

D 14266

(Pages : 2)

Name.....

Reg. No.....

**FIRST SEMESTER B.TECH. (ENGINEERING) DEGREE [2019 SCHEME]  
EXAMINATION, NOVEMBER 2021**

B.Tech.

PH 19 100—ENGINEERING PHYSICS

Time : Three Hours

Maximum : 100 Marks

**Part A**

*Answer any ten questions.  
Each question carries 5 marks.*

1. Explain the formation of interference fringes using air wedge. How is it used to determine the thickness of a thin wire ?
2. What is grating element ? Write the grating equation in terms of grating element.
3. Define circularly and elliptically polarised light. What is a quarter wave plate ?
4. State uncertainty principle and explain why electron cannot be present in the nucleus.
5. Write three postulates of FD statistics and it's distribution equation.
6. Discuss the quantum mechanical tunnelling in detail.
7. Explain the one dimensional wave equation with its solution.
8. A hall has dimensions of 25m × 20m × 8m. The reverberation time is 4 sec. Determine the average absorption co-efficient of the surfaces.
9. Explain the detection of ultrasonic waves using a thermal detector.
10. Explain the working principle of LED with a neat sketch.
11. Define acceptance angle and numerical aperture of an optical fibre.
12. With a block diagram, explain the working of an optical communication system.
13. What is LASER ? Explain the three basic components of a LASER system.
14. Write a brief note on BCS theory.
15. What is superconductivity ? Define transition temperature and critical magneticfield.

(10 × 5 = 50 marks)

**Turn over**

**Part B**

*Answer one full section from each question.*

*Each question carries 10 marks.*

16. (a) Show that the radii of different dark rings in Newton's Rings are proportional to square root of integers. Explain with necessary theory, how the refractive index of the given liquid is determined using Newton's Rings arrangement.

*Or*

- (b) Describe the construction of a Nicol prism. Explain its working as a polarizer and as an analyzer.

17. (a) Write the Schrödinger equation for a particle trapped in a one dimensional box of width  $L$  and solve it to obtain the energy eigen values.

*Or*

- (b) Compare the basic postulates Maxwell-Boltzmann, Bose-Einstein and Fermi-Dirac statistics.

18. (a) Explain the factors affecting the acoustics of a building. How can we rectify these factors while constructing a building. Calculate the reverberation time of a hall having volume  $4000 \text{ m}^3$  and total sound absorption of  $160 \text{ m}^2$  Sabine.

*Or*

- (b) What is the principle of a piezoelectric oscillator? With the circuit diagram explain the working of a piezoelectric oscillator.

19. (a) Explain the structure and working of a solar cell. Draw the I-V graph.

*Or*

- (b) Define numerical aperture of an optic fibre. Obtain an expression for the numerical aperture of a step index fibre.

20. (a) What is population inversion? Using energy level diagrams explain how it is achieved in a Helium-Neon laser.

*Or*

- (b) What is Meissner effect? Explain Type I and Type II Superconductors and compare them.

(5 × 10 = 50 marks)

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**FIRST SEMESTER B.TECH. (ENGINEERING) DEGREE [2019 SCHEME]  
EXAMINATION, NOVEMBER 2021**

B.Tech.

CH 19 100—ENGINEERING CHEMISTRY

Time : Three Hours

Maximum : 100 Marks

**Part A***Answer any ten questions.**Each question carries 5 marks.*

1. A water sample has the following analytical report :  $\text{MgCO}_3$  – 84 mg/L,  $\text{CaCO}_3$  – 40 mg/L,  $\text{CaCl}_2$  – 55.5 mg/L,  $\text{Mg}(\text{NO}_3)_2$  – 37 mg/L and  $\text{KCl}$  – 20 mg/L. calculate the amount of lime (86% pure) and soda (83% pure) needed for the treatment of 8000 litres of water.
2. What is “demineralization process” ? With a neat sketch explain the chemistry involved in demineralization process. Point out its advantages and limitations.
3. List any four differences between addition and condensation polymerization. Explain the free radical mechanism of PVC.
4. How does lubrication occur by thin film or boundary lubrication ? Distinguish between fluid film and boundary lubrication.
5. Define calorific value. How can you measure the calorific value of a solid fuel with the help of a bomb calorimeter ?
6. Calculate the gross and net calorific value of a coal sample having the following composition : carbon - 85%, hydrogen - 8%, Sulphur - 1%, nitrogen - 2%, ash - 4%. Latent heat of steam = 587 cal  $\text{g}^{-1}$ .
7. Describe the construction and working of a glass electrode. How can it be used for the determination of pH of a solution ?
8. The cell potential of a cell which is independent of concentration of KCl solution  $\text{Ag} / \text{AgCl}(\text{s}) / \text{KCl}$  solution /  $\text{Hg}_2\text{Cl}_2(\text{s}) / \text{Hg}$  is 0.0455 V at 25 °C and temperature coefficient is  $+3.38 \times 10^{-4}$  V per degree. What is the reaction taking place in the cell and what are the free energy, enthalpy and entropy changes at 25°C ?
9. Explain the construction, working principle, advantages and limitations of Ni-Cd battery.

**Turn over**

10. What do you mean by dry corrosion ? Define Pilling-Bedworth rule. Explain the mechanism of dry corrosion with the help of a well labeled diagram.
11. Explain galvanic corrosion and stress corrosion.
12. What is galvanizing and tinning ? Explain.
13. What are nanomaterials ? Explain the synthesis of nanomaterials by chemical vapour condensation. List its advantages and limitations.
14. What are carbon nanotubes ? How are they classified ? Explain the properties and applications of CNT.
15. Write a note on green chemistry. List any five importance and limitations on the practical implementation of green chemistry.

