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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

ALC

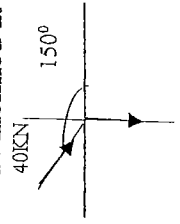
INSTRUCTIONS:

- (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. (18)

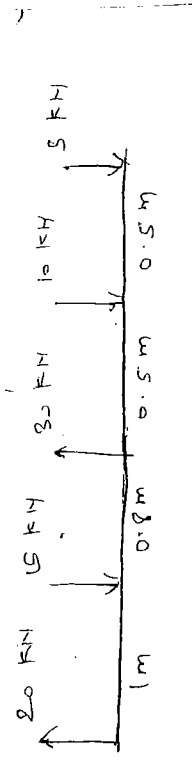
- (1) Define. Rigid body, statics.
- (2) State parallelogram law of forces.
- (3) State Lami's theorem
- (4) Differentiate between Resultant & Equilibrant.
- (5) Resolve a force of 80 KN along two directions making angles 30° & 20° with it on opposite sides.
- (6) What is varignon's theorem of moment?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



(8) Differentiate between Mass and Weight.

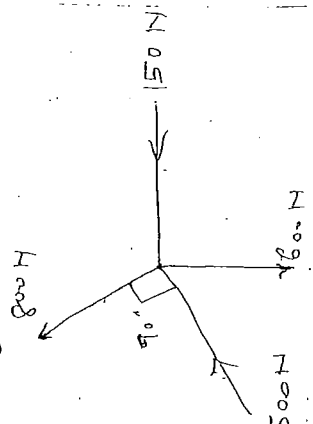
Q.2 Attempt ANY FOUR of the following. (16)

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



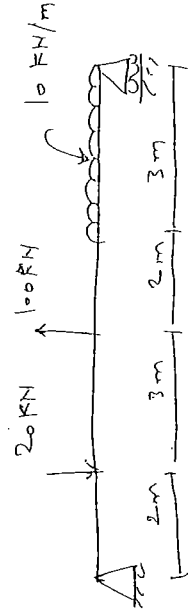
- (b) State properties of couple.
- (c) What are the different types of loads & end support of beam?
- (d) The sum of two forces is 9N. Their resultant which is perpendicular to the smaller force is of 6N. Find magnitude of the force.
- (e) Find the angle between two equal forces P, if their resultant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

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

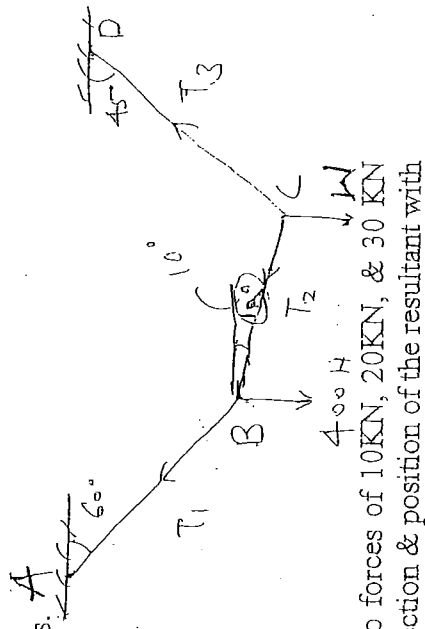


Q.3 Attempt ANY TWO of the following. (16)

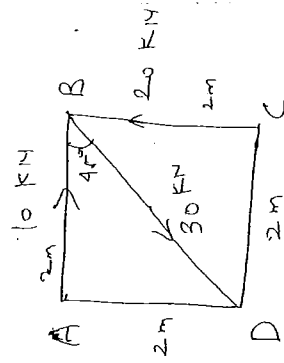
(a) For the beam shown in fig. calculate support reactions using analytical method.



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



(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.

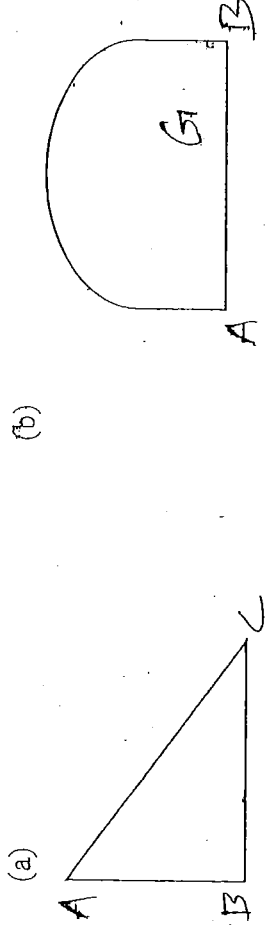


SECTION-II

Q.4 Attempt ANY SIX of the following. (18)

- (1) State law of polyson 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.



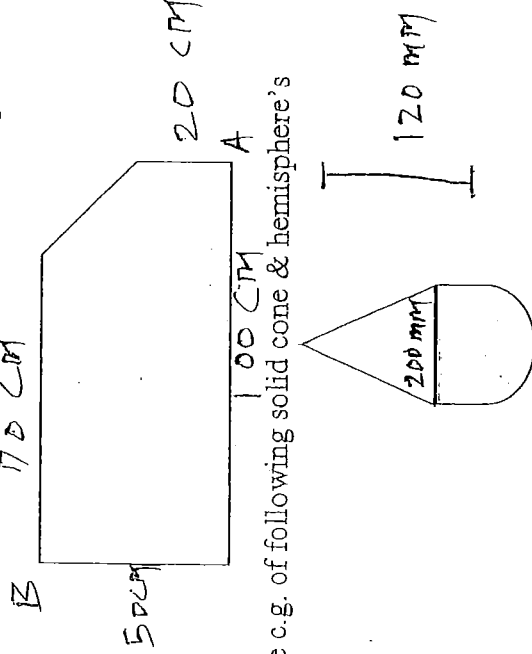
- (6) What is law of machine?
 (7) A body of weight 2000N rests in a horizontal plane. If the coefficient of friction is 0.4, find the horizontal force required to be applied parallel to the plane to move the body.
 (8) The velocity ratio of certain machine is 50. Determine the effort required to lift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

Q.5

Attempt ANY FOUR of the following.

- (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.

(16)



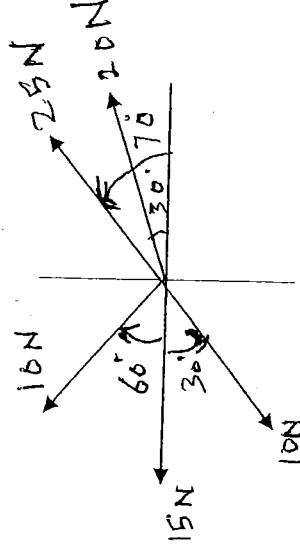
- (d) Find the c.g. of following solid cone & hemisphere's
 (e) What are the advantages & disadvantages of friction?
 (f) In differential axle & wheel the diameter of wheel is 400mm & the dia of axis are 100mm & 80mm. If an effort of 50N can lift a load of 1500N. Find V.R. & efficiency of machine.

