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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:

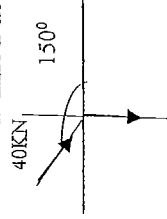
- (1) Answer to the two sections must be written in separate answer books.
- (2) Attempt all questions.
- (3) Illustrate your answer with neat sketches, wherever necessary.
- (4) Use of Mathematical and Steam tables and pocket calculator (non-prog.) is permissible.
- (5) Figures to the right indicate 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.

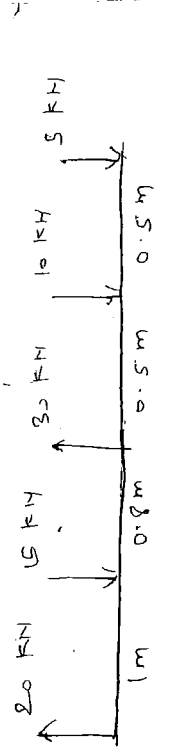


- (8) Differentiate between Mass and Weight.

Q.2

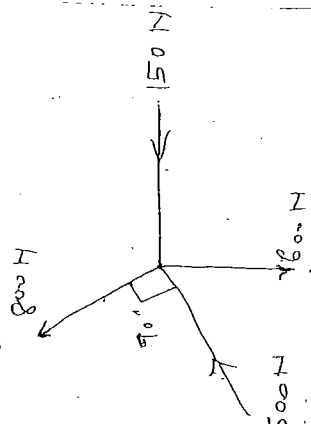
Attempt ANY FOUR of the following.

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



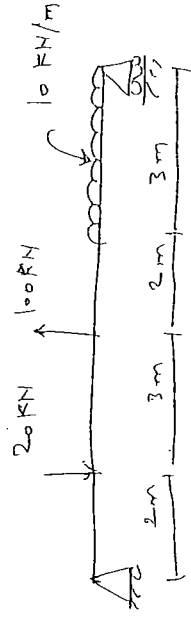
- (b) State properties of couple.
- (c) What are the different types of loads & end support of beam?
- (d) The sum of two forces is 9N. Their resultant which is perpendicular to the smaller force is of 6N. Find magnitude of the force.
- (e) Find the angle between two equal forces P, if their resultant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

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

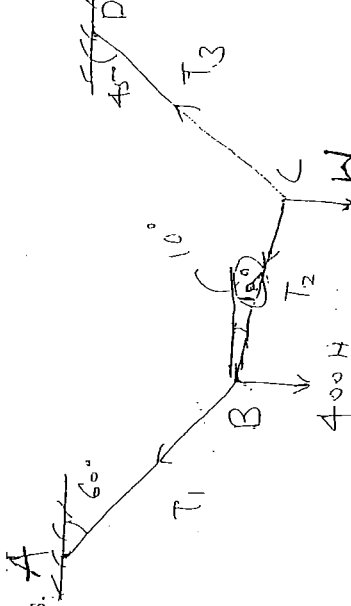


Q.3 Attempt ANY TWO of the following. (16)

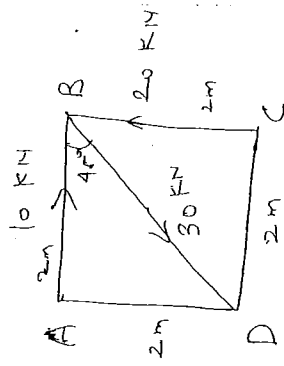
(a) For the beam shown in fig. calculate support reactions using analytical method.



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



(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.



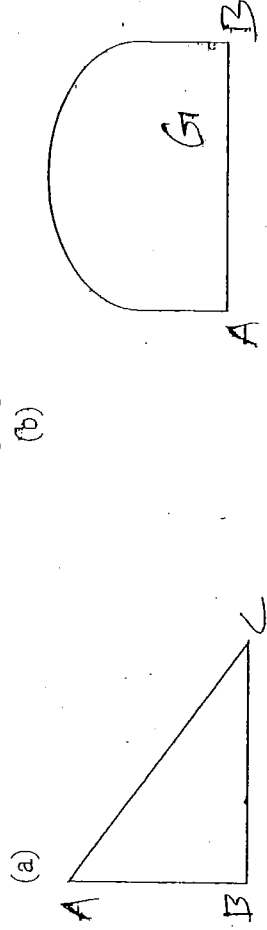
SECTION-II

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.

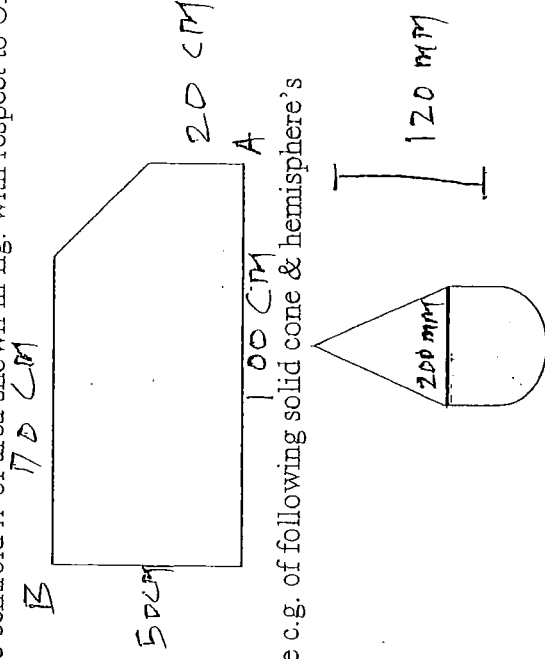


- (6) What is law of machine?
 (7) A body of weight 2000N rests in a horizontal plane. If the coefficient of friction is 0.4, find the horizontal force required to be applied parallel to the plane to move the body.
 (8) The velocity ratio of certain machine is 50. Determine the effort required to lift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

Q.5

Attempt ANY FOUR of the following.

- (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.



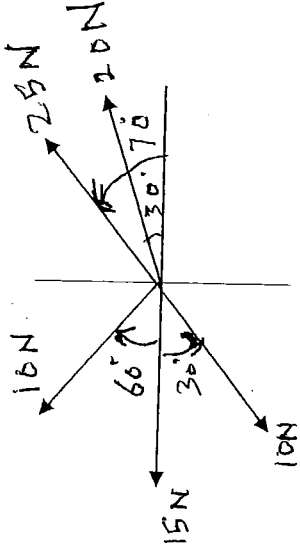
- (d) Find the c.g. of following solid cone & hemisphere's

- (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.

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AUTONOMOUS SEMESTER EXAMINATION APRIL/MAY-2018

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

SEAT NO. _____
 SEMESTER: I
 PROGRAME: 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 $\frac{x^2+23x}{(x+3)(x^2+1)}$

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

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.
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SEAT NO. _____

SEMESTER: I/II _____

PROGRAMME: ALL _____

CODE: 160003 _____

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.

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 examples 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.

Answer the following (any Four)

(16)

- (a) Write your resume without disclosing your identity?
- (b) As a store keeper of your 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.

Answer the following (any Two)

(16)

- (a) As a chief construction engineer, investigate the reasons and submit your report on leakages from ceiling in newly constructed building.
- (b) Write an essay on any one –
- (c) (i) Importance of value education (ii) India – an emerging superpower
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 lose 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 lose 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.
- (4) Use of Mathematical and Steam tables and pocket calculator (non-programmable) is permissible.
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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 $x^2 \cdot \frac{d^2 y}{dx^2} + x \cdot \frac{dy}{dx} + y = 0$
- (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.
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SHRI BHAGUBHAI MAFATLAL POLYTECHNIC
AUTONOMOUS SEMESTER EXAMINATION APRIL/MAY-2018

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

SEAT NO. _____
SEMESTER: III
PROGRAMME: IE/DE/EE
CODE: 160011

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 of the following .