(10 × 5 = 50 marks)

### Part B

*Answer section (a) or section (b) of each question.*

*Each question carries 10 marks.*

16. a) i) Why does hard water consume a lot of soap ? Write any five constituents responsible for the permanent hardness of water. Discuss the principle involved in the determination of hardness by EDTA method. Why does magnesium bicarbonate required double amount of lime for softening ?  
ii) Write any five requirements of potable water supplied by municipalities. Explain the various stages involved in the purification of water for domestic supply.

*Or*

- b) i) What is meant by glass transition temperature ? Explain any five factors affecting glass transition temperature.  
ii) What are conducting polymers ? How are they classified ? Explain the synthesis, structure, properties, applications and limitations of polyaniline.
17. a) How does viscosity varies with temperature ? Explain the determination of viscosity index of a lubricating oil. Suggest any one method to improve the viscosity index of an oil sample.

*Or*

- b) What is cracking ? Why is it important ? Explain the fluidized bed catalytic cracking process for the manufacture of gasoline from heavy oils. What are the advantages of this process over fixed-bed catalytic cracking ?

18. a) What is a fuel cell ? Explain the underlying principle taking the example of an  $H_2 - O_2$  fuel cell under solid polymer electrolyte and alkaline electrolyte.

*Or*

- b) What is meant by concentration cells ? Explain the electrode and electrolyte concentration cell with suitable example. List any two applications of concentration cells.

19. a) Explain in detail the various factors affecting corrosion.

*Or*

- b) Explain the sacrificial anodic protection and impressed cathodic current protection method to minimize the rate of corrosion.

20. a) Discuss the classification nanomaterials. Write a note on fullerenes.

*Or*

- b) Explain any ten principles of green chemistry with suitable example.

(5 × 10 = 50 marks)

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**FIRST SEMESTER B.TECH. (ENGINEERING) DEGREE [2019 SCHEME]  
EXAMINATION, NOVEMBER 2021**

B.Tech.

GS 19 100—ENGINEERING GRAPHICS

Time : Three Hours

Maximum : 100 Marks

*Answer **three** questions from Part A and any **two** questions from Part B.*

*All question carry equal marks.*

**Part A**

1. (a) The line AB measuring 60 mm has its VT 15 mm above HP. The end B is 30 mm above HP and 35 mm in front of VP. The projectors through B and VT are 80mm apart. Draw the projection of the line if the end Q is in second quadrant.

*Or*

- (b) A rectangular plate of size 70 mm × 40 mm rests on its shorter side in the V.P and the surface is inclined at 45° with the V.P. The longer side of the plane is inclined at 30° to the H.P. Draw its projection.
2. (a) Draw the projection of a cube having 40 mm long sides and resting on the ground on one of its corners with a solid diagonal perpendicular to the V.P.

*Or*

- (b) A pentagonal prism having a base with a 40 mm side and 70 mm height is kept on its base on HP with a rectangular face perpendicular to VP. It is cut by an A.I.P such that the true shape of the section is an isosceles triangle of largest base and a 60mm altitude. Draw the sectional top view and true shape of the section.
3. (a) In a cylindrical drum, with a 60 mm diameter and a 100 mm height is resting on its base on the HP. A square hole with an 50mm side is cut through the drum such that one of the faces of the square hole is makes 30° with the HP. The axis of the square hole is perpendicular to the VP and is 12 mm away from the axis of the cylinder. Draw the development of the retained cylinder.

*Or*

**Turn over**

- (b) A hexagonal prism, having a base with a 25 mm side and 100 mm long axis, is placed centrally on its rectangular face over a cylindrical block of with an 80 mm base diameter and 30 mm thickness. Draw isometric projection of the arrangement.

(3 × 20 = 60 marks)

**Part B**

*Answer any two questions.*

4. (a) A square prism having a base with a 40 mm side and 60 mm long axis is resting on its rectangular face on the G.P with axis inclined at 30° to PP. A side of base nearer to the PP is 20 mm behind it and 20 mm to the left of the station point. The station point is 80 mm in front of PP and 70 mm above GP. Draw its perspective view.
- (b) Draw neat sketch of Rag foundation bolt having a diameter of 30 mm.
- (c) A square pyramid side of base 50 mm and axis height 70 mm is kept with its base on H.P It is cut by a section plane perpendicular to VP which contains one of the base corners and is perpendicular to the slant edge opposite to this base corner. Draw the sectional plan, elevation and true shape of the section.

(2 × 20 = 40 marks)

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**FIRST SEMESTER B.TECH. (ENGINEERING) DEGREE  
[2019 SCHEME] EXAMINATION, NOVEMBER 2021**

B.TECH.

EM 19 100—ENGINEERING MECHANICS

Time : Three Hours

Maximum : 100 Marks

**Part A**

*Answer any ten questions.  
Each question carries 5 marks.*

1. State triangle law of forces with relevant diagram.
2. Define characteristics of forces.
3. Two forces of 100 N and 150 N are acting simultaneously at a point. What is the resultant of these two forces, if the angle between them is  $45^\circ$  ?
4. Define kinetic friction and its types.
5. State law of static friction.
6. A body of weight 300 N is lying on a rough horizontal plane having a co-efficient of friction as 0.3. Find the magnitude of the force, which can move the body, while acting at an angle of  $25^\circ$  with the horizontal.
7. Define radius of gyration
8. Derive the moment of inertia of a hollow rectangular section
9. Find the centre of gravity of a 100 mm.  $\times$  150 mm.  $\times$  30 mm. T-section as shown in Figure 1.

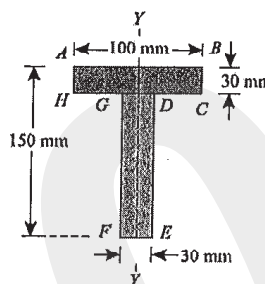


Figure 1

10. On turning a corner, a motorist rushing at 20 m/s, finds a child on the road 50 m. ahead. He instantly stops the engine and applies brakes, so as to stop the car within 10 m. of the child. Calculate (i) Retardation ; and (ii) Time required to stop the car.