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.

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
 $2x + 3y - z = -3, 5x + y + 3z = 10, 4x + 3y - 2z = -3$
- (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 $\frac{x^2+23x}{(x+3)(x^2+1)}$

SECTION-II

- 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 ΔABC , 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.
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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?
- (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)

Q.2.

Attempt (any Four) of the following.

(16)

- (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

Q.3.

Answer the following:- (any Two)

(16)

- (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
- Answer the following (any Four)**
- (a) Write you resume without disclosing your identity?
 - (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. 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.

Answer the following (any Two)

(16)

- (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

(16)

- (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

Attempt Any Six out of the following

(18)

- (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

Attempt Any Four of the following

(18)

- (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

Attempt Any Two out of Three

(16)

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

SEAT NO. _____

TIME ALLOWED: 03 HOURS
MAXIMUM MARKS: 100
COURSE: MATERIAL SCIENCE
SEMESTER: II
PROGRAMME: PLASTIC ENGG.
CODE: 160502

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** (a) **Solve any SIX out of EIGHT** (18)
- (a) Discuss any three factors considered while a selection of material for spring application.
- (b) Define the term 'Material Science'.
- (c) State the names of any three common metals and their Alloys. (Any Three)
- (d) Define 'Plasticity'. State one example.
- (e) Discuss importance of material science.
- (f) State any three factors to be considered for selecting the materials for gear applications.
- (g) Explain the term 'foregability'.
- (h) Discuss the need for ISO/Bureau of Indian standard specification for metals
-
- Q.2** (a) **Attempt any FOUR out of SIX** (16)
- (a) Discuss Indian standard specification for metals and non -metals.
- (b) Explain any two physical properties of metals.
- (c) Define the following
i) Elasticity ii) Yield strength.
- (d) Explain the classifications of metals and non-metals.
- (e) Explain i) Creep ii) Fatigue
- (f) Discussed the properties and classification of spectrum.
-
- Q.3** (a) **Attempt any TWO out of THREE** (16)
- (a) Discuss the following technological properties of metal and alloys in brief
i) Weldability
ii) Machinability
iii) Formability
iv) Cost ability
- (b) Explain following mechanical properties
1) Hardness 2) Impact strength
3) Tensile strength 4) Ductility
- (c) (a) Discuss practical considerations for selection of materials for different purposes. (04)
(b) Discuss various factors which affects mechanical properties (04)

SECTION-II

- Q.4** **Attempt any SIX of the following.** **(18)**
- (a) What is ceramics? Write the properties and application of ceramics.
 - (b) What is equivalent carbon in cast iron? Explain its importance.
 - (c) What are stainless steels? Write its chemical composition.
 - (d) Describe the effect of increasing zinc content on the properties of brasses.
 - (e) Write the composition and properties of brass.
 - (f) Write effect of alloying element on properties of die steels.
 - (g) State the various defects you observed in heat treatment process.
 - (h) Explain surface hardening method.

- Q.5** **Attempt any FOUR out of SIX** **(16)**
- (a) What is super alloy? Explain with suitable example.
 - (b) What is heat treatment processer? Explain tempering in detail
 - (c) State the difference between carburising & cyaniding.
 - (d) What are non-metallic materials? Describe composition, properties & uses of
 - i) Composite
 - ii) Cryogenic materials
 - (e) Discuss the uses and properties of Gun metal & Bronze.
 - (f) Draw & explain Iron carbon equilibrium system diagram.

- Q.6** **Attempt any TWO out of THREE** **(16)**
- (a) Explain properties and application and composition of plastics and rubbers with examples.
 - (b) Write name of non-ferrous metals and its alloys & explain copper and aluminium metal in detail.
 - (c) Write short note on
 - i) Annealing
 - ii) Hardening.

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SHRI BHAGUBHAI MAFATLAL POLYTECHNIC
AUTONOMOUS SEMESTER EXAMINATION APRIL/MAY- 2018

SEAT NO. _____

TIME ALLOWED: 03 HOURS

MAXIMUM MARKS: 100

COURSE: POLYMER CHEMISTRY

SEMESTER: II

PROGRAM: PLASTICS ENGG

CODE: 160503

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

Any Six out of Eight

(18)

- (a) Define Hybridization, Polymerization. Degree of Polymerisation.
- (b) Explain Co-valent and ionic bonds with examples.
- (c) Explain Hybridization of Methane.
- (d) Describe allotropy of carbon.
- (e) Give the chemical formula properties of ethyl Alcohol.
- (f) Why carbon have valency four? Explain.
- (g) Explain significance of degree of cure in plastics.
- (h) Write preparation and properties of either phenol or ethyl alcohol.

Q.2

Solve Any Four out of Six

(16)

- (a) Explain preparation and properties of Nitrobenzene.
- (b) Describe properties and uses of phthalic anhydride and vinyl acetate.
- (c) Explain preparation of Epichlorohydrine and glycols. State their uses.
- (d) Differentiate between thermoplastics and thermoset resins.
- (e) Give classification of polymers with one example each.
- (f) Explain preparation of poly functional acids and sebacic acid.

Q.3

Solve Any Two out of Three

(16)

- (a) Explain two uses and two properties of following
(i) Fumaric acid (ii) Butadiene (iii) Vinyl chloride (iv) Acrylonitrile
- (b) State the types of co-polymers with examples and explain two methods of co-polymerisation.
- (c) Explain preparation and properties of
(i) Aniline (ii) Resorcinol (iii) Glycerine (iv) Fumaric acid

SECTION-II

Q.4

Answer Any Six of the following

(18)

- (a) Explain the step of initiation in an addition polymerization method.
- (b) Describe salient features of bulk polymerization techniques.
- (c) Explain why molecular weights are average values for polymers.
- (d) Describe termination process in addition polymerization method.
- (e) Enumerate various methods of degradations giving examples by which polymer is degraded.
- (f) Explain the phenomena of osmosis used in determination of molecular weight of polymers.
- (g) Discuss principle of ring opening polymerization of an appropriate reactant.
- (h) Write relation between viscosity and molecular weight of a polymer describing constants in the relation.

Q.5

Answer Any Four of the following

(16)

- (a) Discuss the concept of functionality of organic compounds on polymer formation with suitable examples.
- (b) Explain the mechanism of oxidative degradation of polymers.
- (c) What is an end group analysis for polymers? Explain how this method is employed on determination of molecular weight of polymers.
- (d) Write chemical structure and functionality of any four of the following monomers treatment.
 - (i) phthalic anhydride
 - (ii) Vinyl chloride
 - (iii) Formaldehyde
 - (iv) Propylene
- (e) Discuss various methods of prevention of degradation of polymers with examples.
- (f) Explain the term polydispersity of polymers and its significance.

