I—Sem/COMMON/2019(S)(New)

BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

(Theory-4(a, b))

Full Marks : 80

Time : 3 hours

Answer any five questions including Q.Nos.1 & 2

Figures in the right-hand margin indicate marks

1. Answer *all* questions : 2 × 10

   (*a*) State Ohms law.

   (*b*) State KCL and KVL.

   (*c*) Define r.m.s and average value.

   (*d*) Define power factor and draw the power triangle.

   (*e*) State the principle of operation of dc generator.

   (*f*) Define conductor.

   (*g*) Define electron emission and write down the types.

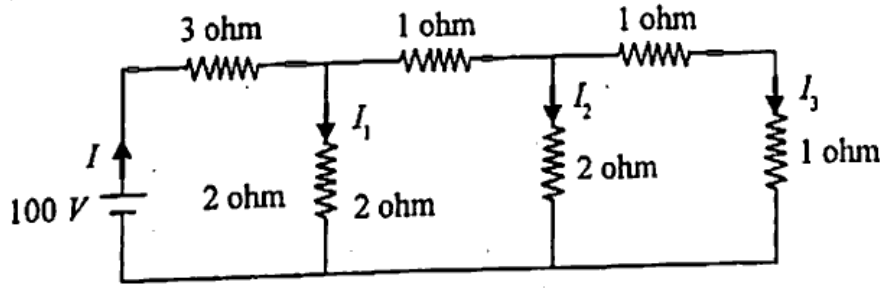
   (*h*) Define SCR.

   (*i*) Define transistor biasing and what is its purpose ?

   (*j*) Define Modulation.

2. Answer *all* : 5 × 6

   (*a*) Find the circuit current I and branch currents I_1, I_2 and I_3 for the below figure.



   (*b*) Give a brief classification of dc motor on the basis of field excitation.

   (*c*) Write down the different uses of PMMC types of instruments.

   (*d*) Differentiate between intrinsic semiconductor and extrinsic semiconductor.

   (*e*) What is pn-junction ? Explain the formation of potential barrier in a pn-junction.

   (*f*) Define transducer. State and explain different types of transducers briefly.

3. (*a*) With a neat block diagram explain briefly about the nuclear power plant. 5

   (*b*) Describe a full wave bridge rectifier using crystal diode. 5

(Turn Over)

4. (*a*) A resistance of 20 ohm, inductance of 0.2 H and capacitor of 150 μF are connected in series and are fed by a 230 Volt, 50 Hz supply. Find X_L, X_C, Z, Y, $p.f.$ 5

   (*b*) Briefly explain the working of a basic oscillator with different elements through simple block diagram. 5

5. (*a*) Briefly explain the types of Wiring for domestic installations. 5

   (*b*) Explain the construction and working of a cathode ray tube. 5

6. (*a*) Explain briefly about the main parts of dc machines. 5

   (*b*) Write a short note on zener diode and draw the equivalent circuit of an ideal zener in the breakdown region. 5

7. (*a*) A building has the following electrical appliances : 5

   (*i*) A 3 HP motor running for 8 hrs in a day.

   (*ii*) Three fans each of 80 watt running for 08 hrs in a day.

   (*iii*) Five tube lights each of 40 watt running for 08 hrs per day.

   Find the monthly bill if, 1 unit = Rs.2.50/-. The month is August.

   (*b*) State the different types of modulations and explain briefly about the amplitude modulation. 5

Total Pages – 4

I – Sem/COMMON/2019(S)(New)

COMMUNICATIVE ENGLISH

(Theory : 1(a))

Time : 3 hours

Full Marks : 80

Answer all questions

Figures in the right-hand margin indicate marks

1. Read the following passage carefully and do as directed :

Fire ! Fire ! "what terrible words to hear when one wakes up in a strange house in the middle of the night ?" It was a large, old, wooden house– the sort that burns beautifully– and my room was on the top floor. I jumped out of bed, opened the door and stepped out into the passage. It was full of thick smoke.