- (a) Evaluate $\int \sin^3 x \, dx$
- (b) Evaluate $\int \frac{\cos x}{\sin(x+a)} \, dx$
- (c) Evaluate $\int_0^1 x^2 \cdot \cos x \, dx$
- (d) Evaluate $\int_0^1 \frac{dx}{1+x+x^2}$
- (e) Evaluate $\int_0^1 \frac{1}{1+\tan x} \, dx$
- (f) Evaluate $\int_5^{10} \frac{dx}{(x-1)(x-2)}$
- (g) Find the area above the X-axis bounded by $y = \sin x$ and the ordinate $x = \frac{\pi}{6}$ and $x = \frac{\pi}{3}$
- (h) Determine the volume of right circular cone generated by revolving the line $y = \frac{3}{4}x$ about X-axis between the ordinates $x = 0$ to $x = 4$.

(18)

Q.2

Attempt any four of the following

- (a) Evaluate $\int \frac{x^2-1}{(x^2+1)(x^2+3)} \, dx$
- (b) Find the centre of gravity (CG) of the area under the parabola $y = 4ax^2$, from $x = 0$ to $x = c$.
- (c) Evaluate $\int \log x \, dx$
- (d) Find the moment of Inertia of C uniform rod of length $2l$ about an axis through one end perpendicular to the rod.
- (e) Evaluate $\int \sqrt{x^2 - a^2} \, dx$
- (f) Prove that $\int_0^{\frac{\pi}{2}} \frac{x \sin x}{1+\cos^2 x} = \frac{\pi^2}{4}$

(16)

Q.3

Attempt any two

- (a) Evaluate $\int \frac{1}{3-2\sin x} \, dx$
- (b) Evaluate $\int x \cdot \tan^{-1} x \, dx$

(16)

- (c) Find the centre of gravity of the area in the first quadrant enclosed by the curves $y = x^2$ and $y = x(2 - x)$

SECTION-II

Q.4

Attempt any six

(18)

- (a) Find the order and degree of the equation

$$2 \frac{d^2 y}{dx^2} + 3 \sqrt{1 - \left(\frac{dy}{dx}\right)^2} - y = 0$$

- (b) From the differential equation by eliminating the arbitrary constants for equation

$$y = Ae^{3x} + Be^{-3x}$$

- (c) Solve :

$$\tan y \frac{dy}{dx} = \sin(x + y) - \sin(x - y)$$

- (d) Find $L(t^2 \cdot \sin 3t)$

- (e) Find the equation of the curve whose slope of tangent at any point is $3x - 4$ and which passes through the point $(3, -2)$

- (f) Find $L[\sin 2t \cdot \sin 3t]$

- (g) If $L[f(t)] = \frac{5}{s^2 + 35 - 9}$

$$\text{Find } L\left[f\left(\frac{t}{2}\right)\right]; L[f(t + 4)]; L[f(2t - 3)]$$

- (h) Find $L^{-1}\left[\frac{3s+12}{s^2+8}\right]$. State the property used to solve the inverse laplace.

Q.5

Attempt any four

(16)

- (a) Find $L[te^{-3t} \sin^2 t]$

- (b) Find $L\left[\frac{\cos bt - \cos at}{t}\right]$

- (c) Find $L^{-1}\left[\frac{3s+7}{s^2-2s-3}\right]$

- (d) Find $L^{-1}\left[\frac{2s^2-1}{(s^2+1)(s^2+4)}\right]$

- (e) Solve : $\frac{dy}{dx} + y = x^2$

- (f) The velocity of a particle at time t seconds from commencement of motion is given by $v = 5t^2 - t + 4$. Much distance does it cover in 3 seconds if it was initially at rest.

Q.6

Attempt any two

(16)

- (a) Apply convolution theorem to find

$$L^{-1}\left[\frac{s^2}{(s^2+4)(s^2+9)}\right]$$

- (b) Solve : $\frac{dy}{dt} + 3y = 1 + e^t$ given that $y(0) = -1$

- (c) Check whether following equation are exact D.E.? If it is exact D.E. then solve the D.E.

$$\text{a) } \frac{dy}{dx} + \frac{y \cos x + \sin y + x}{\sin x + x \cos y + x} = 0$$

$$\text{b) } \left[y\left(1 + \frac{1}{x}\right) + \cos y\right] dx + [x(1 - \sin y) + \log x] dy = 0$$

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

SEAT NO. _____
TIME ALLOWED: 03 HOURS
SEMESTER: I
MAXIMUM MARKS: 100
PROGRAMME: IE/DE
COURSE: ELEMENTS OF ELECTRICAL ENGG CODE: 160401

INSTRUCTIONS:

- (1) Answer to the two sections must be written in separate answer books.
- (2) All questions 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 (18)
- (a) Explain Kirchoff's Voltages Law with neat diagram.
 - (b) Explain Fleming's Left hand Rule with appropriated diagram.
 - (c) Explain Dynamically Induced E.M.F. with neat sketch.
 - (d) Explain Faraday's Laws of electromagnetic Induction with neat sketch?
 - (e) Draw phasor diagram for pure resistor, Inductor and capacitor?
 - (f) Draw and explain in brief resistances in series and parallel?
 - (g) Define magnetic Flux density, magnetic Field strength, magnetic Flux.
 - (h) Explain in brief E.M.F. and potential difference with appropriate sketches.
- Q.2 Attempt any Four (16)
- (a) Explain in detail statically Induced E.M.F. with neat diagrams.
 - (b) Compare Electric and Magnetic circuits.
 - (c) Explain in detail relationship between phase voltage and line voltages for star connected load also draw its vector diagram.
 - (d) How an alternation voltage is generated? Explain with neat sketches.
 - (e) Explain in detail following with neat sketches.
1) Right Hand Gripping Rule
2) Maxwell's Corkscrew Rule.
 - (f) Write down advantages of 3 phase system over single phase system?
- Q.3 Attempt any Two (16)
- (a) Explain following terms with expressions:
1) Average value 2) Form Factor 3) R.M.S. Value 4) Peak Factor
 - (b) Explain in detail relationship between line currents and phase currents for delta connected load? Draw phasor diagram also?

(c) Explain following terms in detail with appropriated sketches.

- 1) Kirchoff's current Law
- 2) Lenz's Law
- 3) Electric Field Intensity
- 4) Electric Density.

SECTION-II

Q.4

(18)

Attempt any Six

- (a) Write advantage of PMMC.
- (b) Different between lap winding and wave winding.
- (c) State the different types of self-excited generators and mention their field of appropriation.
- (d) What do you understand by efficiency of a transformer?
- (e) What is meant by step up and step down transformer. describe in brief.
- (f) Write an application of d.c. motor.
- (g) Explain selection of motor according to industrial application.
- (h) Explain the working principle of single phase induction motor.

Q.5

(16)

Attempt any Four

- (a) Enumerate the various losses in a transformer and state step taken to minimize these losses.
- (b) Derive the condition for maximum efficiency of a transformer.
- (c) Derive the Emf equation of transformer.
- (d) What is electric drive? State the advantage of electric drive.
- (e) Enumerate the different types of electric motor. What electrical characteristics should be considered for choosing the motor for particular application?
- (f) What type of motor are generally used for following application
1) Table Fan 2) Refrigerator 3) Domestic mixer 4) Small water pump

Q.6

(16)

(08)

Solve any Two

- (a) Distinguish between the internal characteristics and external characteristic of d.c. generator. How can the internal characteristic be derived from the external characteristic of
a) Specially excited generator
b) Shunt generator
c) Series generator
- (b) 1) Explain the principle of operation of a d.c. motor
2) In what way does a motor differ from generator in the function it performs?
- (c) State the relationship between the voltages, current and turns on the primary and secondary side of a transformer. Explain the meaning of KVA rating of a transformer?