Q.6

Any Two of the following

(16)

- (a) Describe detail preparation of a polyester polymer by condensation polymerisation technique.
- (b) Describe on Emulsion polymerization technique with various ingredients used in proportion with their functions.
- (c) Write in brief methods of viscometry used in determination of 'K' value of PVC resin.

TIME ALLOWED: 03 HOURS
MAXIMUM MARKS: 100
COURSE: ORGANIC AND
PHYSICAL CHEMISTRY

SEAT NO. _____
SEMESTER: II
PROGRAMME: Plastic/Chem.
CODE: 160604

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 Answer ANY SIX questions.

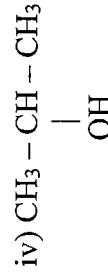
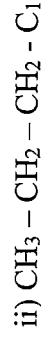
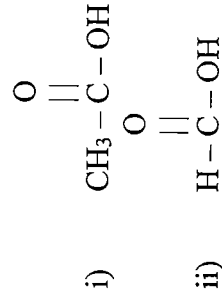
(18)

- Identify the functional unit in the following compounds.
$$\begin{array}{c} \text{O} \\ || \\ \text{CH}_3 - \text{C} - \text{CH}_3 \end{array}$$
- Write the structural formula of the following.
i. Aniline ii. Acetylene iii. Benzoic Acid
- Explain sp^2 hybridisation.
- Distinguish between electrophile and neutrophile.
- Write any two example of substitution reaction?
- Give the names of formulae for first 3 members of homologous series of alkenes.
- Write the chemical equation for wurtz reaction?
- Distinguish between alcohols and phenols.

Q.2 Attempt ANY FOUR

(16)

- Give the IUPAC names of the following.



- Explain Carbylamine Reaction.
- Write any two methods for preparation of ethane.
- Distinguish between aldehydes & ketones.
- Write any two substitution reactions of Benzene.
- Explain esterification.

Q.3

Attempt ANY TWO

(16)

- Define bond fission. Explain homolytic fission and heterolytic fission.
- Give any two methods of preparation of toluene.
- Explain oxidation of ethanol.
- Give any two methods of preparation of Aniline.
- Write a note on Friedel Craft's Reaction.
- Explain Clemmensen's reduction.

Q.4

Answer the following. (ANY SIX)

(18)

- What is hydrolysis and degree of hydrolysis? State the phase rule.
- What are colligative properties? Give examples.
- State which of the following is a colloidal solution and which is true solution.
(i) Ink (ii) Milk (iii) Sugar solution in H₂O
- Define acids and bases.
- Explain the importance of pH in different industries.
- Define electrophoresis.
- Define mole fraction and molality.

SECTION-II

Q.5

Answer the following (ANY FOUR)

(16)

- Draw a neat and labelled phase diagram of water system.
- What is the nature of the following salt solutions?
 - Copper sulphate solution
 - Ammonium chloride solution
 - Sodium carbonate solution
 - Zinc nitrate solution
- Explain the Bredig's arc method for the preparation of gold sols.
- State and explain Raoult's Law of ideal solutions.
- Explain the phenomenon of Tyndall effect.
- State and explain Nernst distribution law.

Q.6

Answer the following (ANY TWO)

(16)

- Define buffer solutions. Give two examples of buffer solutions.
- Give four points of difference between lyophobic and lyophilic sols.
- Define phase, component and degree of freedom.
- Name the processes of purification of colloidal sols. Explain one of them.
- Explain why there is depression in freezing point when a solute is added to non-volatile solvent.
- State Henry's law. Give its application.

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AUTONOMOUS SEMESTER EXAMINATION APRIL/MAY -2018

TIME ALLOWED: 03 HOURS
MAXIMUM MARKS: 100

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

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 & its p.f. is 0.8 lagging.
- c) Calculate : i) Apparent Power ii) True Power iii) Reactive Power
- d) Write down applications for DC series motor, DC shunt motor & DC compound motor (2 applications for each)
- e) Draw the characteristics of DC series motor.
- f) Explain in brief construction of core type transformer.
- g) Enlist the applications of 3 phase induction motors.
- h) Compare between rope drive and belt drive.

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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SHRI BHAGUBHAI MAFATLAL POLYTECHNIC
AUTONOMOUS SEMESTER EXAMINATION APRIL/MAY 2018

TIME ALLOWED: 03 HOURS
MAXIMUM MARKS: 100
COURSE: TECHNOLOGY OF PLASTICS
SEAT NO. _____
SEMESTER: III PE/III CH
PROGRAMME: PLASTICS ENGG.
CODE: 160504

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.
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SECTION-I

Q.1

Attempt Any Six.

- (a) Distinguish between thermoplastics and thermoset polymers with examples.
- (b) Explain why LDPE is amorphous while HDPE is crystalline.
- (c) Explain degree of substitution for cellulose esters and cellulose ethers.
- (d) Discuss the need for import modification for polystyrene giving their applications.
- (e) What do you understand by 'Nano – particles'? Write importance of Nano Materials.
- (f) Discuss source of vinyl monomers writing a brief methodology of their preparation.
- (g) Write function of either anti-static agent of ft lubricants with examples.
- (h) Discuss importance of 'Glass Transition Temperature' for polymers.

(18)

Q.2

Attempt Any Four of the following

- (a) Discuss outline of manufacture of poly propylene writing their importance applications.
- (b) Enumerate sources of cellulose polymer. Describe in brief a method of preparation of cellulose.
- (c) Explain the role plasticizers in PVC compounding. Write classification of plasticizers and application of plasticized PVC.
- (d) Discuss preparation of polyvinyl acetale. Write applications of polyvinyl acetale.
- (e) Write function of filters in polymeric materials along with types of filters.
- (f) Write in brief on poly vinyl brilyval and its applications.

(16)

Q.3

Attempt Any Two of the following

(16)

- (a) Describe a method of preparation of poly ethylene terephthalate with properties and applications.
- (b) Discuss the importance of compounding in polymer processing writing preparation of PVC film for curtain applications.
- (c) Describe preparation, properties and applications of cellulose acetate.

Q.4

SECTION – II

Attempt any Six

(18)

- (a) Write chemical structure of the following materials.
 - i) Nylon-6,
 - ii) Epoxy resin
 - iii) Polycarbonate
 - iv) Poly sulphones
 - v) Teflon (PTFE)
 - vi) ABS
- (b) Explain the difference between aramids and Nylons.
- (c) Explain properties of poly phenylene oxide.
- (d) Explain use of Interlayer glass of automobiles and describe its properties.
- (e) Write applications of liquid crystal polymers.
- (f) What are flouropolymers and give their examples.
- (g) Compare engineering plastics with speciality polymers.
- (h) 'Nylons are engineering polymers'. Justify it.