I began to run, but I was still only half-awake, instead of going towards the stairs, I went in the opposite direction. The smoke grew thicker and I could see flames all around. The floor became hot under my bare feet. I found an open door and ran into a room to get to the window; but, before I could reach it, one of my feet caught in something soft and I fell down. The thing I had fallen felt like a bundle of cloths, and I picked it up to protect my face.from smoke and heat. Just then the floor gave way under me and I crashed to the floor below with pieces of burning wood all around me. I saw a flaming doorway in front, put the bundle over my face, and ran. My feet burned terribly, but I got through. As I reached the cold air outside, my bundle of clothes gave a thin cry. I nearly dropped it in my surprise. Then I saw a crowd gathered in the street. A women in a night dress and a borrowed man's coat screamed as she saw me and came running madly.

"My baby ! My baby" she cried.

The crowd cheered wildly as she took the smoke-blackened bundle out of my arms. I had some difficulty in recognising her. She was the Mayor's wife and I had saved her baby.

I was a hero.

(*a*) Answer briefly the following from your reading of the above passage : 2 × 6

(*i*) How did the narrator describe the fire break ?

(*ii*) What did the narrator find and from where ?

(*iii*) What did the narrator do with his "finding" ?

(*iv*) Who did rush towards the narrator ? Narrate the fellow as per the description given by the narrator.

(*v*) Which mystery was revealed at the end ?

(*vi*) Explain– "I was a hero".

(*b*) Match A with B 1 × 4

A	B
i. Sort	a. Slipped off
ii. Gave way	b. Cried terribly loudly
iii. Surprise	c. Type of
iv. Screamed	d. Astonishment

(*c*) Give antonyms of the following : 1 × 2

(*i*) Bare
(*ii*) Grew

(*d*) Supply a suitable title to the passage. 2

2. Read the following passage :

Insecticides are substances toxic to insects and are used to control them; but, in some situations they can cause harm to men, domestic animals or crops. There are three main kinds of insecticides : stomach insecticides which are eaten by the insects along with food, contact insecticides which get into blood through the skin and fumigant insecticides which the insects breathe in. While all insecticides are harmful, the stomach insecticides are the most harmful, and should be used carefully.

(*a*) Make a not of the above passage. 5

(*b*) Attempt a summary of the above passage basing upon the notes you have made. 5

(*c*) Five meanings of the word "SNAKE" are given under column "A". Match them with sentences under column "B" : 1 × 5

A (Meanings)

i. Cut and curve
ii. Acting hot in regular interval
iii. A reptile
iv. Conspiracy
v. Hidden Agenda

B (Sentences)

a. Brutas was a snake in the guise of a friend.
b. The local political party had stopped snaking.
c. The snake that kills teamwork is political agenda.
d. The narrow path is snaking through the forest.
e. Annaconda is the largest snake in the world.

3. Answer any *five* of the following : 2 × 5

(*i*) What was the result of the 1st encounter with Red ?
(*ii*) What made people afraid of Red ?
(*iii*) What are the key elements of a team's success ?
(*iv*) What act of wickedness did Ralph do and how ?
(*v*) Why did people bless Abbot of Aberbrothok ?

(*vi*) What does the poet pray for ?

4. Do as directed : 1 × 5

(*i*) He is not very much fond of books. He has only _____ books at home. (Insert a "determiner")

(*ii*) Sashi : I must leave now.
Binu : _____ I get a taxi ? (Put a "Modal")

(*iii*) Suresh : What's on TV today ?
Sambhu : I do not know. I _____ the programme yet.
(Put correct tense form of "not see")

(*iv*) The number of students _____ growing in the hostel. (Put correct form of "be"

(*v*) He gave me a rose. (Change the voice)

5. Do as directed :

(*a*) Answer any *two* of the following : 4 × 2

(*i*) Write a paragraph in about *100* words on "Nano Technology".

(*ii*) There is a train accident in the area where you work as a news reporter. You went to the spot and talked to different people including some passengers. You also met railway officials. Draft a report.

(*iii*) You are "Swasthya Bandhu", B/172, Prachi Enclave, Patia, Bhubaneswar dealing with retail medicines. Draft a letter of enquiry to Med Plus, Head Office, Ganga Nagar asking for their business terms and conditions, mode of supply and transactions, stock and delivery as you are interested in availing a distributorship.

(*b*) Read the following advertisement : 7

Super Sales
Bapuji Nagar
Bhubaneswar
Odisha
No. AXX/04/2019 28th April 2019

We are one of the leading show room of two-wheelers dealing with Maruti Suzuki produce. We want 02 diploma holders in automobile for the post of supervisors in our said branch. Experience is not a must. Candidate should not be more that 26 years of age as on dt. 01.01.2019. Attractive salary with perks and free housing.
Apply within 10 days to the undersigned.