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

TIME ALLOWED: 03 HOURS

MAXIMUM MARKS: 100

**COURSE: ELECTRONICS MATERIALS, COMPONENTS
AND DEVICES**

SEAT NO. _____

SEMESTER: II

PROGRAMME: IE/ DE

CODE: 160402

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) Compare active and passive components.
- (b) Draw the symbols for following components.
 - (i) Inductor
 - (ii) Transformer
 - (iii) Electrolytic capacitor.
- (c) Distinguish between conductor, semiconductor and insulator.
- (d) Enlist different types of dielectric and insulator.
- (e) Classify different types of batteries.
- (f) Draw and explain B-H curve in brief.
- (g) State applications of resistors
- (h) Explain brief manufacturing steps of process of resistors.

Q.2

Attempt Any Four out of Six.

(16)

- (a) Classify different types of magnetic materials.
- (b) List types of resistors. Explain constructional details, features and applications of any one type.
- (c) State the concept of ideal voltage source & ideal current source. Draw these symbols.
- (d) Write the colour code for the following resistors.
 - (i) $10\text{ K}\Omega \pm 10\%$
 - (ii) $47\text{ K}\Omega \pm 5\%$
- (e) Explain how you can test the following devices using multimeter
 - (i) Resistor
 - (ii) Transistor
 - (iii) Diode
- (f) Describe variable resistor in detail.

Q.3

Attempt Any Two out of Three.

(16)

- (a) Explain the constructional detail of Carbon composition resistor with neat diagram.
- (b) Define superconductivity. Give example of super conductor. List applications of superconductivity.
- (c) What is dielectric constant? Explain dielectric strength Dielectric loss dielectric polarisation for insulator.

SECTION-II

- Q.4** **Solve Any Six out of Eight** **(18)**
- (a) List different types of capacitors.
 - (b) Elaborate the term Mutual inductance
 - (c) Give the details of different losses in transformer.
 - (d) Enlist the types of transformer and its applications.
 - (e) Demonstrate Electrical and Mechanical test for relays.
 - (f) Compare LED and LCD display device.
 - (g) Give the advantages of IC.
 - (h) Write a note on Monolithic IC.

- Q.5** **Solve Any Four of Six** **(16)**
- (a) Elaborate Moore's law related to IC.
 - (b) Define terms:
 - (i) Transformer
 - (ii) Voltage transformation ratio.
 - (c) Give the Types of LED and explain them in detail. Also list the application of LED.
 - (d) Describe the terms related with relay-
 - (i) Transfer time
 - (ii) Drop out
 - (iii) Non pick up
 - (iv) Contact rating
 - (e) Illustrate the frequency response of capacitor.
 - (f) Enlist the specification and application of capacitor.

- Q.6** **Solve Any Two out of Three** **(16)**
- (a) Explain the various steps in IC fabrication.
 - (b) Describe the working of LCD and its application.
 - (c) Enlist and explain various types of switches.

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

TIME ALLOWED: 03 HOURS
MAXIMUM MARKS: 80

SEAT NO. _____
SEMESTER: II
PROGRAMME: IE/DE

COURSE: Electronics Devices & Circuits – I CODE: 160403

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 Attempt any six (18)**
- a. Define clipper and state its applications.
 - b. Describe breakdown mechanism in breakdown diode.
 - c. Draw the symbol and characteristics of schottky diode.
 - d. Draw circuit of transistor as a switch.
 - e. Define voltage and line regulation with respect to voltage regulators.
 - f. Draw circuit of a positive clamper.
 - g. Draw the piece wise linear model of a PN junction diode.
 - h. State any 3 specification/ratings of a junction diode.
- Q.2 Attempt any Four (16)**
- a. Draw half wave rectifier circuit and give its PIV rating.
 - b. Draw symbol and V-I characteristics of Zener diode.
 - c. Explain application of Zener diode as voltage regulator.
 - d. Draw circuit diagram and waveforms of any one biased clipper circuit.
 - e. Sketch & label constructional diagram of NPN BJT.
 - f. Draw the circuit & waveforms of centre tapped transformer full wave rectifier.
- Q.3 Attempt any Two (16)**
- a. For common Emitter configuration of NPN BJT draw input & output characteristics and explain in detail.
 - b. Draw circuit of CLC filter with full wave rectifier & explain its working. Also draw input & output waveforms.
 - c. Explain working of PN junction diode in forward & reverse bias condition & hence draw V – I characteristics.

SECTION-II

- Q.4** **Attempt any six** **(18)**
- What do you understand by transistor biasing? What is its need?
 - What is faithful amplification? What are the conditions to be fulfilled to achieve faithful amplification in transistor amplification?
 - Define the term i) Bandwidth & Voltage gain.
 - What is the effect of temperature on operating point?
 - Define stability factor and stabilization.
 - Why is gain expressed in dB?
 - List advantages and disadvantages of single stage amplifier.
 - Draw approximate h- parameter equivalent circuit of transistor in C – B of configuration
- Q.5** **Attempt any Four** **(16)**
- What is bias compensation? Explain any one method of bias compensation.
 - Compare h parameter equivalent circuit for the different transistor configuration.
 - Explain the effect of coupling capacitor on low frequency response of an amplifier.
 - What is black box theory? Explain in brief.
 - Draw circuit of fixed bias & state its stability factor.
 - Compare different types of coupling in multistage amplifier.
- Q.6** **Attempt any Two.** **(16)**
- Draw circuit diagram of voltage divider bias & explain in detail. State its stability factor.
 - Explain transformer coupled transistor amplifier with circuit diagram & frequency response.
 - Explain single stage CE amplifier with circuit diagram & its frequency response.

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

TIME ALLOWED: 03 HOURS
MAXIMUM MARKS: 100
COURSE: PRINCIPLES OF ANALOG
TECHNIQUES

SEAT NO. _____
SEMESTER: III
PROGRAMME: IE/DE
CODE: 160405

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 (18)

- (a) State and explain the principle of feedback amplifier and enlist its types.
- (b) Enlist the advantages and disadvantages of Negative feedback.
- (c) Elaborate the effect of negative feedback on
 - i) Voltage gain
 - ii) Input & output impedance
- (d) State and explain the Barkhausen Criterion of oscillator.
- (e) Define Oscillator and enlist the types.
- (f) A Hartley Oscillator is designed with $L_1 = 2\text{mH}$, $L_2 = 20\mu\text{H}$ and a variable capacitance. Determine the range of capacitance values if the frequency of oscillation is varied between 950KHZ to 2050KHZ.
- (g) Draw a circuit of feedback network in Transistor amplifier. (Voltage series feedback)
- (h) Enlist the applications of OP-Amp

Q.2 Attempt any Four (16)

- (a) Draw circuit diagram & obtain the expression for voltage gain of Inverting amplifier using OP-Amp.
- (b) Draw circuit diagram & describe operation of OP-Amp Integrator.
- (c) Distinguish between Hartley and Colpitts Oscillators.
- (d) Draw and explain the block diagram of Opamp.
- (e) With a neat sketch & waveform explain the precision rectifiers using Opamp.
- (f) Describe the working of Wein bridge oscillator.

Q.3 Attempt any Two (16)

- (a) Define following terms related with OP-Amp.
 - i) CMRR
 - ii) Slew rate
 - iii) Input offset voltage
 - iv) Bias current

- (b) With a neat diagram explain the operation of RC phase shift oscillator using transistor. Also state the expression of frequency of oscillations.
- (c) Describe the function of OP-Amp as a square wave generator.