Turn over



11. Define D' Alembert's principle and its applications.
12. A vehicle of mass 2 tonnes has a frictional resistance of 50 N/tonne. As one instant, the speed of this vehicle at the top of an incline was observed to be 36 kmph as shown in Figure 2 :

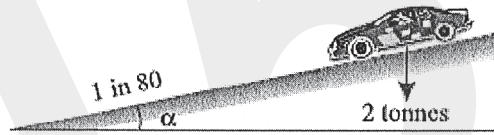


Figure 2

13. Define simple harmonic motion and its types.
14. What are the different types of vibrations ?
15. A 4 kg. mass hung at one end of a helical spring and is set vibrating vertically. The mass makes 2 vibrations per second. Determine the stiffness of the spring.

(10 × 5 = 50 marks)

**Part B***Answer one full question from each Section.**Each question carries 10 marks*

- I. (a) The extremities A and D of a light inextensible string ABCD are tied to two points in the same horizontal line. Weight W and 3W are tied to the string at points B and C respectively. If AB and CD are inclined to the vertical at angle 60° and 30° respectively, show that BC is horizontal and find the tensions in the various parts of the string.

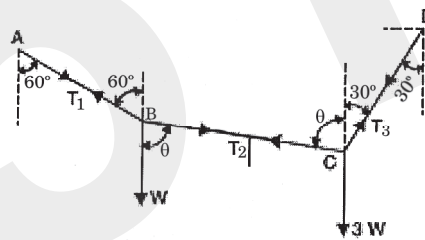


Figure 3

Or

- (b) Two cylinders P and Q rest in a channel as shown in Figure 4. The cylinder P has a diameter of 100 mm. and weighs 200 N, whereas the cylinder Q has a diameter of 180 mm. and weighs 500 N. If the bottom of the box is 180 mm, with one side vertical and the other inclined at 60°, determine the pressure at all the four points of contact.

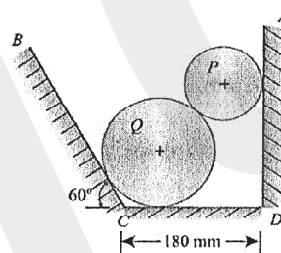


Figure 4

- II. (a) A uniform ladder of length 4 m. length rest against a vertical wall with which it makes an angle of  $45^\circ$ . The co-efficient of friction between the ladder and the wall is 0.4 and that between the ladder and the floor is 0.5. If a man, whose weight is one-half of that of the ladder ascends it, how high will it be when the ladder slips ?

Or

- (b) A simple structure ABCDE is supported on a hinge at A and on rollers at B while it carries a horizontal force of 1000 kN at E as shown in Figure 5. Determine the force in member AC, using the method of joints.

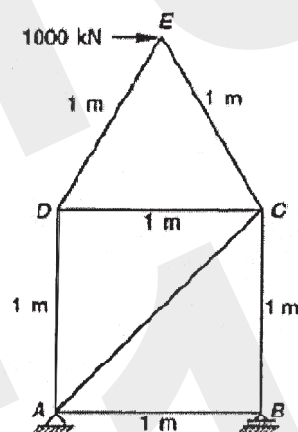


Figure 5

- III. (a) A right circular cylinder of 12 cm. diameter is joined with a hemisphere of the same diameter face to face as shown in Figure 6. Find the greatest height of the cylinder, so that centre of gravity of the composite section coincides with the plane of joining of two sections. The density of the material of hemisphere is twice that of the material of cylinder.

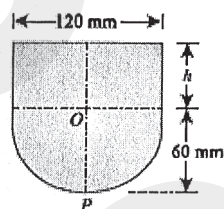


Figure 6

Or

- (b) A semicircular area is removed from a trapezium as shown in Figure 7 (dimensions in mm). Determine the centroid of the remaining area.

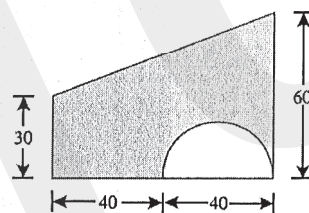


Figure 7

Turn over

- IV. (a) The system of bodies shown in Figure 8 starts from the rest. Determine the acceleration of body B and the tension in the string supporting body A.

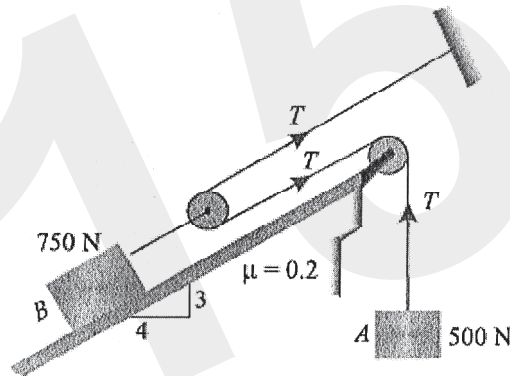


Figure 8

Or

- (b) A body projected vertically upwards attains a maximum height of 450 m. Calculate the velocity of projection and compute the time of flight in the air. At what altitude will this body meet a second body projected 5 seconds later with a speed of 140 m/sec?
- V. (a) The weight of empty rail wagon is 240 kN. On loading it with goods weighing 320 kN, its spring gets compressed by 80 mm.
- (1) Calculate its natural period of vibrations when the railway wagon is : (i) Empty ; and (ii) Loaded as above.
  - (2) It is set into natural vibrations with an amplitude of 100 mm when empty. Calculate the velocity of the railway wagon when its displacement is 40 mm. from the statical equilibrium position.