Manager
Sales

Now draft a job application and attach your CV to it.

6. Answer any *three* of the following : 5×3

(*i*) State the meaning of communication and explain its process with appropriate diagram. 5

(*ii*) Differentiate between up-ward and down-ward communication. State their merits and demerits. 5

(*iii*) Eye-contact is a powerful medium of body language. Explain with minimum five examples. Give diagrams with messages that they convey. 5

(*iv*) Give short notes : $2\frac{1}{2} \times 2$

(*a*) Communication model
(*b*) Parallel communication.

I–Sem/COMMON/2019(S)(New)

ENGG. MATH - I

(Theory : 3)

Full Marks : 80

Time : 3 hours

Answer any **five** questions including **Q. Nos. 1** and **2**

Figures in the right-hand margin indicate marks

1. Answer *all* : 2 × 10

(a) Solve $\begin{vmatrix} 4 & x+1 \\ 3 & x \end{vmatrix} = 5$.

(b) Form a 2×2 matrix with elements,

a_{ij} if $a_{ij} = i \cdot j$

(c) Find the value of $\sin^2 24^\circ - \sin^2 6^\circ$.

(d) Find the distance between the lines $3x - 1 = 0$ and $x + 3 = 0$.

(e) Find the angle between the lines

$x = 2$ and $x - \sqrt{3} \cdot y + 1 = 0$

(f) Find the equation of the circle whose centre is (2, –3) and radius is 4.

(g) Find the direction cosines of the normal to the plane $x + y + 1 = 0$.

(h) Determine the centre and radius of the sphere $x^2 + y^2 + z^2 - 4x + 6y - 8z + 1 = 0$.

(i) Determine the value of k such that the planes $x + 3y + kz = 5$ and $kx + y + 2z = 0$ are perpendicular to each other.

(j) Find the image of the point (–6, 2, –3) w.r.t yz-plane.

2. Answer any *six* : 5 × 6

(a) Find the maximum and minimum value of $8\sin x - 15\cos x - 1$.

(b) Find the equation of the circle, the end points of a diameter being (–4, 3), (2, –2).

(c) Solve by Cramer's rule

$2x - y = 3, \quad x + 2y = 4.$

(d) Find the inverse of the matrix

$$A = \begin{bmatrix} -2 & -1 \\ 1 & -3 \end{bmatrix}.$$

(e) Prove that $2\tan^{-1}\left(\frac{1}{3}\right) + \tan^{-1}\left(\frac{1}{7}\right) = \frac{\pi}{4}$

(*f*) Determine the value of '*a*' so that the points (1, 4), (2, 7), (3, *a*) are collinear.

(*g*) Find the equation of the line passing through (−4, 2) and parallel to the line $4x - 3y = 0$.

(*h*) Find the equation of the plane which passes through the point (1, −1, 4) and is parallel to the plane $2x + 3y + 7z = 11$.

3. Show that

$$\begin{vmatrix} b+c & a & b \\ c+a & c & a \\ a+b & b & c \end{vmatrix} = (a+b+c)(a-c)^2$$ 10

4. If $A + B = 45^\circ$, prove that

(*i*) $(1 + \tan A)(1 + \tan B) = 2$

Hence deduce the value of $\tan 22\frac{1}{2}^\circ$ and $\cot 22\frac{1}{2}^\circ$. 10

5. Find the equation of the line through the point of intersection of $x + 3y - 2 = 0$ and $x - 2y + 4 = 0$ and is perpendicular to the line $2y + 5x + 9 = 0$. 10

6. Show that the points $A(1, 2, 3)$, $B(-1, -2, -1)$, $C(2, 3, 2)$ and $D(4, 7, 6)$ are the vertices of a parallelogram $ABCD$ but it is not a rectangle. 10

7. Find the equation of the sphere passing through the point (1, 2, −3) and (3, −1, 2) and centre lying on *y*-axis. 10

I- SEMESTER - COMMON /2019/ (New)