SECTION-II

Q.4

Attempt any Six

(18)

- (a) State the advantages and disadvantages of active filter.
- (b) State the classification of filter.
- (c) Define timer. State its applications.
- (d) State the general features of time base waveform.
- (e) Explain exponential sweep circuit with a neat diagram.
- (f) Explain voltage doubler with a neat diagram.
- (g) Draw a neat diagram of voltage Tripler.
- (h) State the applications of voltage multiplier.

Q.5

Attempt any Four

(16)

- (a) Draw a neat diagram of high pass filter using opamp, Analyse its typical frequency response.
- (b) Draw a neat diagram of band pass filter using opamp. Explain its operation.
- (c) Explain band reject filter with neat diagram.
- (d) Draw a neat diagram of astable multivibrator using IC555. Derive an equation for its output frequency.
- (e) Illustrate monostable multivibrator using IC555.
- (f) Explain the operating states of IC555 when a triangular waveform of amplitude VCC is applied to Heshole and trigger terminal.

Q.6

Attempt any Two

(16)

- (a) Draw a neat diagram of first order low pass filter using opAmp. Draw its typical frequency response. Explain its equation for cut of frequency.
- (b) Draw a neat block diagram of IC555. State function of each pin in brief.
- (c) Explain UJT sweep circuit for generation of time base waveform.

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

TIME ALLOWED: 03 HOURS
MAXIMUM MARKS: 100
COURSE: ELECTRONICS DEVICES & CIRCUIT- II

SEAT NO. _____
SEMESTER: III
PROGRAMME: IE/DE
CODE: 160406

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. (18)**
- (a) Compare between voltage & power amplifier.
 - (b) State the functions & voltage tuned amplifier & write two applications.
 - (c) Define gm rd. & μ for FET.
 - (d) What is harmonic distortion? Explain in brief.
 - (e) Tuned amplifier is narrow band amplifier, give reasons.
 - (f) Give classification of FET.
 - (g) What is heat sink? Where it is used? Why.
 - (h) Sketch neat symbol for –
(i) N- channel JFET (ii) N channel D- MOSFET
(iii) N-channel E- MOSFET

- Q.2. Answer any Four. (16)**
- (a) Draw circuit diagram of class A transformer coupled amplifier & derive its conversion efficiency.
 - (b) State advantages and disadvantages of FET.
 - (c) Draw circuit diagram frequency response & write advantages of double tuned voltage amplifier over single tuned amplifier.
 - (d) Draw construction of N-channel JFET & explain the effect of V_{GS} on drain current I_D .
 - (e) Draw circuit diagram & explain working of class-b push pull complementary symmetry amplifier.
 - (f) Draw neat circuits for-
(i) JFET source self-bias (ii) JFET voltage divider bias.
- Q.3. Answer any Two. (16)**
- (a) For a class –A transformer coupled power amplifier with $P_2 = 15W$, R_{L+} 4 ohm & efficiency of output transformer =80%, Select –
(i) Power transistor for industry grade temperature (ii) V_{CC}
 - (b) Draw circuit diagram of class-B push pull amplifier and describe its operation.
 - (c) Draw neat construction & describe drain characteristics of N-channel E-MOSFET.

SECTION-II

Q.4. Attempt any Six.

(18)

- (a) What is photo electric effect explain?
- (b) List two applications of LED and LCD each.
- (c) Define holding current and latching current in SCR.
- (d) What is opt coupler explain. List its applications.
- (e) List different triggering methods of multivibrator.
- (f) List the applications of Schmitt trigger monostable, astable and bistable multivibrator.
- (g) Draw the symbols of SCR, DIAC, TRIAC and LED.
- (h) Draw neat, labelled characteristics of DIAC.

Q.5. Attempt any Four

(16)

- (a) Draw and explain construction and equivalent circuit of UJT.
- (b) Draw and explain monostable multivibrator with circuit diagram.
- (c) Draw and explain construction and characteristics of photodiode.
- (d) Draw the circuit diagram of astable multivibrator and explain with waveforms.
- (e) Draw and explain V-I characteristics of UJT.
- (f) Draw and explain constructional diagram and working of SCR.

Q.6. Attempt any Two.

(16)

- (a) Describe UJT relaxation oscillator in detail.
- (b) Draw & explain Schmitt trigger circuit with waveforms.
- (c) Draw and explain characteristics of SCR in detail.

SEAT NO. _____
SEMESTER: II
PROGRAMME: IE/DE
CODE: 160407

TIME ALLOWED: 03 HOURS
MAXIMUM MARKS: 100
COURSE: CIRCUITS & N/W

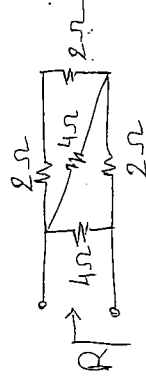
INSTRUCTIONS:

- (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.

Q.1 SECTION-I (18)

Any Six out of Eight

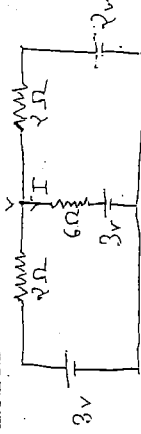
- (a) State and Explain Kirchoff's Voltage Law.
- (b) If $R = 100\Omega$, $L = 2 \text{ mH}$, $C = 0.5\mu\text{F}$. Find frequency of resonance of a series RLC circuit.
- (c) What is an integrating circuit? Explain.
- (d) What is Lag network? Explain.
- (e) State and explain Kirchoff's current Law.
- (f) Define Resonance and explain.
- (g) Define Norton's theorem and explain.
- (h) Find R



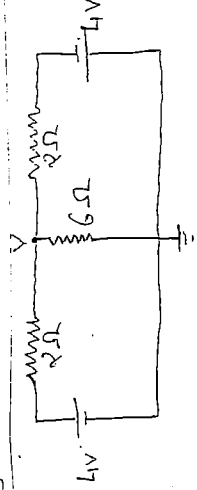
Q.2 (16)

Any Four out of Six

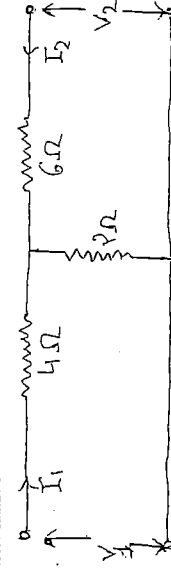
- (a) State and explain maximum power transfer theorem.
- (b) Find I by KVL



- (c) Find V by KCL



- (d) Find Z parameters of following network

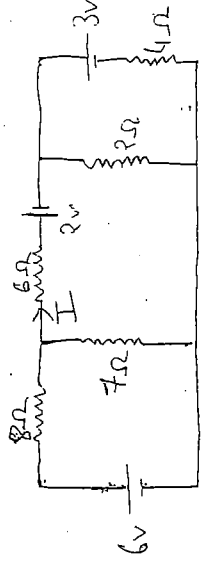


- (e) State and explain thevenin with suitable example.
 (f) Draw and explain Lead network with phasor diagram.