Q.5

Attempt any Four

(16)

- (a) How PTFE is obtained and write it's preparation with its structure, monomer preparation.
- (b) Explain preparation of Epoxy and urea formaldehyde.
- (c) Describe conducting polymers.
- (d) Explain preparation of Nylon 6, 6.
- (e) Give important properties of PEE K and poly sulphones.
- (f) Explain curing of epoxy resin and give its four properties.

Q.6

Attempt any Two

(16)

- (a) Explain preparation and properties and applications of silicon polymers.
- (b) Give properties and application of following materials.
 - i) Poly vinyl fluoride
 - ii) Melamine formaldehyde
 - iii) Phenol formaldehyde.
 - iv) poly vinylidene fluoride.
- (c) Explain Two methods of preparation of polycarbonate and applications of polycarbonate.

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AUTONOMOUS SEMESTER EXAMINATION APRIL/MAY 2018

TIME ALLOWED: 03 HOURS
MAXIMUM MARKS: 100
COURSE: PLASTIC MOULDING TECHNIQUES CODE: 160505

SEAT NO. _____
SEMESTER: III
PROGRAMME: PLASTICS ENGG

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

(18)

- (a) Explain basic process of compression moulding.
- (b) Write merits & demerits of transfer moulding process.
- (c) Describe trouble shooting of Rotational moulding technique.
- (d) How to control wall thickness of rotational moulded part during the process?
- (e) Differentiate low & high foaming process.
- (f) Write principle for foaming process.
- (g) What is a Bulk factor? Write its importance.
- (h) Write significance of transfer & moulding temperature for transfer moulding process

Q.2 Answer ANY FOUR

(16)

- (a) Write on structural foaming with application.
- (b) Explain various grades of compression moulding compounds.
- (c) Explain basic process of transfer moulding.
- (d) What are the advantages & disadvantages of Rotational moulding process?
- (e) State limitations of compression moulding process.
- (f) Write on Expanded bead styrene foams along with application.

Q.3 Answer ANY TWO

(16)

- (a) Write note on Rotational moulding process with neat sketch.
- (b) Differentiate types of transfer moulding techniques with help of suitable diagram.
- (c) Explain any one of the thermosets materials flow properties, curing time, required pressure for formation of compression moulded part with application

SECTION-II

Q.4

Solve ANY SIX

(18)

- (a) Explain casting of plastics with reference to gelation, setting etc.
- (b) What is reinforcing. Explain it's significance.
- (c) Write merits and demerits of the injection molding.
- (d) Explain structural foam molding.
- (e) Give drying time, melt temperature, mold temp. of following material
i)ABS ii) PVC iii) SAN iv) PET
- (f) Explain process cycle of Injection molding.
- (g) Enlist which Resins are used for reinforcing materials.
- (h) Explain filament winding with neat sketch

Q.5

Solve ANY FOUR

(16)

- (a) Explain solvent welding with neat diagram.
- (b) Explain Gas Assisted injection molding with neat diagram.
- (c) Give effect of various ingredients in casting.
- (d) Explain sheet molding and Bulk molding compound.
- (e) Give applications of laminates casting and FRP products.
- (f) Explain production of thin walled molding articles with co-injection method.

Q.6

Solve ANY TWO

(16)

- (a) Give types of laminates and describe high pressure process for the same.
- (b) With neat sketch explain Reaction Injection Moulding, it's process with process parameter.
- (c) Describe Gas assisted injection molding and explain trouble shooting of injection molding process.

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AUTONOMOUS SEMESTER EXAMINATION APRIL/MAY-2018

TIME ALLOWED: 03 HOURS
MAXIMUM MARKS: 100
COURSE: Strength of Materials

SEAT NO. _____
SEMESTER: III
PROGRAMME: PLASTIC ENGG.
CODE: 160017

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 out of EIGHT (18)

- a) Give the definition of stress, strain & modulus of elasticity with units.
- b) Explain temperature stress & strain.
- c) State & explain Linear & Lateral Strain.
- d) Explain types of loading.
- e) Give the definition of principal planes & Principal stresses.
- f) Explain the concept of moment of inertial of plane areas.
- g) Define Bulk modulus & volumetric strain.
- h) Draw stress – strain diagram & explain it in detail.

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

- a) A mild steel wire 5mm in diameter and 1m long. If the wire is subjected to an axial tensile load of 10KN. Find the extension (change in length) of the rod ($E = 200 \text{ CPa}$)
- b) A 10mm diameter tensile specimen has a 50mm gauge length. The Tied load is 55KN and the maximum load is 70KN. Fracture occurs at 60KN. The diameter after fracture is 8mm and the gauge length of fracture is 65mm. Calculate i) % Elongation ii) Ultimate tensile strength iii) Yield strength iv) fracture strength
- c) At a point in a crank shaft the stresses on two mutually perpendicular planes are 30MPa (tensile) and 15MPa (tensile). The shear stress across these planes is 10MPa. Find the normal & shear stresses on a plane making an angle 30° with the plane of first stress
- d) Derive the Expression for Strain Energy.
- e) Explain in details steps involve to calculate the principal plane & stresses using Mohr's Circle.
- f) Explain the parallel axis theorem and perpendicular axis theorem.

P.T.O.

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160017

Q.3

Attempt ANY TWO out of THREE

(16)

- I-section beam of 100mm wide, 150mm depth flange. Determine the moment of Inertia of cross – section of the beam.
- Derive the Expression for relation between modulus of Elasticity, modulus of rigidity & bulk modulus (E , G & K)
- The principal tensile stresses at a point across two perpendicular planes are 100MPa and 50MPa. Find the normal and tangential (shear) stresses and the resultant stress and its obliquity on a plane at 20° with the major principal plane.

SECTION-II

Q.4

Attempt ANY SIX of the following.

(18)

- Define shear force and bending moment.
- Draw S.F.D. and B.M.D. for a simply supported beam of span L carrying u.d.l. w /unit length over the entire span.
- Explain the theory of simple bending.
- Write the flexural formula. State the meaning of symbols used in it.
- Define the terms direct load and eccentric load.
- Define polar modulus of section. State it's S.I. Unit.
- Calculate the torque transmitted by a solid shaft of 40mm diameter if the maximum shearing stress is 20 N/mm^2
- Write Lamé's equation for thick cylindrical shell and name various terms used in it.

Q.5

Attempt ANY FOUR of the following.

(16)

- A simply supported beam of span 6m carries a u.d.l. of 1.5 KN/m over entire span and a point load of 2 KN at 2m from right support. Draw S.F. and B.M. diagrams.
- A cantilever of 2m length is subjected to a u.d.l. of 3 KN/m over the entire length. Draw S.F.D. and B.M.D. State values of maximum bending moment and maximum shear force.
- State any four assumptions in the theory of simple bending.
- A rectangular beam section 300mm wide and 500 mm deep is supported over a span of 4m. It carries a full span uniformly distributed load of 10 KN/m . Find the maximum bending stress induced in the section. Draw the bending stress distribution diagram.
- A short column $200 \text{ mm} \times 100 \text{ mm}$ is subjected to an eccentric load of 60 KN at an eccentricity of 40 mm at an eccentricity of 40 mm in the plane bisecting the 100 mm side. Find the maximum and minimum intensities of stresses at the base.
- The compressed air cylinder 1.4-m internal diameter and 20mm thick is subjected to internal pressure of 1.6 MPa . Calculate the change in diameter. Take Poisson's ratio = 0.28 and $E = 2 \times 10^5 \text{ MPa}$

Q.6

Attempt ANY TWO of the following.