Or

- (b) A point moves with a simple harmonic motion such that it has a velocity of 9 m/s when it is at a distance of 2 m. from the centre and the velocity of 4 m/s when it is at a distance of 3 m. from the centre of the same side for the point moving in the same direction as shown in Figure 9. Calculate (a) The amplitude of the motion ; (b) The time period of the motion ; (c) The time interval between the two positions ; (d) The acceleration of the point at these positions ; and (e) The greatest acceleration.

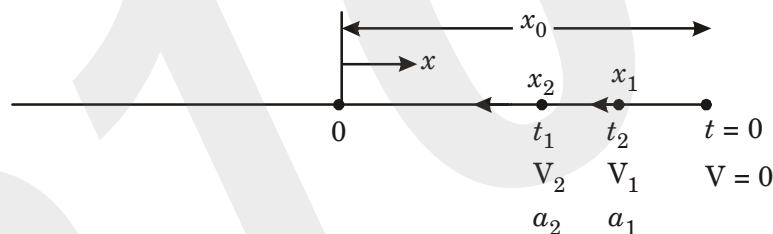


Figure 9

(5 × 10 = 50 marks)

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**FIRST SEMESTER B.TECH. (ENGINEERING) DEGREE [2019 SCHEME]  
EXAMINATION, NOVEMBER 2021**

B.Tech.

EC 19 100—CONCEPTS OF ELECTRONICS ENGINEERING

Time : Three Hours

Maximum : 100 Marks

**Part A**

*Answer any ten questions.  
Each question carries 5 marks.*

1. Explain the concept of fixed and variable resistors.
2. With a suitable diagram discuss charging and discharging action of capacitor.
3. Briefly explain the electrical behavior of inductors and capacitors.
4. What is a semiconductor ? Explain its behavior with help of energy band diagram.
5. Explain diode clipping circuits and give its application.
6. The two diodes used in a centre-tap full wave rectifier are of internal resistance  $15\Omega$ . The load resistance used is  $985\Omega$ . If the r.m.s. secondary voltage from centre tap to each end of secondary is 40 V, calculate : (a) d.c out put voltage ; and (b) Rectifier efficiency.
7. Explain the working of a pnp transistor and npn transistor.
8. Define  $\alpha$  and  $\beta$ . How are they related ?
9. What is meant by transistor biasing ? Name the various methods used.
10. What are the uses of SCR ?
11. Derive the relationship between the parameters of FET.
12. What are the important features of MOSFET ?
13. List the performance parameters of electronic instruments.
14. What are the important features of DSO ?
15. Draw the block diagram of function generator and explain.

(10 × 5 = 50 marks)

**Turn over**

**Part B**

*Answer section (a) or section (b) of each question.*

*Each question carries 10 marks.*

16. (a) With a neat sketch explain structure of mica capacitors, paper capacitors and electrolytic capacitors.

*Or*

- (b) Define inductive reactance and Q factor. Explain how inductors are classified.

17. (a) Draw the structure of LED and explain the mechanism of its operation. State the uses of LED.

*Or*

- (b) Describe an experiment to study the characteristic curves of a diode under forward and backward biasing. Give its applications.

18. (a) Explain the working of an amplifier. Draw the d.c and a.c load line and give its significance.

*Or*

- (b) Describe an experiment to study the input and output characteristics of common emitter configuration of BJT. Briefly explain the comparison of three configurations.

19. (a) Draw the structure of a UJT. Explain its working with the help of electrical equivalent circuit.

*Or*

- (b) With the help of suitable characteristics explain the working of a depletion type MOSFET.

20. (a) Explain the working of a CRO. How it can be used to measure amplitude, frequency and phase angle ?

*Or*

- (b) Draw the front panel of an analog electronic multimeter and explain how different measurements can be done using it.

(5 × 10 = 50 marks)

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**FIRST SEMESTER B.TECH. (ENGINEERING) DEGREE [2019 SCHEME]  
EXAMINATION, NOVEMBER 2021**

B.Tech.

EC 19 101—BASICS OF ELECTRONICS ENGINEERING

Time : Three Hours

Maximum : 100 Marks

**Part A**

*Answer any ten questions.  
Each question carries 5 marks.*

1. Explain wire wound resistors. Give its applications.
2. Briefly explain the construction of ceramic capacitors.
3. Discuss the principle of low power transformers.
4. Explain the working of a PN junction diode.
5. Briefly explain the principle and working of a photodiode.
6. The applied voltage across a zener diode is 12 V, the zener current is 10 mA Find the power dissipated.
7. What is a NAND gate ? Which gate is called a universal gate ? Why ?
8. The input resistance of a transistor is  $1\text{ k}\Omega$  and the collector load is  $1\text{ k}\Omega$ . If  $\beta = 150$ . Calculate the voltage gain.
9. A half wave rectifier, operating on a 230 V a.c supply is required to give a dc output of 300 V. Find the transformation ratio and PIV. Neglect the diode resistance.
10. In a transistor amplifier, when the signal changes by 0.05V, the base current changes by  $20\mu\text{A}$  and the collector current by 2 mA. If the collector load is  $10\text{ k}\Omega$  and  $R_L = 50\text{ k}\Omega$ , find current gain, input impedance, voltage gain and power gain.
11. List and explain the properties of OPAMP.
12. Explain the concept of feedback with a neat diagram.
13. Explain the principle of AM demodulation with a neat circuit diagram.