Q.3

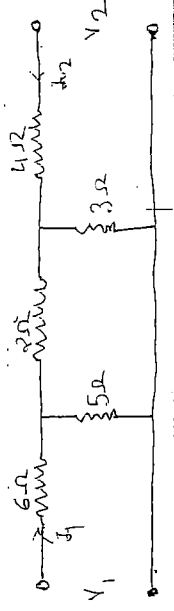
Any Two out of Three

- (a) Find I by superposition theorem

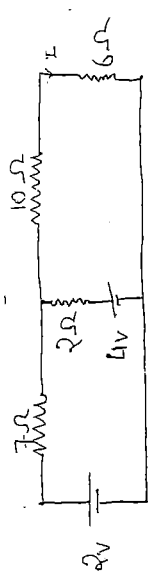


(16)

- (b) Find Y - parameter for given circuit



- (c) Find I by thevenin's theorem



SECTION-II

Q.4

Attempt any Six from following (3 marks each)

- (a) Define and explain mutual inductance.
 (b) Explain transient response of capacitance.
 (c) Explain working of capacitor with variation in frequency.
 (d) Draw output waveform of integrator if input is square wave.
 (e) Explain self-inductance referred to primary & secondary of transformer.
 (f) Draw equivalent circuit of transformer
 (g) Define integrator & differentiator.
 (h) Define: i) Reflection coefficient
 ii) Characteristic impedance

(18)

Q.5

Attempt any Four from following (4 marks each)

- (a) Explain inductive and capacitive coupling.
 (b) Explain transient response of series RC circuit.
 (c) Explain constant K - low pass filter.
 (d) Draw and explain differentiator circuit with wave form.
 (e) What do you mean by impedance matching in transformer?
 (f) What is self and mutual impedance? Give example & explain.

(16)

Q.6

Attempt any Two from following (8 marks each)

- (a) Explain type M band reject filters.
 (b) Give general equation of transmission. Explain each terms.
 (c) Explain type K Low pass filters.

(16)

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

TIME ALLOWED: 03 HOURS
MAXIMUM MARKS: 100
COURSE: MEASURING TECHNIQUES AND INSTRUMENTS
CODE: 160408

SEAT NO. _____
SEMESTER: III
PROGRAMME: IE/DE

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 accuracy & precision.
 - (b) Define sensitivity & Resolution.
 - (c) What is standard?
 - (d) Draw PMMC construction diagram.
 - (e) List the advantages of PMMCG.
 - (f) Give the concept of loading effect.
 - (g) State the specification of DVM.
 - (h) State the different frequency & Time standards.
- Q.2** Attempt any **FOUR** out of **SIX** (16)
- (a) Explain different types of errors with its remedial measures.
 - (b) Explain different types of standards.
 - (c) How to convert D Arsonval movement into a dc voltmeter. Explain it.
 - (d) Explain principle and operation of DVM.
 - (e) How to measure frequency by using digital frequency meter? Explain it.
 - (f) Explain FET voltmeter with neat circuit diagram.
- Q.3** Attempt any **TWO** out of **THREE** (16)
- (a) Draw and explain Integrating type dual slope DVM.
 - (b) Draw block diagram and explain frequency ratio measurement in detail.
 - (c) Draw and explain series type ohmmeter devices expression for R_1 & R_2

...2....

SECTION-II

- Q.4** **Attempt any SIX out of EIGHT** **(18)**
- (a) Define concept of guard application in brief.
 - (b) What are the different problems encountered while measuring low resistance.
 - (c) Explain why a potentiometer does not load the voltage source whose voltage is being measured,
 - (d) Explain the procedure for measurement self reactance of a coil with the help of ac potentiometer.
 - (e) Discuss advantages & disadvantages of Maxwell's Bridge for measurement of unknown inductance.
 - (f) Derive the general equations for balance in ac bridges.
 - (g) Derive the expression for balance in Maxwell's inductance bridge.
 - (h) Explain harmonic distortion in brief.
- Q.5** **Attempt any FOUR out of SIX** **(16)**
- (a) Describe the working of hay's bridge. Draw neat circuit diagram.
 - (b) With neat circuit diagram explain working of Kelvin's double bridge.
 - (c) Discuss the advantages & disadvantages of analog and digital type of oscilloscope.
 - (d) 'The focusing system of a CRO named as electrostatic lens'. Explain
 - (e) Draw block diagram of standard signal generator and explain the same.
 - (f) Write not on frequency & phase measurement using CRO.
- Q.6** **Attempt any TWO out of THREE** **(16)**
- (a) Explain working of Q meter used to measure L, C and Q. Justify the measurements.
 - (b) What are the advantages of dual trace over dual beam CRO? Explain the working of a dual trace CRO with the help of proper block diagram.
 - (c) With the help of block diagram explain The working of a harmonic distortion analyser.

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

SEAT NO. _____
SEMESTER: IV
PROGRAMME: I.E.
CODE: 160410

TIME ALLOWED: 03 HOURS
MAXIMUM MARKS: 100
COURSE: INDUSTRIAL ELECTRONICS

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.

- (a) What is the difference between normal diode & fast recovery diode?
- (b) Draw symbols for
(i) GTO (ii) IGBT (iii) TRIAC
- (c) What is dv/dt turn on for thyristor?
- (d) Draw equivalent circuit of SBS.
- (e) Compare between UJT and PUT.
- (f) List gate turn-on method of thyristor.
- (g) State and explain principle of induction heating.
- (h) Write merits of di-electric heating.

(18)

Q.2.

Answer any Four.

- (a) What is schottky diode? Sketch & label its characteristics.
- (b) Draw and explain construction of IGBT.
- (c) Draw and explain triggering of thyristor using PUT.
- (d) Draw and explain diode-resistance-capacitance firing circuit.
- (e) List applications & induction heating & explain any one.
- (f) State and explain the factor governing the process of di-electric heating.

(16)

Q.3.

Answer any Two.

- (a) Draw construction and explain characteristics of power MOSFET.
- (b) Draw and explain SBS firing circuit of thyristor.
- (c) What is synchronized UJT firing? Draw & explain the circuit for same.

(16)

SECTION-II

Q.4.

Attempt any Six out of Eight.

(18)

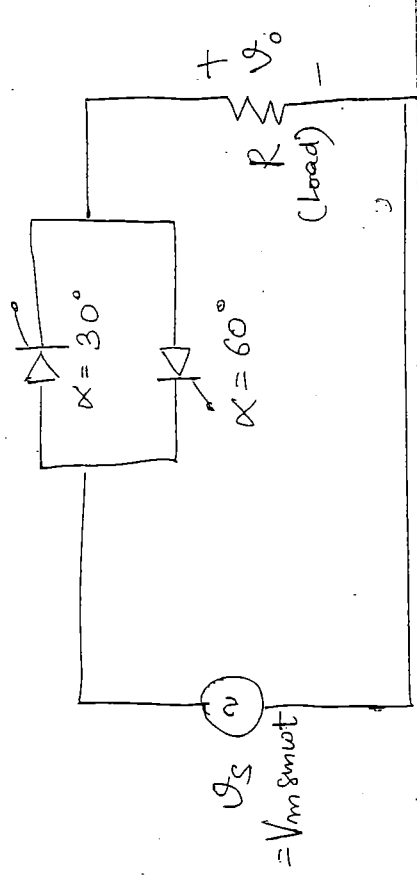
- (a) Explain why commutation circuit is required for SCR.
- (b) List the various factors to be considered for Gate protection of SCR.
- (c) Explain advantage of Free wheeling diode.
- (d) Write short note on Zener diode.
- (e) Write short note on Metal oxide varistor.
- (f) Draw circuit diagram of three phase Half wave controlled rectifier with Resistive Load.
- (g) Write short note on $\frac{dv}{dt}$ protection using snubber.
- (h) Write short note on class F commutation.

Q.5.

Attempt Any Four out of Six.

(16)

- (a) Draw and explain transistor voltage regulator.
- (b) With neat circuit diagram explain class C (Complementary commutation) of SCR.
- (c) Explain half wave controlled rectifier with resistive load.
- (d) Explain voltage regulator 7805.
- (e) Explain block diagram of SMPS.
- (f) Draw waveform of load voltage for the given circuit.



