechanical efficiency is 80%. Calculate the diameter and stroke of each cylinder if the stroke

- and bore ratio is 1.5. Also Calculate break specific fuel consumption of the engine. If break thermal efficiency is 28%, The calorific value is 44100 KJ/ kg.
- (b) A simple Jet carburettor is required to supply 5 kg of air power minute. The oil is initially at 1.013 bar and 27°C. Calculate throat diameter of the choke for a flow velocity of 90 m/sec and velocity coefficient of 0.8.
- (c) Explain with neat sketch stages of combustion of Compression Ignition.

SECTION-II

Q.4 Attempt Any Six of the following (18)

- (a) What is meant by supercharging? What is its effect on engine performance?
- (b) Write the difference between super charging and turbocharging.
- (c) Differentiate between turbojet and turboprop engine.
- (d) Write at least three applications of gas turbine.
- (e) Define emissivity and transmissivity.
- (f) Define heat transfer also give different modes of heat transfer.
- (g) Draw a labelled diagram sketch of elapsd cycle gas turbine.
- (h) List the advantages of jet propulsion over other system.

Q.5 Attempt Any Four of the following (16)

- (a) What are the limitation of super charging?
- (b) What is governing of Internal Combustion engine? Describe the need of governing, state its application.
- (c) With I.S. diagram, explain the advantages of reheating in gas turbine.
- (d) Compare open cycle gas turbine with closed cycle gas turbine.
- (e) Draw neat labelled diagram in pipe heat exchange and explain its construction and working.
- (f) Explain principle of working of ram jet with neat sketch.

Q.6 Attempt Any Two of the following (16)

- (a) State common faults, causes and remedies of I.C. Engine.
- (b) Define 'a perfect black body. By considering a body explain the terms absorptivity transmissivity and reflectivity. Also state Stefan Boltzmann's law.
- (c) A steam pipe of 16 cm inside diameter and 17 cm outside diameter ($K=58\text{W/mk}$) is covered with first layer of insulating material of 3 cm thick ($K=0.17\text{W/mk}$) and second layer of insulating material 5 cm thick ($K=0.093\text{ W/mk}$). The temperature of steam passing through pipe is 300°C and atmosphere temperature is 30°C. Take $h_i=30\text{W/m}^2\text{k}$ and $h_o=5.8\text{ W/m}^2\text{K}$. Find the heat lost per meter length of pipe.

Shri Vile Parle Kelavani Mandal's
SHRI BHAGUBHAI MAFATLAL POLYTECHNIC
AUTONOMOUS SEMESTER EXAMINATION APRIL/MAY, 2018

SEAT NO. _____
SEMESTER: IV
PROGRAMME: MECHANICAL ENGG.
SUB CODE: 160213

TIME ALLOWED: 03 HOURS

MAXIMUM MARKS: 100

COURSE: INDUSTRIAL FLUID POWER

Instructions:

1. Answer to the two sections must be written in separate answer books.
2. All Questions are compulsory.
3. Use of Mathematical and Steam tables and pocket calculator (non-programmable) is permissible.
4. Illustrate your answer with neat sketches, wherever necessary.
5. Figure to the right indicate full marks.
6. Assume suitable additional data, if necessary.
7. The students should read the name and code of the subject and confirm that the question paper received is as per subject registered.

SECTION - I

Q.1 Attempt any six (18)

- (a) Draw neat sketch of oil Reservoir & label the parts. Also draw its symbol.
- (b) Differentiate between seat type & spool type direction control valves.
- (c) Explain Meter-out circuit with neat labelled circuit diagram.
- (d) Give classification of hydraulic seals. Also name any four types of materials used for seals.
- (e) "Flow control valves are normally integrated with check valves in hydraulic circuits" Justify.
- (f) State at least three limitations of using hydraulic systems over pneumatic systems.
- (g) Draw symbol of following components used in hydraulic circuit.
 - i) Pressure Reducing Valve
 - ii) Hand level operated spring returned 4 way 3 positions tandem centre Direction Control valve.
 - iii) Variable Displacement bi-directional rotary actuator.
- (h) State function of control valves in hydraulic system. (At least three functions)

Q.2 Attempt any four (16)

- (a) State the causes and remedies for the following problem in hydraulic circuit.
 - a. Fluctuating Motion of actuator.
 - b. No pump delivery.
- (b) Differentiate between gear pump & piston pump on the basis of
 - a. Construction
 - b. Function
 - c. Delivery of oil
 - d. Pressure Range.