**Turn over**

14. Compare AM and FM.  
15. Give the basic principle of cellular communication.

(10 × 5 = 50 marks)

**Part B**

*Answer section (a) or section (b) of each question.  
Each question carries 10 marks.*

16. (a) Explain briefly the specifications of a resistor. Discuss the colour coding associated with it.  
*Or*  
(b) How inductors are classified? Explain briefly. What are electro mechanical components?
17. (a) Explain with a neat sketch the principle and operation of LED. What are its advantages? State its uses.  
*Or*  
(b) Explain the principle and operation of solar cell.
18. (a) With help of a block diagram explain the parts of a DC power supply and discuss the function of each block.  
*Or*  
(b) Explain the working of FW bridge rectifier with the help of waveforms.
19. (a) With a neat circuit diagram explain the working of a CE amplifier. Derive an expression for voltage gain, current gain and power gain.  
*Or*  
(b) What is a phase shift oscillator? Explain the principle and its working.
20. (a) With help of block diagram explain the principle and working of FM receiver. What do you mean by the frequency deviation of FM?  
*Or*  
(b) Draw the block diagram of AM super heterodyne receiver. Explain the function of each block. What is its advantage over other receivers?

(5 × 10 = 50 marks)

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B.Tech.

EE 19 100—CONCEPTS OF ELECTRICAL ENGINEERING

Time : Three Hours

Maximum : 100 Marks

**Part A**

*Answer any ten questions.  
Each question carries 5 marks.*

1. State and explain superposition theorem.
2. With suitable example explain star delta transformation.
3. Explain with suitable example constant voltage source and constant current source.
4. Define form factor of sinusoidal wave. Explain.
5. With suitable graph illustrate phase difference.
6. Represent  $V(t) = 10 \sin(\omega t + 30)$  in exponential form.
7. What is balanced three-phase system of voltage ?
8. Define active power, reactive power and apparent power of single phase a.c. circuit.
9. What is meant by phase sequence in 3-phase system ?
10. A current of 5A when flowing through a coil of 1000 turns, produces a flux of 0.3 m Wb. Determine the inductance of the coil.
11. Explain Flemings Left Hand Rule.
12. Explain how Lenz's law must follow from principle of conservation of energy.
13. The maximum flux density in the core of a 250/3000 V, 50 Hz single phase transformer is 1.2 Wb/m<sup>2</sup>. If the emf/turn is 8 V, determine the primary and secondary turns and the area of the core.
14. List the applications of DC machine.
15. Obtain an expression for energy stored in a capacitor.

(10 × 5 = 50 marks)

**Turn over**



**Part B**

*Answer section (a) or section (b) of each question.*

*Each question carries 10 marks.*

16. (a) Two resistance of  $10\ \Omega$  and  $40\ \Omega$  respectively are connected in parallel with each other. Another resistance of  $10\ \Omega$  is connected in series with the combination. Calculate the respective d.c. voltage which should be applied across the whole circuit to pass 6A through the  $10\ \Omega$  resistance.

*Or*

- (b) With suitable example illustrate Norton's theorem.

17. (a) The instantaneous value of an alternating voltage is given by  $e(t) = 230 \sin 314 t$ . Find the frequency, time period and angular velocity.

*Or*

- (b) With suitable graph explain RMS value and average value of sinusoidal waveform. Obtain mathematical expression for the same.

18. (a) Explain resonance in series RLC circuit and resonance in parallel RLC circuit.

*Or*

- (b) What are the advantages of 3-phase power generations? Obtain the relationship between the line and phase values of voltage and current in 3-phase balanced delta circuit.

19. (a) A wheel with 10 metallic spokes each 0.5 m. long is rotated with speed of 120 r.p.m. in a plane normal to the earth's magnetic field at the place. If the magnitude of the field is  $0.4 \times 10^{-4}\ \text{T}$ , what is the induced e.m.f. between the axle and the rim of the wheel?

*Or*

- (b) What is co-efficient of coupling? Derive the relation for co-efficient of coupling in terms of mutual inductance and self inductance.

20. (a) Explain in detail the principle and construction of a single phase transformer. Derive e.m.f. equation.

*Or*

- (b) A constant e.m.f. is applied to a circuit containing capacitance and resistance in series. Obtain an expression for the charge on capacitor plates and current during charging. What do you mean by time constant of the circuit?

(5 × 10 = 50 marks)

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**FIRST SEMESTER B.TECH. (ENGINEERING) DEGREE [2019 SCHEME]  
EXAMINATION, NOVEMBER 2021**

B.Tech.

EE 19 101—BASICS OF ELECTRICAL ENGINEERING

Time : Three Hours

Maximum : 100 Marks

**Part A**

*Answer any ten questions.  
Each question carries 5 marks.*

1. With a neat circuit diagram explain constant voltage and current source.
2. A 40 W, 110 V lamp is connected to a 230 V. Calculate the value of resistance required to connect the bulb in series to safety of the bulb.
3. Explain how circuit elements are classified ? Draw a basic electric circuit and explain.
4. Define field strength and flux density. What is its significance ?
5. State and explain Lenz's law. How it support the law of conservation of energy ?
6. Define co-efficient of coupling. Obtain an expression for the same.
7. Explain with a neat diagram the generation of AC voltage and derive its mathematical expression.
8. Define form factor of a sine wave. Obtain its value.
9. Briefly explain power and power factor in an AC circuit.
10. Discuss the various type of dc generators.
11. Obtain the emf equation of a dc generator.
12. Define the terms (i) Synchronous speed ; (ii) Slip ; and (iii) Rotor speed.
13. What are the advantages of hydroelectric power station ?
14. Draw labeled block diagram of solar power station.
15. Write a short note on geo thermal energy.

(10 × 5 = 50 marks)

**Turn over**

**Part B**

*Answer section (a) or section (b) of each question.*

*Each question carries 10 marks.*

16. (a) Explain the importance of matrix representation. With suitable example explain the solution of any network equation by matrix method.

*Or*

- (b) With help of diagram explain the characteristics of an ideal and practical voltage source. With a diagram explain how a practical current source can be converted to ideal current source.

17. (a) An air cored toroidal coil has 300 turns. The length of the magnetic circuit is 40 cm. And cross sectional area is  $7 \text{ cm}^2$ . Find the current required to establish a flux of 3 mWb. Also find permeance.