Q.6.

Attempt Any Two out of Three.

(16)

- (a) With circuit diagrams and waveform explain single phase Full controlled full wave bridge rectifier with R-L Load.
- (b) Write note on UPS. Hence distinguish between online & off line UPS.
- (c) Explain with circuit diagram three phase fully controlled bridge rectifier with purely resistive load.

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

TIME ALLOWED: 03 HOURS
MAXIMUM MARKS: 100
COURSE: ELEMENTS OF
COMMUNICATION ENGINEERING.

SEAT NO. _____
SEMESTER: IV
PROGRAMME: IE/DE
CODE: 160411

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 six**

(18)

- (a) Define AM, modulation index of AM & sketch AM wave for $m=1$.
- (b) Draw diagram of FET balanced modular.
- (c) Compare between AM and FM (6 points)
- (d) What is AGC? State need & types.
- (e) Define PWM, sketch waveform and state two applications.
- (f) Define noise and give classification of noise.
- (g) Find the total power in the AM wave modulated to the depth of 40% with carrier power 25W.
- (h) Sketch frequency spectrum and FM and comment on its bandwidth.

Q.2 **Attempt any four**

(16)

- (a) Derive AM wave equation.
- (b) For the FM wave represented by $10 \sin (6 \times 10^8 t + 5 \sin 1250t)$, find maximum deviation, carrier frequency & power dissipated by this wave in 8 ohm resistor.
- (c) Draw block diagram and explain phase shift method of SSB generation.
- (d) Stat and explain characteristics of radio receiver.
- (e) Explain the terms sampling & quantization as applied to PCM.
- (f) Describe thermal noise in detail.

Q.3 **Attempt any two**

(16)

- (a) Describe generation of AM wave using grid modulated class 'C' amplifier.
- (b) Draw and explain Armstrong Transmitter.
- (c) Draw block diagram of FM receiver and explain in brief function of each block.

SECTION-II

Q.4

Attempt any six

(18)

- (a) Define the following terms w.r.to Antenna.
 - i) Antenna gain.
 - ii) Antenna resistance.
- (b) Define the term Non resonant antenna. Draw its radiation pattern.
- (c) Describe the ground wave propagation along with sketch.
- (d) Write the comparison between sky wave and space wave propagation (Any three points)
- (e) Describe the following terms related to sky wave propagation.
 - i) Critical frequency
 - ii) Skip distance.
- (f) Describe in brief composite video signal.
- (g) What is chrominance signal? Describe in brief.
- (h) Draw the block diagram of PAL-D colour receiver.

Q.5

Attempt any four

(16)

- (a) What is folded dipole? List its applications.
- (b) Describe in brief w.r.t. colour TV
 - i) Colour mixing
 - ii) Luminance signal.
- (c) Explain the interface scanning in detail giving the line no. wise details for odd and even field.
- (d) Describe the following terms for monochrome Television
 - i) Aspect ratio
 - ii) Synchronization.
- (e) Define EM wave and state its characteristics.
- (f) Draw the sketch of space wave propagation. State the applications of space waves.

Q.6

Attempt any two

(16)

- (a) i) Define the terms
 - A) Bandwidth
 - B) Beamwidth
 - C) Polarisation w.r.to antenna
- ii) What is Resonant Antenna? Describe half wave dipole antennas with the help of suitable diagram.
- (b) Draw the block diagram of monochrome TV receiver and explain the operation of each block.
- (c) Draw the block diagram and describe the operation of PAL encoder.

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: IE/DE
COURSE: Principle of Instrumentation and control system CODE: 160412

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) State different types of ADC & DAC used for signal conditioning.
- b) State Any 3 application of Instrumentation Amplifier.
- c) Define : Error, Accuracy, Precision
- d) Define Active transducer & give an example.
- e) What is strain gauge? Define gauge factor.
- f) Draw thermistor characteristics for PTC & NTC.
- g) What are different types of transducer for level measurement?
- h) Define & Explain the term transducer.

Q.2 Attempt ANY FOUR

(16)

- a) Draw the block diagram of Instrumentation system a explain any block in detail.
- b) Classify the transducer based on
 - (i) Nature of output signals
 - (ii) Conversion
 - (iii) Requirement of power supply
 - (iv) Connectivity with measurand
- c) Compare between RTD & Themister.
- d) Explain working of LVDT.
- e) Draw a circuit diagram of instrumentation amplifier and state any two features.
- f) Explain chopper modulator with help of neat diagram.

Q.3 Attempt ANY TWO

(16)

- a) Explain multi-channel DAS & state it's applications.
- b) Explain solid state modulator & Demodulator.
- c) Explain Electromagnetic flow meter & state its advantages & disadvantages.

SECTION-II

Q.4 Attempt ANY SIX from the following. **(18)**

- a. Compare open Loop and closed Loop systems.
- b. State the effect of feedback on control system based on stability.
- c. Define poles of Transfer Function, Zeros of transfer function by giving suitable examples.
- d. $G(S)H(S) = \frac{(S+2)}{S^3 + 3S^2 + 2S}$ Find order of the system & type of the system.
- e. Define steady state and transient response.
- f. State steady state error co-efficient with their mathematical formula.
- g. Draw the static characteristics of stepper motor.
- h. State the advantages of AC servo motor.

Q.5 Attempt ANY FOUR **(16)**

- a. Derive the Transfer Function of Closed Loop System.
- b. State the following Block Diagram Reduction Rule:
 - i) Cascaded Block
 - ii) Shifting summing point after the block
 - iii) Shifting take off point before the block.
 - iv) Minor feedback Loop.
- c. State the standard test signal with mathematical formula.
- d. $G(S)H(S) = \frac{200}{S^2(S+2)}$ Find steady state error coefficient for above Transfer Function
- e. Define & Explain : Absolute Stability
Relative Stability
- f. With the help of neat diagram, explain potentiometer as an Error Detector.

Q.6 Attempt ANY TWO **(16)**

- a. Explain any one type of stepper motor with neat diagram and compare it with D.C. Motor.
- b. Draw the transient response of 2nd order closed loop system indicating all time domain specification & define them.
- c. The characteristic equation of the Transfer Function is $2s^5 + 3s^4 + 2s^3 + s^2 + 2s + 2$. Determine the stability of the system using Routh's criteria & determine no. of poles on Left Hand Side.

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

TIME ALLOWED: 03 HOURS
MAXIMUM MARKS: 100
COURSE: ADVANCED IND. ELECTRONICS

SEAT NO. _____
SEMESTER: IV
PROGRAMME: INDUSTRIAL ELCTO.
CODE: 160413

INSTRUCTIONS:

- (1) Answer to the two sections must be written in separate answer books.
- (2) All questions 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) Explain operating principle of inverter in brief.
 - (b) Write short note on principle of operation of cycloconverter.
 - (c) Explain IN short the principle of operation of chopper.
 - (d) Draw circuit diagram of single phase full bridge inverter using IGBT switches and resistive load (no explanation and waveforms needed)
 - (e) Classify chopper according to quadrant of operation.
 - (f) Explain step down cycloconverter with circuit diagram.
 - (g) Distinguish between Inverter and Cycloconverter (only 3 points)
 - (h) Explain load voltage control of PWM inverter in brief.
- Q.2** **Attempt Any four out of Six** **(16)**
- (a) With circuit diagram and waveform explain working of step up cycloconverter.
 - (b) With circuit diagram and waveform explain operation of step down chopper.
 - (c) Explain sinusoidal PWM switching for single phase full bridge inverter.
 - (d) Draw circuit diagram and waveforms for series inverter.
 - (e) Draw and explain any one type of forced commutated thyristor inverter.
 - (f) With circuit diagram and waveform explain step up/down chopper.