(16)

- a) Select a suitable diameter of a solid shaft to transmit 147 KW at 180rpm. The allowable shear stress is 80 N/mm^2 and the allowable angle of twist is 1° in a length of 3m. Take $C = 0.82 \times 10^5 \text{ N/mm}^2$
- b) A simply supported beam of span 7m carries a u.d.l. of 2KN/m over 4m length from the left support and a point load of 5KN at 2m from the right support. Draw S.F. and B.M. Diagrams.
- c) Find the maximum stress in a propeller shaft 400mm external and 200mm internal diameter, when subjected to a twisting moment of 4650 N.m. If the modulus of rigidity is 82 GPa. Calculate the twist in a length 20times the external diameter.



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AUTONOMOUS SEMESTER EXAMINATION APRIL/MAY, 2018

TIME ALLOWED: 03 HOURS

MAXIMUM MARKS: 100

COURSE: BASICS OF MOULD DESIGN

SEAT NO. _____

SEMESTER: IV

PROGRAMME: PLASTICS ENGG

CODE: 160508

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) Steam table (S.I. unit) & psychometric chart should be provided.
- (8) 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

(18)

- (a) Prepare neat diagram (sketches) of the following mould component. Indicate material of construction Guide bush.
- (b) Define cull & sprue.
- (c) Explain two plate mould with neat sketch.
- (d) Differentiate between transfer pot and transfer ram.
- (e) Explain positive and semi-positive moulds with the help of neat sketch.
- (f) Explain with neat sketch: Auxiliary transfer moulds.
- (g) Explain Three plate mould.
- (h) Prepare neat diagram of guide Pin. Indicate material of construction.

Q.2

Attempt any Four of the following

(16)

- (a) Write explanatory note on ejector system in compression mould.
- (b) Explain advantages & limitations of transfer moulds over compression moulds.
- (c) Explain types of heaters.
- (d) Explain standard components of compression mould.
- (e) Write explanatory note on heating systems used in compression/transfer moulds.
- (f) Explain shrinkage allowance with examples.

Q.3

Attempt any Two of the following

(16)

- (a) Explain side core actuation techniques.
- (b) Explain design of integral pot and Auxillary ram transfer moulds with neat diagram.
- (c) Explain types of feed gates used in transfer moulds.

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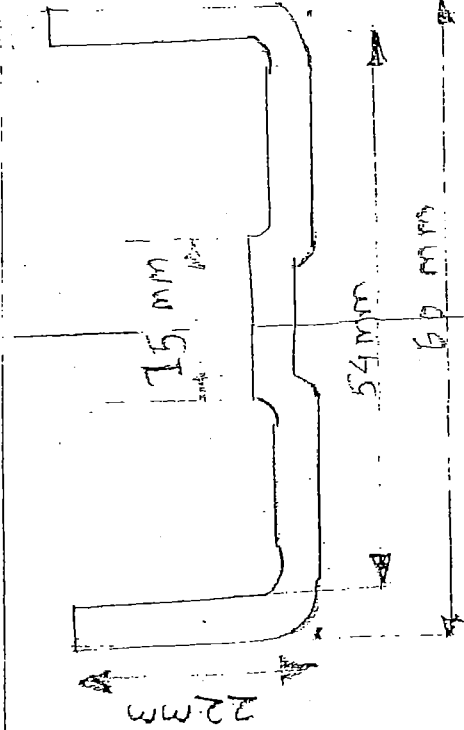
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SECTION-II

(50)

Q.4 Attempt any One out of Two

- (a) Fig. 1 shows an article to be produced out of M.F. powder. Design and draw a compression mould suitable for producing single article per cycle, showing sectional front view and top view, prepare bill of materials and insert major dimension on it. All dimensions are in mm Fig.1
- (b) Fig. 2 shown on Annular article to be produced out of P.F. powder. Design and draw a transfer mould showing sectional front view and partial top view, showing lay out of cavities suitable for producing four article per cycle. Prepare bill of material and insert major dimensions on it. All dimensions are in 'mm' (Take uniform thickness) Fig 2



Uniform wall thickness 4mm.