*Or*

- (b) Derive an expression for energy stored in a magnetic circuit. Distinguish between statically induced emf and dynamically induced emf.

18. (a) Explain with necessary theory three phase system of ac circuit and generation of three phase voltage. What are its advantages ?

*Or*

- (b) Explain the concept of active power, reactive power and apparent power of an AC circuit. Draw power triangle to represent these three.

19. (a) An ideal single phase transformer has 500 turns on the primary winding, and 100 turns on the secondary winding. If the supply voltage is 1000 V, find the turns ratio and the secondary voltage. If the secondary load is a no inductive resistor of  $10 \Omega$  resistance, calculate (i) Current through the secondary windings ; (ii) Current through the primary windings ; and (iii) Power drawn by the load.

*Or*

- (b) Discuss the principle and working of three phase induction motor.

20. (a) List the factors to be considered in the alignment of electric power distribution system. Discuss the advantages and disadvantages of underground versus overhead system.

*Or*

- (b) With a schematic arrangement of thermal power plant explain the principle and working of it. List its advantages and disadvantages.

(5 × 10 = 50 marks)

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Name.....

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**FIRST SEMESTER B.TECH. (ENGINEERING) DEGREE [2019 SCHEME]  
EXAMINATION, NOVEMBER 2021**

B.Tech.

ME 19 100—CONCEPTS OF MECHANICAL ENGINEERING

Time : Three Hours

Maximum : 100 Marks

**Part A**

*Answer any ten questions.  
Each question carries 5 marks.*

1. Write two statement of second law of thermodynamics and prove their equivalence.
2. Show that the entropy is a property of the system.
3. What are the assumptions made in the analysis of Carnot cycle ?
4. Differentiate SI and CI engines.
5. List out the advantages of MPFI over carburetion.
6. List the merits and demerits of 2 stroke engine over 4 stroke engine.
7. What are the important properties of an ideal refrigerant ?
8. State the advantages and disadvantages of a Francis turbine over pelton wheel turbine.
9. List out the advantages of centrifugal pump over reciprocating pump.
10. Why do we use surge tank in hydel plant ?
11. What is the function of control system in a thermal plant ?
12. List out the advantages and disadvantages of diesel power plant.
13. Define Rolling process with the help of neat sketch.
14. With the help of neat sketch explain up milling and down milling.
15. What are the applications of CNC machines ?

(10 × 5 = 50 marks)

**Turn over**

**Part B**

Answer any **one** full section from each question.

Each question carries 10 marks.

16. (a) 1 kg of air at 3.5 bar and occupying  $0.35 \text{ m}^3$  is heated at constant volume until its temperature has rises to  $316^\circ\text{C}$ . Find : (a) Heat added ; and (b) Gain in internal energy per kg of air. Take  $C_v = 0.718 \text{ kJ/kg.K}$ .

Or

- (b) A constant volume chamber of  $0.3 \text{ m}^3$  capacity contains 2 kg of a gas at  $5^\circ \text{C}$ . Heat is transferred to the gas until the temperature is  $100^\circ \text{C}$ . Find the work done, heat transferred, and the change in internal energy, enthalpy and the entropy. Take  $c_p = 1.968 \text{ kJ/kg.K}$  and  $c_v = 1.507 \text{ kJ/kg.K}$ .

17. (a) Differentiate between 2 stroke and 4 stroke engine.

Or

- (b) Derive the expression for belt tension ratio and power transmission for a belt drive.

18. (a) Explain the working principle of reciprocating pump.

Or

- (b) What is the principle of working of vapour absorption refrigeration system ?

19. (a) Explain the working principle of nuclear power plant with the help of neat sketch.

Or

- (b) Explain the various types of non-renewable energy sources.

20. (a) Describe the various milling operations.

Or

- (b) What are the various operations that can be performed in a drilling machine ? Explain any four of them.

(5 × 10 = 50 marks)

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Name.....

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**FIRST SEMESTER B.TECH. (ENGINEERING) DEGREE [2019 SCHEME]  
EXAMINATION, NOVEMBER 2021**

B.Tech.

ME 19 101—BASICS OF MECHANICAL ENGINEERING

Time : Three Hours

Maximum : 100 Marks

**Part A**

*Answer any ten questions.  
Each question carries 5 marks.*

1. What is meant by ideal cycle or air standard cycle ? What is its use ?
2. Draw the p-V and T-S diagram for diesel cycle.
3. 'Carnot cycle engine cannot be realized in practice'. Justify the statement.
4. Describe the various parts of IC engine.
5. Explain the creep and slip in belt drive.
6. What are the different types of brakes and its application ?
7. What is meant by eco-friendly refrigerant ? Why do we need it ?
8. What is the function of volute casing in centrifugal pump ?
9. Why priming is required in pump.
10. What is geo thermal energy ?
11. What is a chain reaction ?
12. List out the advantages and disadvantages of thermal power plant.
13. What are the various applications of alloy steel ?
14. List out the merits and demerits of CNC machines over conventional machines.
15. Distinguish between direct and indirect extrusion.

(10 × 5 = 50 marks)

**Part B**

*Answer any one full section from each question.  
Each question carries 10 marks.*

16. (a) 5 m<sup>3</sup> of gas at 8 bar and 180°C is heated keeping the pressure same throughout till the volume is doubled. Find the heat added, external work done and the change in internal energy during the process. Take  $c_p = 1.005$  kJ/kg.K,  $c_v = 0.718$  kJ/kg.K.

Or

**Turn over**

(b) 0.5 kg of air is compressed reversibly and adiabatically from 80 kPa, 60° C to 0.4 MPa, and is then expanded at constant pressure to the original volume. Calculate the heat transfer and work transfer for the whole path. Take  $R = 0.287 \text{ kJ/kg.K}$ ,  $c_p = 1.005 \text{ kJ/kg.K}$  and  $c_v = 0.718 \text{ kJ/kg.K}$ .