Q.3

Attempt Any Two out of Three

(16)

- (a) With circuit diagram and waveforms explain the operation of three phase bridge inverter with 180° conduction mode.
- (b) With proper diagrams and waveforms explain time ratio control and current limit control for DC choppers.
- (c) Explain the need for reduction of harmonics in inverter output voltage and hence list different methods for the same. Explain any one harmonic reduction method in detail.

SECTION-II

Q.4

Answer Any Six out of Eight

(18)

- (a) List advantages of static switches (3 points).
- (b) Draw circuit diagram of Flashed Circuit.
- (c) List types of HVDC transmission link and draw any one.
- (d) Explain Alarm Actuator in brief.
- (e) Explain any one ultrasonic application.
- (f) Draw circuit diagram of saw tooth generator.
- (g) Draw circuit diagram of Emergency Lighting System.
- (h) Define power factor. List methods of power factor improvement.

Q.5

Answer Any Four out of Six

(16)

- (a) Give classification of solid state relays and explain any one in brief.
- (b) Explain battery charger circuit.
- (c) Explain DC static switch.
- (d) List advantages of HVDC transmission.
- (e) Explain working of Liquid Level controller.
- (f) Explain temperature control in brief.

Q.6

Answer Any Two out of Three

(16)

- (a) Explain working of static circuit breakers in detail.
- (b) Explain general layout of HVDC transmission.
- (c) Explain effect of poor power factor.

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

TIME ALLOWED: 03 HOURS
MAXIMUM MARKS: 100
COURSE: PRINCIPLES OF DIGITAL TECHNIQUES. CODE: 160702

SEAT NO. _____
SEMESTER: III
PROGRAMME: IE/DE

INSTRUCTIONS:

- (1) Answer to the two sections must be written in separate answer books.
- (2) All questions 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) Name any five types of Number system.
 - (b) Convert $(AB\ 6)_{16}$ Hexadecimal to Decimal.
 - (c) Draw Half adder circuit diagram using gate.
 - (d) Find 2'S complement of $(53)_{10}$
 - (e) Define min term & max term with example.
 - (f) Convert $Y = AB + BC + AC$ into standard SOP Form.
 - (g) Differentiated between encoder and multiplexer.
 - (h) Write two example of encoder and decoder.
- Q.2** Attempt any Four of the following (16)
- (a) Reduce $Y = (A + \overline{A}\overline{B}) (B + \overline{A} B) = AB$. By using Boolean's formula.
 - (b) Draw full subtractor by using half subtractor circuit diagram & write it truth table.
 - (c) Write $Y = (A + BC) (B + \overline{C} A)$ in standard POS form.
 - (d) Draw $Y = B\overline{C} + B\overline{D}C$ circuit using universal gates.
 - (e) Draw pin diagram for Arithmetic and logic unit & describe it.
 - (f) Draw 4 bit comparator block diagram & write it working.
- Q.3** Attempt any Two of the following (16)
- (a) Write & prove De Morgan's 1st & 2nd theorems with truth table.
 - (b) Reduce of $(ABCD) = \sum m(8, 10, 11, 13, 15) + d(9, 12, 14)$ using K – map. Draw logic circuit for reduce equation.
 - (c) Draw 4 bit parallel adder circuit diagram and write its working.

SECTION-II

- Q.4** **Attempt any six** **(18)**
- (a) Define Flip Flop. State its types.
 - (b) What is sequential circuit? Draw its block diagram.
 - (c) Draw SIPO & PIPO.
 - (d) Define semiconductor memory. Give its classification.
 - (e) Give difference between synchronous & asynchronous counter.
 - (f) Define power dissipation, fan in & fan out
 - (g) Draw R – 2R ladder method of DA converter.
 - (h) What are registers? State its types.
- Q.5** **Attempt any Four** **(16)**
- (a) Compare combinational and sequential circuit.
 - (b) Explain operation of 1 bit memory cell.
 - (c) Explain TTL with neat circuit diagram.
 - (d) Draw and explain D – type flip flop. Give its applications.
 - (e) Discuss about ROM & EEPROM.
 - (f) Draw 3 input ECL NOR gate.
- Q.6** **Attempt any Two** **(16)**
- (a) Explain Digital to Analog converter using Binary weighted register method.
 - (b) Explain the operation of 4 bit binary up ripple counter with neat sketches.
 - (c) Explain TTL logic family in detail.

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: Ind.El ext.

COURSE: Microcontrollers & its applications

CODE: 160703

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 Attempt ANY SIX (Each carry 3 marks) (18)**
- a) Explain following pin functions of 8051.
i) RXD ii) PSEN iii) RST
- b) The contents of the accumulator after execution of following instructions will be
MOV A, # 0FH
ANL A, # 2CH
- c) Explain following instructions of 8051.
i) ORL ii) MOVX iii) DJNZ
- d) Explain power ON reset.
- e) Classify instruction sets of 8051 microcontroller.
- f) Write any 3 features of 8051.
- g) WAP to add two numbers.
- h) Explain how serial data is received in 8051.
-
- Q.2 Attempt ANY FOUR (Each carry 4 marks) (16)**
- a) Explain addressing modes of 8051 microcontroller with examples.
- b) Explain port structure of 8051.
- c) State the significance of RESET in microcontroller? Write the method to implement manual and power on reset in 8051?
- d) Compare instructional ACALL and LCALL of 8051.
- e) Explain PCON SFR with role of each bit.
- f) Draw timing diagram to access external data memory.
-
- Q.3 Attempt ANY TWO (Each carry 8 marks) (16)**
- a) Design 8051 based system with following specification.
i) 8051 is working at 10MHZ
ii) 8 KB External program memory using 8 KB chips.
iii) 16 KB External data memory using 8KB chips.
- b) Draw block diagram of 8051 microcontroller and explain in brief.
- c) Write a program to arrange a given array of 10 elements in ascending order.

SECTION – II

Q.4 **Answer ANY SIX**

(18)

- a) Compare 8-bit microcontroller with 16-bit microcontroller.
- b) Compare Assembler with cross compiler.
- c) W.A.P. to generate time delay of 1 sec.
- d) List types of keyboard.
- e) State the functions of a simulator.
- f) Explain word "Interfacing" w.r.t. microcontroller. Give example.
- g) Draw an interfacing diagram of 'Relay' with microcontroller
- h) Explain significance of Delay in a program.

Q.5 **Attempt ANY FOUR**

(16)

- a) W.A.P. to generate a square wave at P.I.O. The frequency of square is 1 KHz.
- b) Describe D/A converter interfacing with 8051 microcontroller.
- c) W.A.P. for 8051 microcontroller to transfer letter "A" serially at 4800 baud, continuously.
- d) Explain multiple interrupts using 8051 microcontroller.
- e) Explain in detail expansion of i/o ports.
- f) Explain event counting using 8051 microcontroller.

Q.6 **Answer ANY TWO**

(16)

- a) Describe keyboard interfacing in detail with program.
- b) Draw a neat interfacing of 3 – digit display and explain its working in detail with program.
- c) Explain pulse width measurement in detail.

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: DIGITAL ELEXT.

COURSE: MICROPROCESSOR AND MICROCONTROLLER CODE: 160707

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-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 the following (SIX)

(18)

- (a) Explain pin functions of 8085 Microprocessor.
 - i) TRAP
 - ii) HLDA
 - iii) $I\bar{O} / \bar{M}$
- (b) Write any four comparison points between microprocessor & microcontroller.
- (c) The contents of the accumulator after execution of following instructions will be
MOV A, # OF H
ANL A, # 2C H
- (d) Explain following instructions of 8051 microcontroller.
 - i) MOVX
 - ii) ORL
 - iii) ADDC
- (e) Explain use of i) editor ii) assembler iii) linker
- (f) State the functions of ALE in 8051 microcontroller.
- (g) Draw the diagram for Flag register for 8051 Microcontroller.
- (h) Compare direct and indirect addressing mode of microcontroller.