SECTION - II

Q.4

Attempt any Six

(18)

- (a) Draw a suitable pneumatic circuit showing use of OR logic function.
- (b) State the causes and remedies for the following troubles in pneumatic system.
 - i) Filter not working
 - ii) Resistance to air flow.
- (c) Give the detailed classifications of valves used in pneumatic system.
- (d) What will happen if 'FRL' is not used in pneumatic system?
- (e) Compare seat types with spool type valve.
- (f) Explain the working of twin pressure valve with a neat sketch.
- (g) Draw constructional details of pneumatic hose. Why hose is required in pneumatic circuits?
- (h) What is impulse circuit? Explain.

Q.5

Attempt any four

(16)

- (a) Draw actual pneumatic system structure state the functions of each component of the system.
- (b) Explain the construction and working of time delay valve with the help of a neat sketch. Also state its application.
- (c) Draw the symbols of
 - i) Diaphragm Cylinder
 - ii) Pressure regulator
 - iii) Uni-directional air motor
 - iv) Tandem Cylinder

- (d) A pneumatic Cylinder receives an air flow of 120 LMP at 6 bar. It is has 80mm diameter with a 40 mm diameter rod, Calculate
 - i) Extension and retraction Speeds
 - ii) Extension and retraction load carrying capacities.
- (e) Explain the advantages of hydraulic system over the pneumatics system
- (f) Draw an exhaust air throttling speed control circuit for pneumatic double acting actuator. Explain its working in brief.

Q.6

Attempt any two

(16)

- (a) A workpiece is to be clamped by double acting actuator. Another double acting actuator to be used for stamping operation. Extension of Stamping actuator is to start only after the completion of extension of clamp actuator. Similarly retraction of clamp actuator is to start only after the completion of retraction stamping actuator. Develop the suitable travel dependent pneumatic sequencing circuit ensure the safety.
- (b)
 - i) Explain the contraction and working of pressure relief valve with neat sketch.
 - ii) Sketch normal and actuated positions of 4 x 2 seat type direction control valve state its applications.
- (c)
 - i) Draw a circuit to control speed of bi-directional air motor. Explain its working in brief.
 - ii) Develop a suitable pneumatic circuit to increase speed of extension for a double acting cylinder. Explain its working in brief.

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Shri Vile Parle Kelavani Mandal's
SHRI BHAGUBHAI MAFATLAL POLYTECHNIC
AUTONOMOUS SEMESTER EXAMINATION APRIL/MAY-2018

TIME ALLOWED: 03 HOURS
MAXIMUM MARKS: 100
COURSE: AUTOMOBILE ENGINEERING

SEAT NO. _____
SEMESTER: IV
PROGRAMME: MECH. ENGG.
CODE: 160214

INSTRUCTIONS:

- (1) Answer to the two sections must be written in separate answer books.
- (2) Attempt ALL questions from Section-I and Section-II.
- (3) All questions are compulsory.
- (4) Illustrate your answers with neat sketches, wherever necessary.
- (5) Use of Mathematical and Steam tables and pocket calculator (non-prog.) is permissible.
- (6) Figures to the right indicate full marks.
- (7) Assume suitable additional data, if necessary.

SECTION-I

Q.1 Attempt Any Six (18)

- (a) Draw typical gear wheel drive vehicle layout.
- (b) Draw nomenclature of car body.
- (c) Explain the importance of aerodynamic shape of car body.
- (d) Differentiate between framed and frameless vehicles.
- (e) Differentiate between single plate and multi plate clutch.
- (f) State the need of gear box.
- (g) Define (i) Camber (ii) Included angle in steering geometry
- (h) Give classification of brakes.

Q.2 Attempt Any Four (16)

- (a) Define (i) Toe-In (ii) Toe- Out
- (b) Differentiate between Drum brake and disc brake.
- (c) Explain various resistances that have to overcome by automobile.
- (d) Explain with sketch overdrive.
- (e) List of stub axles and draw a sketch of any one.
- (f) Explain with sketch function of sliding joint in propeller shaft.

Q.3 Attempt Any Two (16)

- (a) Explain with sketch full floating rear axle.
- (b) Explain with sketch pneumatic braking system.
- (c) Explain with sketch recirculating ball steering gear.

SECTION-II

Q.4 **Attempt Any Six out of Eight** (18)

- (a) List down the classification of suspension system.
- (b) Explain wheel alignment in automobile.
- (c) Explain lighting system of automobile.
- (d) Explain colour coder used in automobile wiring system.
- (e) Explain need of vehicle testing.
- (f) List down the different vehicle tests.
- (g) Explain working of microprocessor in automobile control system.
- (h) Explain operating modes of ECM.