17. (a) Compare SI engines with CI engines.

*Or*

(b) With the help of neat sketch explain the working of single plate clutch.

18. (a) Explain the working principle of reciprocating pump.

*Or*

(b) What are the important properties that are required for an ideal refrigerant ?

19. (a) Explain the working principle of Hydel power plant with the help of neat sketch.

*Or*

(b) Explain the various types of non renewable energy sources.

20. (a) Describe the various milling operations.

*Or*

(b) What are the various operations that can be performed on a shaper machine ? Explain any four of them.

(5 × 10 = 50 marks)

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**FIRST SEMESTER B.TECH. (ENGINEERING) DEGREE  
[2019 SCHEME] EXAMINATION, NOVEMBER 2021**

B.Tech.

PT 19 100—CONCEPTS OF PRINTING TECHNOLOGY

Time : Three Hours

Maximum : 100 Marks

**Part A**

*Answer any ten questions.  
Each question carries 5 marks.*

1. Write notes on ideographs.
2. Discuss the sequence of steps in the printing processes.
3. Describe various allied printing industries
4. Describe the terms brochure, magazine and book.
5. What are the different types of publishers ? Explain.
6. Write notes on copy editing and proof reading.
7. What is the importance of computer networking in printing industry ?
8. Write notes on computer peripherals. Give examples.
9. Describe URL and modem.
10. Write notes on image manipulation.
11. Discuss the 3 attributes of color.
12. Write notes on neutral colors, additive colors and subtractive colors.
13. Discuss different parts of an offset printing press.
14. With neat diagram, explain the offset cylinder configuration.
15. Explain the process of printing colors.

(10 × 5 = 50 marks)

**Turn over**



**Part B**

*Answer **one** full question from each section.*

*Each question carries 10 marks.*

16. (a) Discuss the features of intaglio and screen printing processes.

*Or*

(b) Explain the role of printing in packaging.

17. (a) Discuss the features of different forms of print media.

*Or*

(b) Explain the process of book publishing.

18. (a) Describe operating system, its features and types.

*Or*

(b) Discuss the advantages and types of digital printing.

19. (a) Discuss various types of image file formats.

*Or*

(b) Discuss various types of scanners.

20. (a) (i) Explain the significance of electromagnetic spectrum in printing. (5 marks)

(ii) Write notes on color psychology. (5 marks)

*Or*

(b) (i) Discuss the effect of light on color. (5 marks)

(ii) Compare warm and cool colors. (5 marks)

[5 × 10 = 50 marks]

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Name.....

Reg. No.....

**FIRST SEMESTER B.TECH. (ENGINEERING) DEGREE [2019 SCHEME]  
EXAMINATION, NOVEMBER 2021**

B.Tech.

IT 19 100—INTRODUCTION TO COMPUTING AND PROBLEM SOLVING

Time : Three Hours

Maximum : 100 Marks

**Part A**

*Answer any ten questions.  
Each question carries 5 marks.*

1. What is the function of CPU in a computer ? Explain its operation.
2. What is Algorithm ? How to analyze it ?
3. What do you mean by I/O units ?
4. With a diagram explain access time and write time in a memory.
5. What is the function of processor in a computer ?
6. What do you understand by the term software of the computer ?
7. Demonstrate the use of exception handling in Python.
8. With suitable example explain the advantage of Python.
9. Explain why programs written in Python are much shorter than C or C<sup>++</sup>.
10. With suitable example define function.
11. Write a program to illustrate working of call-by-value method of a function invoking.
12. Explain user defined function.
13. What are objects ? How are they created ?
14. Explain how is memory allocated to a class and its objects ?
15. What is the difference between object and class ?

(10 × 5 = 50 marks)

**Turn over**

**Part B**

*Answer section (a) or section (b) of each question.*

*Each question carries 10 marks.*

16. (a) Perform  $(1100)_2 \times (0101)_2$  using the basic multiplication algorithm. Tabulate the step by step process.

*Or*

- (b) Draw and explain a flow chart for floating point number addition, together with a block diagram of an arithmetic unit dedicated to floating point addition.

17. (a) Give the detailed steps used in memory-processor communication.

*Or*

- (b) Explain in detail why do we need an operating system. Illustrate a multiprogramming operating system.

18. (a) Write a Python program to the following logic.

“If a list of words is empty, then let the user know it’s empty, otherwise let the user know it's not-empty”

*Or*

- (b) Write a program in Python to find the solution of simultaneous equation.

19. (a) Write a program to print the largest element of an array (using a function).

*Or*

- (b) With suitable example explain how are data and functions organized in an object oriented program.

20. (a) Write a program to copy a file and omit any line which begins with #.

*Or*

- (b) Write a program that copies one file to another.

(5 × 10 = 50 marks)

D 14278

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Name.....

Reg. No.....

**FIRST SEMESTER B.TECH. (ENGINEERING) DEGREE [2019 SCHEME]  
EXAMINATION, NOVEMBER 2021**

B.Tech.

CE 19 101—BASICS OF CIVIL ENGINEERING

Time : Three Hours

Maximum : 100 Marks

**Part A**

*Answer any ten questions.  
Each question carries 5 marks.*

1. Distinguish between geotechnical and environmental engineering.
2. List out the factors to be considered in the selection of site for a building.
3. What is national building code ?
4. How can you classify buildings ?
5. Define plot area, plinth area, floor area and carpet area.
6. List out the points to be consider while considering the position and number of doors and windows in a building.
7. List the various uses of contour maps.
8. List the various points to be considered in selecting stations for surveying.
9. Distinguish between cumulative error and compensating errors. Give examples for each case.
10. List out the advantages of RCC over PCC.
11. State the important properties of cement mortar.
12. What is meant by seasoning of timber ? Distinguish between natural and artificial seasoning.
13. Define safe bearing capacity of soil, and explain its importance in foundation design.
14. Distinguish between Flemish bond and English bond in brick masonry.
15. Explain the structural and functional features of dam.

