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2E2304

Roll No. _____ Total No of Pages: 3

2E2304

B. Tech. II Sem. (Back) Exam., May - 2019

EE – 101 Basic Electrical & Electronics Engineering

Time: 3 Hours **Maximum Marks: 80**

Min. Passing Marks: 28

Instructions to Candidates:

*Attempt any **five questions** including Question No. 1, which is compulsory. All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.*

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL 2. NIL

Q.1 Compulsory, Answer for each sub-question be given in about 25 words. [8×2=16]

(a) State Thevenin's Theorem.

(b) What do you mean by Regulation and Efficiency of a Transformer?

(c) How is Root Mean Square (RMS) value different from Average value of alternating currents?

(d) State principle of operation of DC machine.

(e) Write down properties of semiconductor diodes.

(f) What do you mean by PMMC instruments?

(g) Write down De Morgan's Laws for Boolean algebra.

(h) Discuss the applications of Field Effect Transistor (FET).

Q.2 The resistances of the various arms of a bridge are given in Fig. 1. The battery has an e.m.f. of 2.0 V and a negligible internal resistance. Determine the value and direction of the current in BD, using:

(a) Kirchhoff's laws [8]

(b) Thevenin's theorem [8]

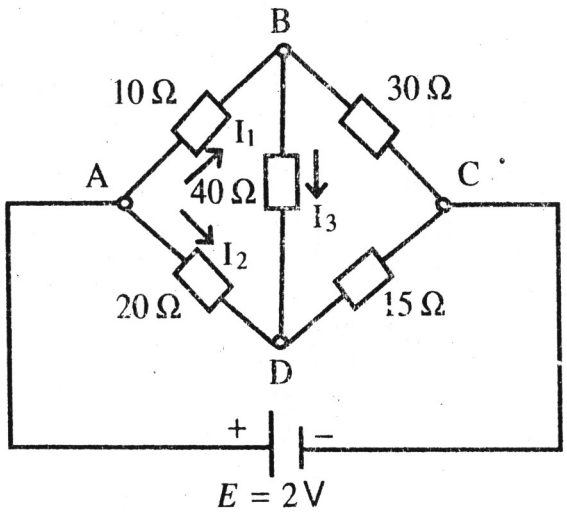

Fig .1

Q.3 (a) Explain open and short circuit tests for Transformers. [7]

(b) A 250 kVA, 11000 V/400 V, 50 Hz single-phase transformer has 80 turns on the secondary. Calculate:

(i) the approximate values of the primary and secondary currents [3]

(ii) the approximate number of primary turns [3]

(iii) the maximum value of the flux [3]

Q.4 (a) Express in rectangular and polar notations, the impedance of each of the following circuits at a frequency of 50 Hz:

(i) a resistance of 20Ω in series with an inductance of 0.1 H; [4]

(ii) a resistance of 50Ω in series with a capacitance of 40 μF; [4]

If the terminal voltage is 230 V at 50 Hz, calculate the value of the current in each case and the phase of each current relative to the applied voltage.

(b) A coil having a resistance of 6Ω and an inductance of 0.03 H is connected across a 50V, 60 Hz supply. Calculate: [4×2=8]

(i) the current

(ii) the phase angle between the current and the applied voltage

(iii) the apparent power

(iv) the active power

Q.5 Explain with suitable diagram, the principle of operation of :

(a) 3-phase Synchronous motor [8]

(b) AC Watt-hour meter [8]

Q.6 (a) Compare the Common Emitter (CE), Common Collector (CC) and Common Base (CB) configuration of Bipolar Junction Transistor (BJT). [8]

(b) Explain the working of full wave rectifier. Also calculate the efficiency. [8]

Q.7 (a) With suitable diagrams explain the following Logic gates with truth table:

(i) NAND gate [4]

(ii) NOR gate [4]

(b) Explain the series and shunt multipliers. [8]

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2E2307

Roll No. _____ Total No of Pages: 3

2E2307

B. Tech. II Sem. (Main/Back) Exam., May - 2019

OE – 101 Engineering Mechanics

Time: 3 Hours **Maximum Marks: 80**

Min. Passing Marks: 28

Instructions to Candidates:

*Attempt any **five questions** including Question No. 1, which is compulsory. All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.*

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL 2. NIL

Q.1 COMPULSORY, Answer for each sub-question be given in 25 words- [8×2=16]

(a) Explain the principle of Transmissibility of Forces.