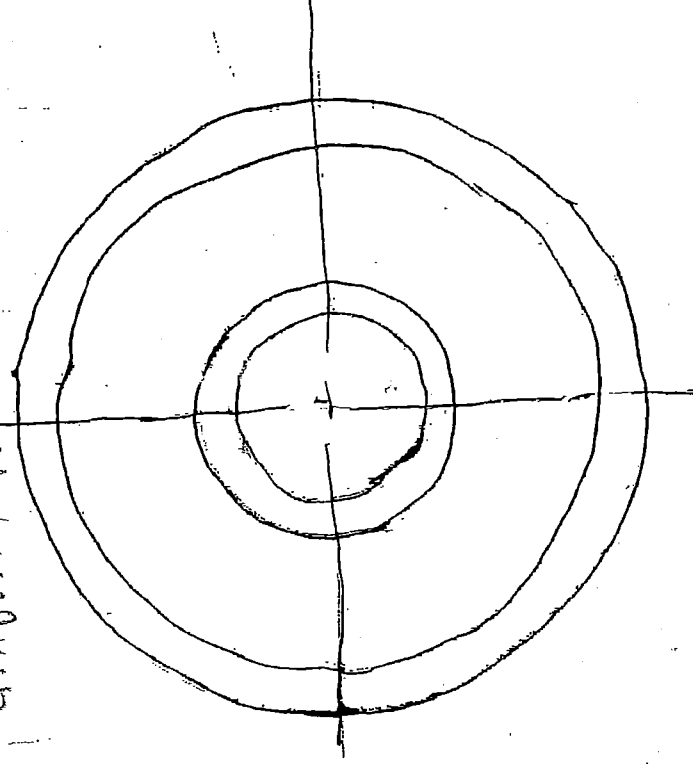


FIG.1

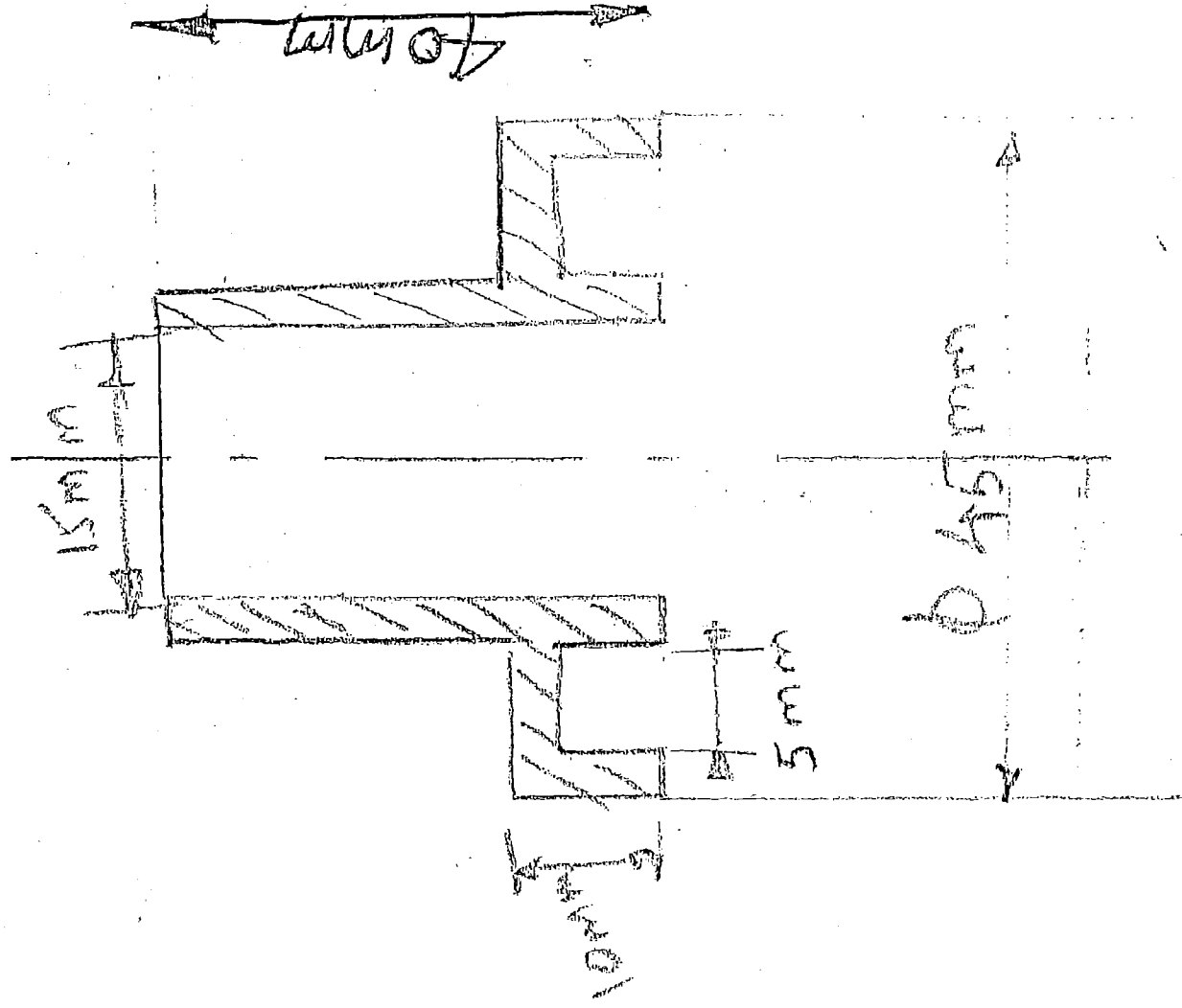


Fig. 2



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AUTONOMOUS SEMESTER EXAMINATION APRIL/MAY- 2018

TIME ALLOWED: 03 HOURS

MAXIMUM MARKS: 100

COURSE: METROLOGY & QUALITY CONTROL

SEAT NO. _____

SEMESTER: IV

PROGRAMME: PLASTICS ENGG.

CODE: 160509

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

Attempt Any Six out of Eight

(18)

- (a) List the four instruments used in angular measurement.
- (b) State any four characteristics of good comparator.
- (c) Explain need of inspection.
- (d) What is wringing of slip gauge?
- (e) How can measure flatness using auto collimator?
- (f) What are precaution while using instruments for getting higher precision and accuracy?
- (g) Explain concept of limits, fits and tolerances.
- (h) How can measure a major diameter using two wire method, housing carriage micro meter?

Q.2

Attempt Any Four out of Six

(16)

- (a) What s engineering hit? Explain types of hits.
- (b) Explain briefly hole basis system and shaft basis system of limits and fits.
- (c) Describe with sketch the working principle of an Autocollimator for angular measurement.
- (d) Explain working principle of the Johansson`s Mikrokator and comparator.
- (e) With neat sketch explain 'The tomlinson surface meter 'for measuring surface finish.
- (f) How can measure of squareness using indicator method using optical square.

Q.3

Attempt Any two out of Three

(16)

- (a) (i) What are types of error in thread? Explain in detail.
(ii) Describe with neat sketch, working principle of Bevel protractor.
- (b) Explain inter changeability and selective assembly.
- (c) With neat sketch explain pneumatic comparator.

SECTION-II

Q.4 **Attempt Any Six** (18)

- (a) Write importance of TQM.
- (b) State the meanings and importance of SQC.
- (c) What is six sigma statistical concept? Enlist its benefits.
- (d) Explain JIDOKA.
- (e) Compare acceptance sampling with 100% inspection.
- (f) Explain the concept of cost of quality and value of quality using suitable graph.
- (g) What is PDCA cycle? Explain.
- (h) Explain the importance of control charts.

Q.5 **Attempt Any Four** (16)

- (a) Enlist the sampling plans and draw the block diagram of single sampling plan.
- (b) What are various techniques of qualitative analysis? Explain.
- (c) Calculate the mean, mode, median for following observation data

| | | | | | | | | | | |
|--------------|------|------|------|------|------|------|------|------|------|------|
| Obs.No | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Observations | 4.11 | 4.18 | 4.19 | 4.22 | 4.25 | 4.15 | 4.16 | 4.18 | 4.18 | 4.20 |

- (d) Explain quality control tools.
- (e) Explain the differences between x-bar and R-charts. How can they be used together and why would it be important to use them together.
- (f) Write advantages of pareto analysis and cause and effect diagram.

Q.6 **Attempt Any Two** (16)

- (a) A Production Manager at a light bulb plant has inspected the number of defective lights in 10 random samples with 30 observation each. Followings are the no.of defectives

| | | | | | | | | | | |
|-----------------------|---|---|---|---|---|---|---|---|---|----|
| Sample | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| No.of defective bulbs | 1 | 3 | 3 | 1 | 0 | 5 | 1 | 1 | 1 | 1 |

Construct a control chart with this information.

- (b) Two machines producing components are checked up for statistical stability. Draw the 'P' chart for both machines and comment upon the process. Sample size for both machines are 200.