TH-2(b)-ENGINEERING CHEMISTRY

Full Marks: 80

Time : 3 Hours

Answer any FIVE Questions including Q No. 1 & 2

Figures in the right hand margin indicates marks

1.	Answer ALL questions: (a) What is (n+l) rule? Arrange 3d, 4s, 4p & 5s in order of their increasing energy. (b) Draw the lewis structure of methane. What is the structure and bond angle of it? (c) What do you mean by amphoteric substance? Give an example of it. (d) Calculate the Molarity of sodium carbonate solution, 1.92 gm of which is dissolved in 400 ml of solution. (e) What is corrosion? Write the chemical formula of rust? (f) What are amalgams and alloys (g) Write two uses of Benzoic acid. (h) Write the composition of CNG. Give two application of it. (i) What is Co-polymer? Give an example of it. (j) Write the disadvantage of Lime-soda process.	2×10
2.	Answer any SIX questions : (a) What are the postulates of Bohr's model of atom? (b) Explain the formation of NH_4^+. (c) 4.6 gm of H_2SO_4 is present in 1.5 litre of its solution having density 1.4 gm/ml. Calculate Molarity and molality of the solution. (d) Explain briefly about waterline corrosion. (e) Define flux. What is acidic flux and basic flux? Give two example of each. (f) Differentiate thermoplastic polymer and thermosetting polymer. (g) Write the IUPAC name and structure of following compounds (i) 3,3,4- trimethyl pentan-2-ol (ii) 2- chloro-3-bromo-3-ethyl hex-1-ene (iii) $CH_3CH(Cl)C(C_2H_5)_2CH_2CH_2CH_2CH_3$ (iv) Toluene (v) Ethyne	5×6
3.	(a) Write down the observation and conclusion of Rutherford's Gold foil experiment. (b) What are isotopes and isobars? Give an example of each.	6 4
4.	(a) What is ionic bonding? Explain briefly with an example. (b) Explain Faradays 2nd law of electrolysis briefly. (c) Write the electronic configuration of Ti^{2+} and Cu^{2+}.	4 4 2
5.	(a) make a comparison between cold and hot lime soda processes.. (b) Find the pH of the solution contain3.2 g of hydrogen chloride dissolved in 1.0 litre of water.	5 5
6.	(a) What are hydrocarbon? Differentiate between saturated and unsaturated hydrocarbon. (b) Write the composition and uses of bronze and duralumin and almico.	4 6
7.	(a) Write the importance of pH value in industries. (b) Write the functions of lubricants.	6 4

I- SEM COMMON / 2019(W) / (NEW)

PR. – 3A (ENGINEERING DRAWING)

Full Marks: 100 Time : 3 Hours

Answer any FIVE Questions including Q No. 1 & 7

Figures in the right hand margin indicates marks

1	a) Draw a title block as per B.I.S. for student use in the class room.	5
	b) What is Auto CAD? Write down the commands required to draw a circle with centre (10, 10) and diameter 20 units.	5
2.	Construct a diagonal scale to read kilometres and decametres, given that 1 Km is represented by 5 cm on the drawing. Mark a distance of 3.47 Km on the scale.	20
3.	Construct an ellipse, with a distance of the focus from the directrix as 50 mm and eccentricity as 2/3. Also draw normal and tangent to the curve at a point 40 mm from the directrix.	20
4	The plan of straight line PQ 85 mm long measures 70 mm while its elevation measures 55 mm. Its end P is in the HP and 20 mm in front of VP. Draw its projections and find the angle of inclination of the line with HP & VP.	20
5	A cylinder 60 mm in diameter and 70 mm long is resting on its base on ground. It is cut by a section plane perpendicular to VP and cuts the axis at a point 45 mm from the base making an angle of 40^0 to HP. Draw the sectional front view and true shape of the section.	20
6.	Draw the isometric projection of a hexagonal pyramid, side of base 40 mm and axis 70 mm long, when its axis is horizontal.	20
7.	Draw to a suitable scale the following views of a single room building with front verandah from the given specification.	
	a) Plan at Window sill level	20
	b) Front Elevation	10

Specification:- (All dimensions are in mm)

Room Size = 5000 X 3500
Front Verandah = 2000 wide
Plinth Projection = 50
Plinth Height = 450
Chajja Projection = 450
Slab Thickness = 150
Door Size = 1200 X 2100 (1 No. in front wall)
Window Size = 1000 X 1500 (1 No. in front wall, 2 Nos. in back wall, 1 No. in each side wall)
Step Size = 300 X 150
Verandah Pillar Size = 300 X 300
Ceiling Height = 3500

(Assume any other data required suitably)

I – Sem/COMMON/2019(S)(New)

ENGINEERING PHYSICS

(Theory : 2 (A))

Full Marks : 80 *Time* : 3 hours

Answer any **five** questions including **Q.Nos.1 & 2**

Figures in the right-hand margin indicate marks

1. Answer *all* questions : 2 × 10

(*a*) State the Principle of Homogeneity.