(b) What do you mean by polar moment of inertia?

(c) Define Angle of Repose.

(d) Explain principle of virtual work.

(e) Define projectile motion.

(f) State D'Alembert principle.

(g) State the principle of work and energy.

(h) Write the impulse-momentum equation and mention its applications.

Q.2 (a) State and prove Lami's theorem. [6]

(b) The resultant of two forces P and Q is at right angles to P. Show that the angle between the forces is $\cos^{-1}(-P/Q)$. [10]

Q.3 Find out the centroid and moment of inertia about the centroidal axis I_{xx} and I_{yy} of a plane section shown in fig.1 [16]

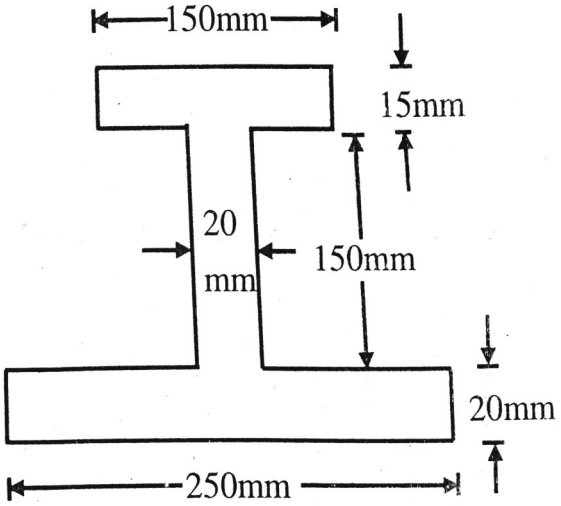

fig.1

Q.4 (a) Explain, with the help of neat diagram, the concept of limiting friction. [6]

(b) A beam has been loaded and supported as shown in fig.2, use the method of virtual work to determine the reactions at the end supports. [10]

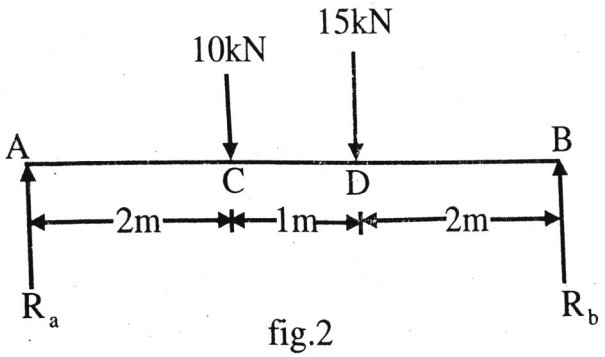

fig.2

Q.5 (a) A toy car accelerates from rest at a constant rate of $2m/s^2$ for same time. Then it retards at a constant rate of $4m/s^2$ and comes to rest. If the car remains in motion for 3 seconds. Determine the maximum speed attained and the total distance travelled by the car. [8]

(b) A projectile has a horizontal range S. If y_1 and y_2 are the greatest heights in the two paths possible, show that $S = 4\sqrt{y_1\, y_2}$ [8]

Q.6 (a) Explain the principle of conservation of mechanical energy. [6]

(b) A body of weight 100N falls from a height of 12m on a sand bed. It is estimated that the body penetrates 1.2m into sand before coming to rest. Make calculations for the average thrust exerted by the sand on the body. [10]

Q.7 (a) A glass Marble whose weight is 0.2N falls from a height of 12m and rebounds to a heights of 9m. The marble and the floor remain in contact for 0.1 second. Determine the impulse and the average force between the marble and the floor. [8]