Machine A

| | | | | | | | | | | |
|------------|----|----|----|----|----|----|----|----|----|----|
| Sample | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Defectives | 25 | 28 | 30 | 30 | 20 | 29 | 31 | 26 | 31 | 27 |

Machine B

| | | | | | | | | | | |
|------------|----|----|----|----|----|----|----|----|----|----|
| Sample | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Defectives | 11 | 08 | 22 | 15 | 12 | 27 | 10 | 15 | 10 | 02 |

- (c) (i) Define process capability and state how it is achieved ?
(ii) Explain pareto analysis

Shri Vile Parle Kelavani Mandal's
SHRI BHAGUBHAI MAFATLAL POLYTECHNIC
AUTONOMOUS SEMESTER EXAMINATION NOV. /DEC. 2018

TIME ALLOWED: 03 HOURS
MAXIMUM MARKS: 100
COURSE: HYDRAULICS, PNEUMATICS AND
SYSTEM CONTROL

SEAT NO. _____
SEMESTER: IV
PROGRAMME: PLASTIC ENGG.
CODE: 160510

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 Attempt any Six of the following. (18)**
- (a) Define –
 - (i) Specific weight (ii) Mass density (iii) Volume density
 - (b) Write advantages of pneumatic system.
 - (c) Comparison between Air Motor & Electric Motor.
 - (d) Calculate the specific weight, density and specific gravity of 1 lit of liquid which weights 7 N.
 - (e) What is seal? Classify different types of seals.
 - (f) State and explain Pascal's Law? Write its unit.
 - (g) Draw a symbol for
 - (i) 4/2 DCV (ii) Accumulator (iii) FRL
 - (h) Describe the various energy of flowing fluid.

- Q.2 Attempt any Four of the following. (16)**
- (a) Explain construction, working of lobe pump with suitable diagram.
 - (b) What is an actuator? Explain single acting actuator.
 - (c) Classify different type of pump. Explain external gear pump with neat sketch.
 - (d) With neat sketch explain 2/2 direction control valve.
 - (e) Write the application of pneumatic system.
 - (f) What is non-Newtonian fluid? Explain their types.

- Q.3 Attempt any Two of the following. (16)**
- (a) By using 4/3 DCV explain meter in circuit with its advantages and disadvantages.
 - (b) Explain following circuit with suitable circuit diagram.
(i) Meter out circuit (ii) Bleed off circuit
 - (c) Derive an expression for Bernoulli's equation? Write the assumption made for Bernoulli's equation.

SECTION-II

Q.4 **Attempt any Six.**

(18)

- (a) What is the principle of operation of solenoid valve? Write classification of solenoid valve used in fluid power circuit.
- (b) Differentiate between Servo Valve & Solenoid Valve.
- (c) Draw block diagram for servo valve.
- (d) Differentiate between open loop & closed loop control system.
- (e) Write the use of HMI & PLC.
- (f) Write characteristics of amplifier.
- (g) Draw neat sketch of two stage servo valve.
- (h) What is transducer? Write the function of transducer.

Q.5

Attempt any Four.

(16)

- (a) Describe with sketch the construction and working of LVDT.
- (b) Describe PID control system used in hydraulic circuit. What are the advantages of it?
- (c) Explain principle, construction working, characteristics of flapper nozzle assembly with diagram.
- (d) Describe with sketch Air Gap Solenoid.
- (e) What are the advantages of closed loop system?
- (f) Justify proportional mode is different than derivative mode.

Q.6

Attempt any Two.

(16)

- (a) Describe with sketch PID controller and write the equation for it.
- (b) What is HMI? Explain its necessity.
- (c) Explain in detail PLC architecture.

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: Plastic Engg.
COURSE: Polymer, Composites, Blends & Alloy
CODE: 160511

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 Engineering polymer blends with examples.
- b) Define commoditive plastics with examples.
- c) Explain significance of degree of polymerisation.
- d) State two important properties of polypropylene.
- e) Write structure of PP & PVC.
- f) Define Homopolymer, give one example.
- g) Explain in brief, morphology of blend.
- h) Give two example of latest commercial polymer blends.

Q.2 Attempt ANY FOUR out of SIX **(16)**

- a) Differentiate polymer blends & polymer alloy.
- b) Explain PP/EPDM blend.
- c) Explain solution blending of polymers.
- d) Define co polymer, Explain its types with examples.
- e) Explain banberry mixture for blending of polymer.
- f) Explain melt blending method of polymer.

Q.3 Attempt ANY TWO out of THREE **(16)**

- a) Explain in detail polymer - polymer combination technology.
- b) Explain the thumb rule used to design new polymer blends & alloy.
- c) Define Interpenetrating polymer network.

SECTION-II

- Q.4** **Attempt ANY Six of the following:** (18)
- 1) Enlist names of resins used for FRP. Explain their role in FRP.
 - 2) State uses of composites in defence services.
 - 3) Define with example : (i) Filled plastics (ii) FRP
 - 4) Write identification codes for PET, PS & PP in recycling of plastics.
 - 5) Explain (DMC) dough moulding compounds.
 - 6) Why fillers are added in composites? Give two examples of fillers.
 - 7) Explain bag moulding process used in composites.
 - 8) Explain matched Die Moulding Process used in Composites.

- Q.5** **Attempt Any four of the following.** (16)
- 1) With the help of neat sketch explain hand-lay-up technique used in composites.
 - 2) Discuss sheet moulding compound with neat sketch.
 - 3) Enlist the various fibres hardener used in composites. Write two examples of each.
 - 4) Discuss the conductive and magnetic polymer composites.
 - 5) Explain the need of recycling of plastics.
 - 6) With the help of new sketch explain pultrusion technique used to manufacture composites.

- Q.6** **Attempt Any Two of the following** (16)
- 1) Discuss the various mechanical testing used for composites.
 - 2) With the help of neat sketch explain filament winding process used to manufacture FRP pipe.
 - 3) Discuss manufacturing applications and properties of ceramic based composites.

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

TIME ALLOWED: 03 HOURS
MAXIMUM MARKS: 100
COURSE: PLASTICS PRODUCT DESIGN & TESTING CODE: 160512

SEAT NO. _____
SEMESTER: IV
PROGRAMME: PLASTICS ENGG

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 Attempt Any Six out of Eight (18)**
- (a) How conditioning of samples done?
 - (b) State the importance of testing.
 - (c) How do you compare Shore A and Shore D Hardness?
 - (d) Define 'Hardness' and state its significance.
 - (e) Draw a neat labelled diagram of Izod specimen. Explain significance of notch in Izod specimen.
 - (f) Define volume resistivity and surface resistivity
 - (g) Define vicat softening temperature and heat distortion temperature.
 - (h) Define bulk factor and bulk density of polymer.
- Q.2 Attempt Any four out of Six (16)**
- (a) Define Refractive Index. How is Refractive Index of plastic determined?
 - (b) Define melt flow Index? How is met flow index for HDPE determined?
 - (c) How do you determined specific gravity by using specific gravity bottle?
 - (d) What are difference between fatigue and creep property of plastic and explain in detail?
 - (e) Define break down voltage. How is it determined? Explain with neat sketch.
 - (f) Explain heat distortion temperature for thermoplastics material.
- Q.3 Attempt Any Two out of Three (16)**
- (a) How tensile strength and percentage elongation are determined? Explain stress strain curve of plastic.
 - (b) Explain differential scanning calorimetry with suitable graph.
 - (c) What is weathering resistance? Explain weathering resistance for plastics.