(*b*) Define Universal Gravitational Constant (G).

(*c*) State Triangle law of vector addition.

(*d*) State two properties of Ultrasonic.

(*e*) State the Laws of Refraction.

(*f*) Define Unit Charge.

(*g*) Define Joule's Mechanical Equivalent of Heat.

(*h*) State Ohm's Law.

(*i*) Mention the properties of LASER.

(*j*) State Lenz's Law.

2. Answer any *six* questions : 5 × 6

(*a*) Check the correctness of the relation dimensionally : $F = 2mv^2/r$.

(*b*) Establish the relation between (*i*) Linear and Angular Velocity (*ii*) Linear and Angular Acceleration.

(*c*) Distinguish between Transverse wave and Longitudinal wave.

(*d*) State Kepler's Laws of Planetary Motion.

(*e*) State the Laws of Limiting Friction.

(*f*) Define Specific Heat. Find its unit and dimension.

(*g*) State Coulomb's Laws in Magnetism.

(*h*) Find the total capacity when three capacitors of capacity, 2μF, 3μF and 5 μF are connected in series.

3. Derive expression for displacement, velocity and acceleration of a particle executing. Simple Harmonic Motion. 10

4. State Kirchhoff's Laws and obtain Balanced condition of Wheatstone's Bridge. 4 + 6

5. Define the coefficients of Linear, Superficial and cubical Expansion of solids and Establish the relation $\alpha : \beta : \gamma :: 1 : 2 : 3$. 4 + 6

6. State Faraday's Laws of Electromagnetic Induction. Calculate the equivalent resistance of 5 resistors of 5Ω each connected in parallel. 6 + 4

7. Write short notes on any *two* : 5 × 2

   (*i*) Total Internal Reflection

   (*ii*) Properties of Magnetic Lines of Force

   (*iii*) Relation between wave parameters

   (*iv*) Fleming's Left Hand Rule.

COMPUTER APPLICATION

(Theory : 1(B))

Full Marks : 80 *Time* : 3 hours

Answer any **five** questions including **Q.Nos.1 & 2**

Figures in the right-hand margin indicate marks

1. Answer the following in brief : 2 × 10

(*a*) Define ternary operator ?
(*b*) What is CPS and MIPS ?
(*c*) Differentiate between impact and non-impact printer ?
(*d*) Define algorithm ?
(*e*) What do you mean by volatile memory ?
(*f*) Differentiate between softcopy and hardcopy.
(*g*) What do you understand by device driver software ?
(*h*) What are the goals of the network ?
(*i*) How file is different from folder ?
(*j*) Define NULL statement and NULL character constant.

2. Answer any *five* questions : 6 × 5

(*a*) Differentiate between primary and secondary memory ?
(*b*) Give a detailed note on different output devices ?
(*c*) How is compiler different from interpreter ?
(*d*) Draw a flow chart to add all the odd numbers in 10 random numbers ?
(*e*) Write a short note on the different types of area networks ?
(*f*) Write on various types of data processing method ?

3. Define memory. Give the details of various types of memory present in a computer system. 10

4. Write on different types of networking devices used to form a network in details. 10

5. Draw a flow chart and write a program in C to print all prime numbers in 05 random numbers. 10

6. Compare the various features of DOS, Windows and unix operating system. 10

7. Write short notes on the following (any *two*) : 5 × 2

(*i*) Full duplex data transmission mode
(*ii*) e-mail
(*iii*) STAR topology.