Q.5 **Attempt Any Four out of Six** (16)

- (a) Explain the construction and working of air suspension system.
- (b) Explain the construction and working of radial tyre with sketch.
- (c) Explain with sketch construction and working of fuel level gauge.
- (d) Explain the construction and working of electronics ignition system.
- (e) Explain function of electronics control module in automobile.
- (f) Explain emission norms Euro III & IV.

Q.6 **Attempt Any Two out of Three** (16)

- (a) Explain the construction and working of telescopic shock absorbers.
- (b) Explain the starting system of automobile.
- (c) List down the automobile shop equipments.

SECTION-II

Q.4

Attempt any Six out of Eight

(18)

- (a) Compare open loop and closed loop control system.
- (b) State the advantages and disadvantages of Pneumatic system.
- (c) Explain the concept of stability in control system.
- (d) State the advantages and disadvantages of Hydraulic systems.
- (e) State the advantages and disadvantages of transfer function of control systems.
- (f) Explain change over type of Push Button.
- (g) Derive steady state error coefficient for a step Input signal.
- (h) Draw and explain the symbols for
 - i) 4/2 way valve
 - ii) 4/3 way valve
 - iii) 5/2 way valve.

Q.5

Attempt any Four out of Six questions

(16)

- (a) Derive the expression for steady state error of a simple closed loop control system.
- (b) Explain solenoid valves with help of suitable diagram.
- (c) Explain and derive force voltage analogy for modelling of system.
- (d) Explain Relays with help of suitable diagram.
- (e) Explain the various rules of Block diagram reduction.
- (f) Explain servo valves with help of suitable diagram

Q.6

Attempt any Two out of Three questions

(16)

- (a) Explain the principle of Cascade method using electro pneumatics with a suitable sequence example.
- (b) Give, $G(s) = \frac{170(1+\frac{s}{10})}{s(1+\frac{s}{1.75})(1+\frac{s}{60})}$
Draw the open loop bode diagram. Determine the gain crossover frequency, phase crossover frequency, Gain Margin, phase margin. Determine the stability of closed loop system.
- (c) The loop transfer function of a units feedback control system is $G(S). H(S) = \frac{K}{s(s+2)(s+5)}$
Sketch the Root locus of the system and determine the value of 'K' for (i) critical damping (ii) marginal stability from the Root locus.

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AUTONOMOUS SEMESTER EXAMINATION APRIL/MAY-2018

TIME ALLOWED: 03 HOURS
MAXIMUM MARKS: 100
COURSE: MATERIALS HANDLING SYSTEMS

SEAT NO. _____
SEMESTER: IV
PROGRAMME: MECH ENGG
CODE: 160216

INSTRUCTIONS:

- (1) Answer to the two sections must be written in separate answer books.
- (2) Attempt ALL questions from Section-I and Section-II.
- (3) All questions are compulsory.
- (4) Illustrate your answers with neat sketches, wherever necessary.
- (5) Use of Mathematical and Steam tables and pocket calculator (non-programmable) is permissible.
- (6) Figures to the right indicate full marks.
- (7) Assume suitable additional data, if necessary.

SECTION-I

Q.1 Attempt Any Six out of Eight (18)

- (a) Define material handling system and write their different types with applications.
- (b) Explain construction and working of lever operated hoist.
- (c) Describe with neat sketch belt conveyor and chain conveyor.
- (d) Explain construction and working of floating cranes and cranes travelling on guide rails.
- (e) Explain the principles of material handling systems.
- (f) Describe the troubleshooting of following hoists :
 - (i) Portable hand chain hoist
 - (ii) Worm geared and spur geared hoists.
- (g) Write the range of material handling.
- (h) Explain the construction and working of passenger lifts.

Q.2 Attempt Any Four out of Six (16)

- (a) Explain the method of stacking, loading and unloading system.
- (b) Explain construction and working of electric and pneumatic hoists.
- (c) Describe with neat sketch and trouble shooting of:-
 - (i) Vibrating and Oscillating conveyors
 - (ii) Screw conveyors
- (d) Classify the conveying machinery and surface transportation equipments. Which are the various types of cross handling equipments? Explain any two.
- (f) Write different types of tractionless type of conveyors. Explain any two.