(10 × 5 = 50 marks)

**Turn over**

**Part B**

*Answer any one full section from each question.*

*Each question carries 10 marks.*

16. (a) List various disciplines of civil engineering and briefly explain any four of them.

*Or*

- (b) Explain the various components of a residential building and their functions.

17. (a) Explain in detail the principles of building planning.

*Or*

- (b) Draw a rough sketch of the section of a simple storied building and mark the basic building components.

18. (a) Explain the classification of surveying based on the instruments used.

*Or*

- (b) What are the errors in chaining? How can these errors be corrected?

19. (a) What are the requirements of good building stones?

*Or*

- (b) What is meant by seasoning of timber? Distinguish between natural and artificial seasoning.

20. (a) State advantages and disadvantages of brick masonry over stone masonry.

*Or*

- (b) What are different types of foundations and its functions?

(5 × 10 = 50 marks)

D 14265

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Name.....

Reg. No.....

**FIRST SEMESTER B.TECH. (ENGINEERING) (2019 SCHEME) DEGREE  
EXAMINATION, NOVEMBER 2021**

B.Tech.

MA 19 100—CALCULUS AND LINEAR ALGEBRA

Time : Three Hours

Maximum : 100 Marks

**Part A**

*Answer any ten questions.  
Each question carries 5 marks.*

1. Evaluate  $\lim_{x \rightarrow \pi/2} \frac{\log(x - \pi/2)}{\tan x}$ .
2. Is the series  $\sum_{n=1}^{\infty} \frac{n^2}{3^n}$  convergent or divergent? Verify.
3. Test for convergence of the series :  
 $\frac{2}{1^3} - \frac{3}{2^3} + \frac{4}{3^3} - \frac{5}{4^3} + \dots$ . Is the series absolutely convergent.
4. Obtain the Taylor's series expansion of  $f(x) = \sin x$  about  $x = \pi/4$ .
5. Find the Maclaurin's series expansion of  $e^x \sin x$ .
6. Find the  $n^{\text{th}}$  derivative of  $\sin x \sin 2x \sin 3x$  using Leibnitz formula.
7. If  $u = \sin^{-1}\left(\frac{x}{y}\right) + \tan^{-1}\left(\frac{y}{x}\right)$ ,  $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = 0$ . Verify Euler's theorem.
8. Find the maxima and minima of  $f(x, y) = x^3 y^2 (12 - x - y)$  if  $x > 0, y > 0$ .
9. Find the radius of curvature at  $\left(\frac{1}{4}, \frac{1}{4}\right)$  on the curve  $\sqrt{x} + \sqrt{y} = 1$ .

Turn over

10. Find the rank of  $A = \begin{bmatrix} 3 & -4 & -1 & 2 \\ 1 & 7 & 3 & 1 \\ 5 & -2 & 5 & 4 \\ 9 & -3 & 7 & 7 \end{bmatrix}$ .

11. Show that the system of equations  $3x + y + 2z = 3$ ,  $2x - 3y - z = -3$ ,  $x + 2y + z = 4$  are consistent and hence solve them.

12. Using Cayley–Hamilton theorem, find the inverse of  $A = \begin{bmatrix} 7 & -1 & 3 \\ 6 & 1 & 4 \\ 2 & 4 & 8 \end{bmatrix}$ .

13. Find the Fourier series expansion of  $f(x) = x^2$ , in  $-\pi < x < \pi$ .

14. Find the half range cosine series expansion of  $f(x) = 3x - 2$  in  $0 \leq x \leq 4$ .

15. Find the half range sine series expansion of  $f(x) = x \sin x$  in  $0 < x < \pi$ .

(10 × 5 = 50 marks)

### Part B

*Answer all questions.  
Each question carries 10 marks.*

16. (a) Discuss the convergence of the series  $\sum_{n=1}^{\infty} \frac{\sqrt{n}}{\sqrt{n^2+1}} x^n$ ; ( $x > 0$ ).

*Or*

(b) Test the following series for convergence :

$$\frac{1}{2}x + x^2 + \frac{9}{8}x^3 + x^4 + \frac{25}{32}x^5 + \dots \infty.$$

17. (a) Prove that  $\log(1 + \tan x) = x - \frac{x^2}{2!} + \frac{4x^3}{3!} + \dots$

*Or*

(b) If  $y = \sin(m \sin^{-1} x)$  prove that :

$$(1 - x^2)y_{n+2} - (2n + 1)xy_{n+1} + (m^2 - n^2)y_n = 0.$$

3

18. (a) Find the equation of the circle of curvature of the curve  $y^2 = 12x$  at  $(3,6)$ .

Or

(b) Find the equation of the evolute of the ellipse  $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ .

19. (a) Develop  $f(x)$  in Fourier series in the interval  $(0, 2)$  if  $f(x) = \begin{cases} \pi x, & 0 \leq x \leq 1 \\ \pi(2-x), & 1 \leq x \leq 2. \end{cases}$

Or

(b) Find the Fourier series of  $f(x) = \begin{cases} -x+1, & -\pi \leq x \leq 0 \\ x+1, & 0 \leq x \leq \pi \end{cases}$

20. (a) Diagonalize  $\begin{bmatrix} 7 & -2 & -2 \\ -2 & 1 & 4 \\ -2 & 4 & 1 \end{bmatrix}$ .

Or

(b) Reduce the quadratic form :

$2x_1^2 + 2x_2^2 + 2x_3^2 - 2x_1x_2 + 2x_1x_3 - 2x_2x_3$  to Canonical form by orthogonal transformation.

(5 × 10 = 50 marks)