(b) A lift carrying a load of 1000N is moving with uniform acceleration of 2.5m/s^2. Calculate the tension in the cable supporting the load when- [8]

(i) lift is moving upward,

(ii) lift is moving downward

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2E2005

Roll No. _____ Total No of Pages: 4

2E2005

B. Tech. I Year II Sem. (Main/Back) Exam., May - 2019

205 Engineering Mechanics

Time: 3 Hours **Maximum Marks: 80**

Min. Passing Marks: 26

Instructions to Candidates:

*Attempt any **five questions,** selecting **one question** from **each unit.** All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL 2. NIL

UNIT- I

Q.1 (a) State and prove Varignon's Theorem. [6]

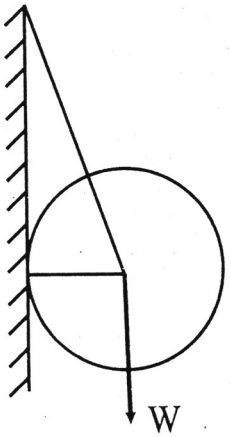
(b) The resultant of two forces P and Q acting at a point is R, if Q is doubled, the force R also gets doubled and if Q is reversed, R is again doubled. Show that the ratio of P, Q and R is given by [10]

$P: Q : R = \sqrt{2} : \sqrt{3} : \sqrt{2}$

OR

Q.1 (a) What do you know about virtual work? Explain with the help of example. [6]

(b) A smooth sphere of radius r and weight W hangs by a light string of length ℓ. One end of the string is fastened to a point on the sphere where its other end is fixed to a point on a smooth vertical wall. Determine the reaction of the wall and the tension in the string. [10]



UNIT- II

Q.2 (a) Draw neat sketch of third system of pulleys and obtain expression of mechanical advantage, velocity ratio and efficiency. [6]

(b) The effort required to lift a load of 250N is 160N and 375N is 170N respectively using a lifting machine. If the velocity ratio of the machine is 20, find out the following – [10]

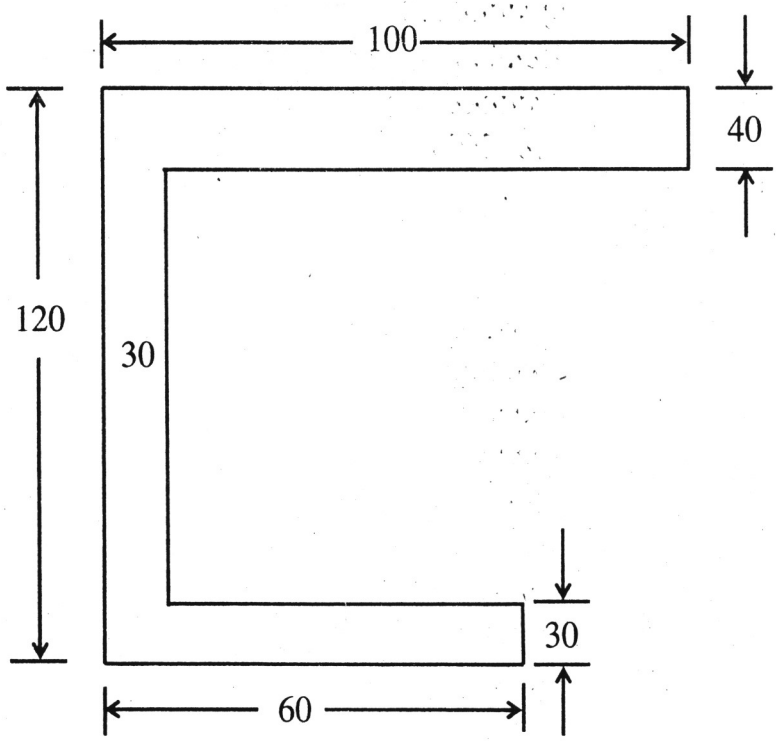
(a) Law of machine

(b) Efficiency of the machine at 250N and 375N loads.

(c) Effort lost in friction in both the cases.