I–Sem/COMMON/2019(S)(New)

ENGINEERING MECHANICS

(Theory : 4)

Time : 3 hours

Full Marks : 80

Answer any **five** questions including **Q. Nos. 1 & 2**

Figures in the right-hand margin indicate marks

2 × 10

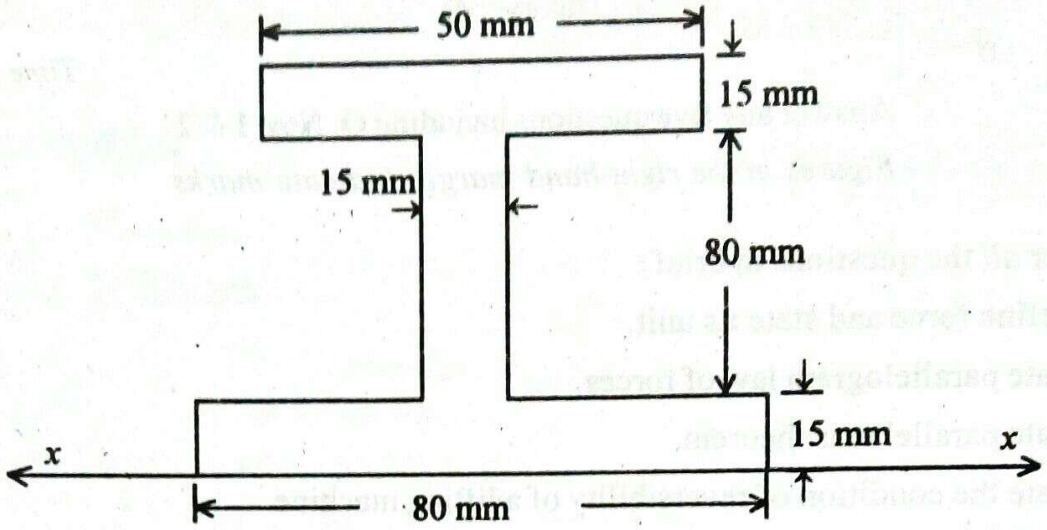
1. Answer *all* the questions in brief :
   (*a*) Define force and state its unit.
   (*b*) State parallelogram law of forces.
   (*c*) State parallel axis theorem.
   (*d*) State the condition of reversibility of a lifting machine.
   (*e*) Define co-efficient of friction.
   (*f*) What do you mean by conservation of momentum ?
   (*g*) State Lami's theorem.
   (*h*) Define co-efficient of restitution.
   (*i*) Define velocity ratio of simple gear train.
   (*j*) State Varignon's theorem.

5 × 6

2. Answer the following (any *six*) :
   (*a*) The forces 20 N , 30 N, 40 N, 50 N, 60 N are acting at one point of a regular hexagon towards the other five angular points taken in order. Find the magnitude and direction of the resultant force.
   (*b*) Find the moment of inertia of a rectangular section 40 mm wide and 60 mm deep about *X*-axis and *Y*-axis.
   (*c*) A certain weight lifting machine of velocity ratio 40 can lift a load of 2000 N, with the help of 150 N effort. Determine efficiency of the machine ?
   (*d*) State the laws of static friction.
   (*e*) Derive the expression for velocity ratio of compound gear train.
   (*f*) A body starts with a velocity of 3 m/sec and moves in a straight line with constant acceleration. If its velocity at the end of 5 sec is 6 m/sec. Find uniform acceleration and distance traveled in 20 sec.
   (*g*) Explain Dynamics, Kinematics and Kinetics.
   (*h*) State and proof triangle law of forces.

(*Turn Over*)

3. Determine MI about $x - x$ axis of the following section : 10



4. What load can be lifted by an effort of 100 N, if the velocity ratio is 15 and efficiency of machine at this load is 50%. Determine the law of machine, if it is observed that an effort of 200 N is required to lift a load of 2500 N and find the effort required to run the machine at a load of 5 KN. 10

5. Derive the expression for conservation of energy. 10

6. A uniform ladder of 4 m length rests against a vertical wall with which it makes an angle of 45°. The co-efficient of friction between the ladder and the wall is 0·4 and that between ladder and the floor is 0·5. If a man whose weight is one-half of that of the ladder ascends it, how height will it be which the ladder slips ? 10

7. A body, resting on a rough horizontal plane required a pull of 180 N inclined at 30° to the plane just to move it. It was found that a push of 220 N inclined at 30° to the plane just moved the body. Determine the weight of the body and co-efficient of friction. 10