Q.3 Attempt Any Two out of Three (16)

- (a) Explain construction, working and troubleshooting of :
 - (i) Bridge cranes
 - (ii) Jumper
 - (iii) Mobile crane
 - (iv) Industrial lift
- (b) Explain construction, working of troubleshooting of :
 - (i) Freight elevators
 - (ii) Chain conveyors
 - (iii) Bucket elevators
 - (iv) Industrial Lift
- (c) Explain construction, working and troubleshooting of :
 - (i) Winches
 - (ii) Capstans
 - (iii) AGV
 - (iv) Powered trucks

SECTION-JI

Q.4

Attempt Any Six

(18)

- (a) Draw hemp rope and state its advantages.
- (b) State functions of mechanism used in material handling equipment.
- (c) Explain economic of material handling systems.
- (d) Explain fixed cost involved in material handling.
- (e) Explain control brake used in MHS.
- (f) Explain selection of material handling equipment on the basis of production process involved.
- (g) State difficulties and needs of determining maintenance cost in material handling.
- (h) Explain crane attachments for handling molten metal.

Q.5

Attempt Any Four

(16)

- (a) Explain any two fastening method of steel wire rope.
- (b) Explain working of arresting gear with sketch.
- (c) Explain hoisting mechanism with diagram.
- (d) Explain methods of stocking at initial points.
- (e) Explain preventive maintenance of material handling equipments.
- (f) Explain selection of material handling equipment on the basis of load to be lifted.

Q.6

Attempt Any Two

(16)

- (a) ABC Company has three plants and three warehouses, with the following matrix find the optimum profit. Solve the problem using Vogel's method as well as North-West corner method and explain the difference in results, if any.

To From	W1	W2	W3	Supply
P1	10	12	8	6
P2	15	10	9	10
P3	9	11	10	9
Demand	7	13	5	25
			5	25

- (b) Explain grabbing attachments in material handling systems with sketches.
- (c) Explain travelling and slewing mechanism with sketch.

TIME ALLOWED: 03 HOURS

MAXIMUM MARKS: 100

COURSE: MECHANICAL MEASUREMENT & CONTROL CODE: 160217

INSTRUCTIONS:

- (1) Answer to the two sections must be written in separate answer books.
- (2) Attempt ALL Questions from Section I & Section II.
- (3) Illustrate your answer with neat sketches, wherever necessary.
- (4) Use of Mathematical and Steam tables and pocket calculator (non-programmable) is permissible.
- (5) Figures to the right indicate full marks.
- (6) Assume suitable additional data, if necessary.
- (7) Student should read the name and code of the subject and confirm that the question paper received is as per subject registered.

SECTION-I

Q.1 Answer ANY SIX out of EIGHT (3 marks each) (18)

- (a) What is dead zone? What are the factors responsible for dead zone?
- (b) Define closed loop system. State its applications.
- (c) What are the requirements of measurement?
- (d) List advantages and limitations of potentiometer (2 points)
- (e) Differentiate systematic and random error.
- (f) What is transducer? Classify it.
- (g) Define :- Threshold
Calibration
Sensitivity
- (h) Compare :- Hydraulic, pneumatic and electronic control system
(2 points each)

Q.2 Answer ANY FOUR out of SIX (4 marks each) (16)

- (a) Compare active and passive transducer.
- (b) Differentiate accuracy & precision.
- (c) Define i) Controlled variable
ii) Primary feedback signal
iii) error defector
iv) Feedback element
- (d) Classify flow meters and describe orifice type flow meter.
- (e) Explain environmental error.
- (f) List different static characteristics related to measurement.

Q.3 Answer ANY TWO out of THREE (8 marks each) (16)

- (a) Why rotameter is called variable area flow meter. Sketch & describe its working.
- (b) Explain the construction and working of venturimeter with the help of neat sketch.
- (c) Explain hydraulic control system with the help of schematic diagram. Also state advantages & disadvantages.

SECTION-II

Q.4

Solve ANY SIX of the following.

(18)

- (a) Define temperature, temperature scale. Write unit of temperature.
- (b) Classify tachometer, why tachometers are used?
- (c) What is hygrometer? Classify it.
- (d) Describe with neat sketch sight glass. Write practical application of it.
- (e) Describe with neat sketch linear potentiometer.
- (f) Illustrate with neat sketch revolution counter.
- (g) Establish relationship of $^{\circ}\text{C}$ with $^{\circ}\text{K}$, $^{\circ}\text{R}$, & $^{\circ}\text{F}$
- (h) Describe with neat sketch working of hand speed indicator

Q.5

Solve ANY FOUR of the following.