OR

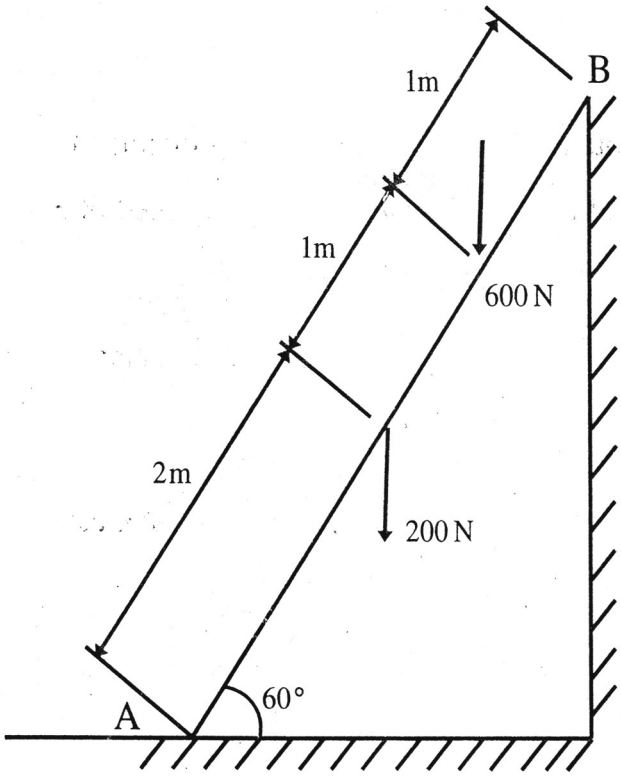
Q.2 Find the moment of inertia of the following fig. about XX and YY axis. [16]



UNIT- III

Q.3 (a) A ladder of length 4 m weighing 200 N in placed against a vertical wall as shown in fig. The co-efficient of friction between the wall and the ladder is 0.2 and that between the floor and the ladder is 0.3. The ladder in addition to its own weight

has to support a man weighing 600 N at a distance of 3m from A. Calculate the minimum horizontal force to be applied at A to prevent slipping. [10]



(b) What are the various law of friction? Explain. [6]
Explain different types of friction also.

OR

Q.3 (a) What do you mean by velocity ratio? What is the effect of slip on velocity ratio? [6]

(b) In an open belt drive the sum of the diameters of two pulleys is 60 cm. they are running at 1500 and 3000 rpm. Determine the diameter of each pulley assuming the total slip of the system is 5%. The pulley running at 1500 rpm is the driver pulley. [10]

UNIT- IV

Q.4 (a) Derive an expression for the maximum height and range of a projectile traversed by a stone thrown with an initial velocity of u and an inclination of θ. [6]

(b) A shot is fired with a velocity of 30 m/s from a point 15 m in front of a vertical wall 6 m high. Find the angle of projection to the horizontal to enable the shot to just clear the top of the wall. [10]

OR

Q.4 (a) What do you know about D' Alembert principle? Explain. [6]

(b) The speed of a truck, moving at constant speed of 30m/s, is reduced to 20 m/s, in a distance of 200m. Determine- [10]

(i) The acceleration assuming it to be constant

(ii) The time taken

Also determine the distance in which the truck can be brought to a stop with the acceleration calculation in part (i).

UNIT- V

Q.5 (a) What do you understand by the term energy? Explain various forms of mechanical energies. [6]

(b) A 40 ton rail car travels at 4 km/h and collides with a 100 ton wagon on the same track, moving in the opposite direction at 1.2 km/h. Find their velocities immediately after impact assuming no loss of energy. What is the impulse between them? [10]

OR

Q.5 (a) Explain the principle of momentum for a particle and rigid body, Principle of Conservation of Angular momentum and angular momentum of rigid body. [6]

(b) A hammer mass of 1 kg is used to drive a nail of 100 gms into a timber log. The striking hammer velocity is 10 m/s and nail is driven inside 1 cm with each blow. Find the resistance of the timber to penetrate the nail and the energy lost in driving the nail 5 cm inside the timber. [10]