SECTION-II

- Q.4** **Attempt Any Six out of Eight** **(18)**
- “Wall Thickness should be uniform throughout the plastic product” Justify the statement.
- (a) Justify “ All extreme of cavity should fill at same time and at same temperature in injection moulding ”
- (b) Draw a curve of product per hour v/s part thickness of injection moulding.
- (c) State functions of rib and types of rib.
- (d) “Plastic product life depends on properties of polymer” Justify.
- (e) Write a note on properties of Nylon and PP Polymer with respect to design consideration.
- (f) What are causes and remedies of jetting?
- (g) Define weld line and meld line
- (h)
- Q.5** **Attempt Any Four out of Six** **(16)**
- (a) Mention various factors to be considered while designing a plastic product.
- (b) How do you estimate the cost of plastic product which manufactured by injection moulding?
- (c) Write note on material selection while designing of plastic product.
- (d) Draw and explain velocity profile and shear rate profile of molten polymer.
- (e) Discuss basic design consideration for blow moulded part.
- (f) Explain shear thinning behaviour of polymer.
- Q.6** **Attempt Any Two out of Three** **(16)**
- (a) Discuss basic design consideration for extrusion moulded part.
- (b) Discuss basic design consideration for injection moulded part.
- (c) State and explain press fit assemblies of plastic part.

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

TIME ALLOWED: 03 HOURS
MAXIMUM MARKS: 100
COURSE: ELASTOMER TECHNOLOGY

SEAT NO. _____
SEMESTER: IV
PROGRAM: PLASTICS ENGG.
CODE: ~~160513~~ 160513

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) Show structure of ethylene rubber, and mention its applications.
 - (b) Define vulcanization, and state stages in raw rubber.
 - (c) State and explain in brief molecular requirement of rubber materials.
 - (d) Show structure of NBR and mention its properties.
 - (e) Give applications of silicon rubber and chloroprene rubber
 - (f) Distinguish between synthetic rubber and natural rubber.
 - (g) Write note on dry rubber product.
 - (h) Give chemical structure of butadiene rubber and mention its properties.
- Q.2 **Attempt any FOUR out of SIX** (16)
- (a) Explain sulphur vulcanization process.
 - (b) Describe thermoforming of rubber.
 - (c) Compare resin vulcanization and metal oxide vulcanization.
 - (d) State and explain in brief about various vulcanizing agents.
 - (e) Explain in brief manufacturing and mention properties of Tennis balls.
 - (f) Write note on accelerator and activator.
- Q.3 **Attempt any TWO out of THREE** (16)
- (a) Describe in detail injection moulding of rubber. State its advantages and limitations.
 - (b) Describe in detail compounding process of rubber. Also describe the role of processing additives and fillers.
 - (c) Give chemical structure, preparation, properties and applications of
1) EPDM
2) SBR

SECTION-II

- Q.4 **Attempt any SIX of the following.** (18)
- (a) Explain the origin of tyre.
 - (b) State any four applications & properties of latex.
 - (c) Explain chemical structure of thermoplastics polyolefin elastomer.
 - (d) Write any four functions of tyre.
 - (e) Write any four properties of polyamide TPE.
 - (f) Explain electrodeposition in detail.
 - (g) Explain processing of Latex toys.
 - (h) State any four applications of TPU
- Q.5 **Attempt any FOUR out of SIX** (16)
- (a) Explain latex allergies in detail.
 - (b) Explain processing of polyamide TPE.
 - (c) What are basic concept of smart tyre? Explain in details
 - (d) Enlist latex manufacturing process & explain dipping process.
 - (e) Write difference between conventional elastomer & TPE elastomer.
 - (f) Explain eco-friendly tyre in detail.
- Q.6 **Attempt any TWO out of THREE** (16)
- (a) Explain processing, properties, applications & structure of styrenic TPE.
 - (b) Enlist components of tyre & explain functions of each component used in tyre construction.
 - (c) Explain following from manufacturing process
 - i) Dunlop process
 - ii) Talalay process

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: PLASTICS ENGG.

COURSE: ADDITIVES & COMPOUNDING OF PLASTICS CODE: 160514

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) Explain types of Fillers.
- b) Define compounding. Give at least 2 plastics compounds names with their applications.
- c) Mention role of Antistatic agents. Write name at least two.
- d) How to select polymer to design specific compound? Explain with an example.
- e) Describe significance of coupling agents. Name at least two.
- f) Mention purpose of pigments & dyes used in compounding. Write at least one chemical name for both.
- g) Describe types of plasticizers. Name at least two.
- h) Explain about Flame retardant. Name at least one.

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

- a) Describe functions of Anti-blocking agents with application. Name atleast Two.
- b) How to select mixing equipments for plastic compounding?
- c) What are the limitations of additives in polymer compounding?
- d) Explain role of Lubricants. Name atleast Two.
- e) Describe function of mould release agent. Name atleast two.
- f) What are the different ingredients added to make compound? Explain in short each one of them.

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

- a) What is the need of plastic compounding? Explain in detail with suitable example.
- b) Describe following and name atleast 2
 - i) UV stabilizers
 - ii) Impact Modifiers.
- c) Explain types of plastic compounding.

SECTION-II

Q.4

Solve ANY SIX of the following.

(18)

- a) Define i) L/D ratio ii) Compression Ratio
- b) Write the advantages of twin Screw Extruder.
- c) List the different equipments used for compounding.
- d) Write short note on PP-NANO composite.
- e) Write the physical and chemical properties of PVC.
- f) Write the different application of PVC.
- g) Draw neat diagram for twin screw extruder.
- h) Explain details of additives used for compounding of PP.

Q.5

Solve ANY FOUR of the following.

(16)

- a) Explain with neat labelled diagram of single Screw Extruder.
- b) Differentiate between single Screw Extruder and Twin Screw Extruder.
- c) Explain in details, Filled PP with suitable example.
- d) Write the formulation for wire cable.
- e) Write short note on Nano-filler
- f) What are the parameter consider while compounding of PVC.

Q.6

Solve ANY TWO of the following.

(16)

- a) Describe different selection grade of PVC? Explain the use of it.
- b) Write the Formulation for following PVC products
 - i) Wire & Cable
 - ii) Sheet
 - iii) Rigid PVC
- c) Explain with neat sketch, working, construction of INTENSIVE BATCH MIXER'.