Q.2

Attempt ANY FOUR

(16)

- (a) Draw architecture of 8085 microprocessor & explain any 4 blocks in brief.
- (b) Explain port 1 structure of 8051.
- (c) What is significance of RESET in microcontroller? How to implement manual and power on reset in 8051.
- (d) Compare instructions ACALL and LCALL of 8051.
- (e) Draw the timing diagram for memory read operation.
- (f) Write a program to implement following logic
 $F(A,B,C) = \bar{A}BC + A\bar{B}\bar{C} + ABC$

Q.3

Attempt ANY TWO (Each carry Eight Marks)

(16)

- (a) Write a program to arrange a given array of 10 elements in ascending order.
- (b) Explain interrupt structure of 8051.
- (c) Explain timer modes of operation of 8051 microcontroller.

SECTION-II

Q.4 Answer the following (ANY SIX) (18)

- (a) Explain the features of IC 8255
- (b) Draw the diagram to interface LED – 7 – segment display to microcontroller.
- (c) Draw the diagram to interface 8 KB of external data memory to the microcontroller.
- (d) Draw the diagram to connect four keys to the microcontroller. Explain how the key pressed is recognised.
- (e) Write a program to turn the LED's connected at Port 1, ON, when a switch at P3.0 is closed
- (f) Draw the diagram to interface D/A converter to the microcontroller 8051.
- (g) List the derivatives of 8 - bit microcontroller.
- (h) Explain any three features of the advanced 8 – bit microcontroller.

Q.5 Answer the following (ANY FOUR) (16)

- (a) Explain how the interrupts (hardware) can be increased in 8 – bit microcontroller.
- (b) Draw the diagram to interface 4 x 4 keyboard matrix.
- (c) State the need for keyboard debounce logic and explain how it can be implemented.
- (d) Explain the benefit of multiplexing 7 – segment displays. Give example.
- (e) Explain how the number of ports available in 8051 can be increased.
- (f) Compare polling mechanism and interrupt mechanism of interfacing external devices.

Q.6 Answer the following (ANY TWO) (16)

- (a) With a neat diagram implement elevator controller using 8051 microcontroller.
- (b) Draw the diagram to interface following devices to the microcontroller 8051:
 - (a) Program Memory of 16 KB
 - (b) Data Memory of 12 KB
 - (c) Four keys
 - (d) One LCD 7 – segment displayWrite the memory map table.
- (c) Draw the diagram to implement a digital clock using 8051 microcontroller and explain how it functions.

SECTION-II

Q.4

(18)

- Attempt any Six of the following**
State Ridel's conditions for Fourier series.
- (a) Write the expressions for Fourier coefficients using trigonometric Fourier series.
 - (b) Compare Fourier Series and Fourier transform.
 - (c) Explain convolution property of continuous time Fourier transform.
 - (d) Explain time scaling property of discrete time Fourier series (DTFS)
 - (e) Write the expression for discrete time Fourier transform(DTFT)
 - (f) Obtain DTFT of $x[n] = u[n]$
 - (g) Explain the difference between even and odd Fourier coefficients.

Q.5

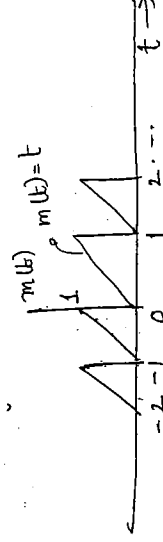
(16)

- Attempt any four of the following**
Explain the linearity property of CTFS.
- (a) Explain time reversal and time shifting property of DTFT.
 - (b) Check whether the Fourier series can be determined for following signals. Give reason $\{n\} = 2 \cos \sqrt{3}t$ (ii) $x\{n\} = 4 \cos \frac{t}{2}$
 - (c) Explain the process of finding the Fourier series using exponential terms. What is the significance of magnitude and phase spectrum?
 - (d) Explain the frequency shifting and differentiation property of DTFT.
 - (e) Find the Fourier transforms of $x\{n\}$ where $X\{n\} = 1; 0 \leq n \leq 4$
-0 ; otherwise

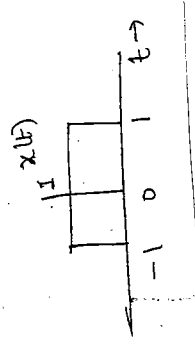
Q.6

(16)

- Attempt any Two of the following**
Draw the magnitude and phase spectrum of the periodic signal $m(t)$



- (b) Find the Fourier transform of the following signal



- (c) Determine the Fourier series representation of the following discrete time signal $X\{n\} = 4 \cos \frac{\pi n}{2}$

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

SEAT NO. _____
SEMESTER: IV
PROGRAMME: IE/DE

TIME ALLOWED: 03 HOURS
MAXIMUM MARKS: 100

COURSE: VLSI
CODE: 160709

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 SIX (18)**
- a) Draw output characteristics & transfer characteristics of n-channel enhancement type MOSFET.
 - b) List the method for CMOS Fabrication.
 - c) Write current equation for linear region & saturation region for P channel MOSFET.
 - d) Show stick encoding of following layer with colours.
 - (i) n⁺ diffusion
 - (ii) Polysilicon
 - (iii) Metal
 - e) Define Noise Margin with help of graphically indicating NM_H & NM_L.
 - f) State advantages of Butting contact.
 - g) Draw voltage transfer characteristics of resistive load NMOS inverter.
 - h) Draw only circuit diagram for following Boolean expression in CMOS.
$$Y = \overline{AB + C}$$
- Q.2 Attempt any FOUR (16)**
- a) List various important steps of IC fabrications.
 - b) Give summary of masks used for P-well process.
 - c) Explain the concept of channel length modulations.
 - d) Draw circuit diagram & stick diagram of CMOS Inverter.
 - e) Explain the concept of Buried contact.
 - f) Define V_{IL}, V_{IH}, V_{OL}, V_{OH}

- Q.3** **Attempt any TWO** (16)
- a) State ANY EIGHT design rule for NMOS.
- b) Draw circuit diagram for
(i) MOSFET inverter with Resistive load.
(ii) MOSFET inverter with Enhancement load
(iii) MOSFET inverter with depletion load
Draw stick diagram for any one from above.
- c) Describe complete fabrication steps for NMOS transistor.

SECTION-II

- Q.4** **Attempt any SIX** (18)
- a) Draw pass transistor logic for NAND gate with truth table.
- b) Give various features of VHDL.
- c) Write VHDL code for 2 input NAND gate.
- d) Give classification of memory.
- e) Explain Data Flow Modeling.
- f) Write VHDL code for 4:1 multiplexer using behavioural modeling.
- g) Draw static RAM cell.
- h) Explain basic structure of VHDL code.

- Q.5** **Attempt any FOUR** (16)
- a) Explain total power dissipation in transistor.
- b) Write VHDL code for 3:8 decoder using behavioural Modeling.
- c) Explain various sequential statement used for behavioural Modeling.
- d) Compare SRAM and DRAM.
- e) Explain various data types used in VHDL
- f) Draw and Explain I/O block architecture of FPGA.

- Q.6** **Attempt any TWO** (16)
- a) Draw and explain CPLD Architecture.
- b) Write a VHDL code for 4 bit barrel shifter.
- c) Explain structural modelling. Write VHDL code for 4 – input AND gate using 2 input AND Gate (Use structural Modelling)