(16)

- (a) Describe with neat label sketch 'purge system' write its working.
- (b) What is thermistor, classify it. Describe bead type thermistor.
- (c) Differentiate between Resistance temperature detectors (RTD) & Thermistors.
- (d) Illustrate with sketch working of shaft & float gauge.
- (e) Explain with neat label diagram bimetallic thermometer.
- (f) State & describe Laws of thermocouple.

Q.6

Solve ANY TWO of the following.

(16)

- (a) Explain with neat sketch, working of Linear variable differential transformer transducer.
- (b) Describe with neat label diagram working of Resistance temperature detector (RTD)
- (c) Illustrate with neat label sketch capacitance Level Instrument (Sensor) used as liquid level measurement.

Shri Vile Parle Kelavani Mandal's
SHRI BHAGUBHAI MAFATLAL POLYTECHNIC
AUTONOMOUS SEMESTER EXAMINATION APRIL/MAY 2018

TIME ALLOWED: 03 HOURS
MAXIMUM MARKS: 100

SEAT NO. _____
SEMESTER: IV
PROGRAMME: MECH ENGG.

COURSE: World Class Manufacturing System CODE: 160218

INSTRUCTIONS:

- (1) Answer to the two sections must be written in separate answer books.
- (2) Attempt **All** questions.
- (3) All Questions are compulsory.
- (4) Use of Mathematical and Steam tables and pocket calculator (non-programmable) is permissible.
- (5) Illustrate your answers with neat sketches, wherever necessary.
- (6) Figures to the right indicate full marks.
- (7) Assume suitable additional data, if necessary.
- (8) The student should read the name and code of the subject and confirm that the question paper received is as per subject registered.

SECTION – I

- Q.1 Solve any SIX (18)**
- a) State various principle of World Class Mfg.
 - b) Enlist various structural & infrastructural parameters involved in basic decision categories under manufacturing strategy.
 - c) Explain the term "Design of Experiment".
 - d) State the characteristics of world class Mfg. system
 - e) List various competitive priorities. Also state its dimensions.
 - f) Explain schonberger model of WCM with neat sketch.
 - g) Explain the terms "Delivery performance" and "cost performance" related manufacturing performance.
 - h) State various advantages of digital manufacturing.
- Q.2 Attempt any FOUR (16)**
- a) Explain various pillars of TQM.
 - b) Explain Model of Competitive advantage.
 - c) Explain the term "Quality performance" with appropriate example.
 - d) Define benchmarking. State its advantages.
 - e) Explain block diagram of digital manufacturing with neat sketch.
 - f) List various tools of VSM. Explain any one.
- Q.3 Attempt any TWO (16)**
- a) Explain various techniques of World Class Mfg.
 - b) Explain various factors responsible for WCM practices. Also state barriers in implementation of WCM practices.
 - c) The following table lists the routing of ten parts that are being considered for cellular manufacturing in a machine shop parts are identified by letters & machines are identified numerically. For the data given.
a) Develop the Part-Machine incidence matrix.

b) Apply the rank order clustering technique to the part-machine incidence matrix to identify logical part families & machine groups.

Part	Machine Routing
A	3 → 2 → 1
B	6 → 1
C	6 → 5
D	6 → 5 → 1
E	3 → 2 → 7 → 4
F	5 → 1
G	3 → 2 → 4
H	3 → 2 → 4 → 7
I	2 → 4 → 7
J	5 → 6 → 1

SECTION-II

Q.4

Attempt any SIX out of Eight.

a. What is meaning of E-supply chain Management?

b. Define Work study.

c. Explain various performance measures in world class organisation.

d. Explain value Engineering in short.

e. Describe E-marketing & recent E-marketing Trends.

f. Explain advantages of method study.

g. Explain application of work study

h. Explain Time study in short.

(18)

Q.5

Attempt any FOUR out of SIX

a. Explain why improving product & process design required in WCM?

b. Describe E-payment system current scenario.

c. Explain in detail. Rapid prototyping system.

d. Explain 'E-business models are good with respect to customer & manufactures'.

e. Explain in detail Kaizen.

f. Describe E-marketing & E-marketing Trends.

(16)

Q.6

Attempt any TWO out of THREE

a. Explain Total waste elimination & its various methods in detail.

b. What is Lean Manufacturing system? Explain its tool name & also describe JIT & MRP system.

c. Explain any 3 system as given below

(i) MRP – II (ii) Kanban (iii) 5's (iv) MPC

(16)