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2E1024

Roll No. _____ Total No of Pages: 3

2E1024

B. Tech. II Sem. (Back) Exam., May - 2019

204 (O) Environmental Engineering & Disaster Management

Time: 3 Hours **Maximum Marks: 80**

Min. Passing Marks: 26

Instructions to Candidates:

*Attempt any **five questions,** selecting **one question** from **each unit.** All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL 2. NIL

UNIT- I

Q.1 (a) What do you understand by Renewable Sources of Energy? Discuss various sources of renewable energy in our counters. [8]

(b) Explain hydrological cycles with a neat sketch. [8]

OR

Q.1 (a) Describe various sources of Non-conventional sources of Energy. [8]

(b) Discuss about adverse effect of environmental pollution and control strategies. [8]

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UNIT- II

Q.2 (a) What is Environment Impact Assessment (EIA)? Give the necessary and methodology of Implementing E/A. [8]

(b) Describe surface and ground water sources in view of their characteristics. [8]

OR

Q.2 (a) Describe the functioning of septic tank with giving a neat sketch. [8]

(b) What are the common impurities found in surface water? Discuss the ill effects of these impurities on mankind. [8]

UNIT- III

Q.3 What is solid management? What are the various methods of disposal of municipal solid waste? [16]

OR

Q.3 What is air pollution? What are the adverse effects on air pollution on human health? Suggest different methods to control Air pollution. [16]

UNIT- IV

Q.4 What is disaster? Explain types of disasters. [16]

OR

Q.4 Write down the do and don'ts for safety related to nuclear hazards, droughts and floods. [16]

UNIT- V

Q.5 (a) Describe various types of seismic waves and their role in occurrence of earthquakes. [8]

(b) Discuss about Plate Tectonic Theory of Earthquake. [8]

OR

Q.5 (a) Define Magnitude and Intensity of Earthquakes. [8]

(b) Describe the basic concepts of Earthquake Resistant Houses & Construction Practices. [8]

2E2306

Roll No. _____ Total No of Pages: 3

2E2306

B. Tech. II Sem. (Main/Back) Exam., May - 2019

ME – 102 Basic Mechanical Engineering

Time: 3 Hours **Maximum Marks: 80**

Min. Passing Marks: 28

Instructions to Candidates:

*Attempt any **five questions** including Question No. 1, which is compulsory. All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.*

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL 2. NIL

Q.1 Compulsory, Answers for each sub-question be given in about 25 words. [8×2=16]

(a) State requirements of a good boiler.

(b) Differentiate between centrifugal pump and reciprocating pump.

(c) Why should the internal combustion engines be lubricated?

(d) State the requirements of conditioned air.

(e) What is the purpose of providing pattern allowances?

(f) Explain the difference between forward and backward extrusion.

(g) What are the advantages of a V-belt drive over a flat belt drive?

(h) List the benefits of flexible manufacturing system.

Q.2 (a) Discuss in brief, advantages of high pressure boilers. [4]

(b) Compare 'fire-tube' boiler with 'water-tube' boiler. [4]

(c) Explain the working of closed cycle gas turbine with the help of neat sketch. [4]

(d) List the type of wind mills and describe how they utilize wind energy? [4]

Q.3 (a) Differentiate between single acting and double acting pumps. [4]

(b) Briefly explain main components of an Internal Combustion engine. [4]

(c) Compare 'Petrol engines' with 'Diesel engines'. [4]

(d) Discuss various types of lubrication systems used in internal combustion engine. [4]

Q.4 (a) Explain different types of gear trains with the help of neat sketches. [4]

(b) What are the advantages of rope drives over belt drives? Explain in brief. [4]

(c) Compare power transmission with gears with power transmission with belts. [4]

(d) Discuss compound belt drive and stepped pulley drive with the help of neat sketch. [4]

Q.5 (a) Explain vapour compression refrigeration system with the help of neat sketch. [4]

(b) Explain important terms frequently used in air conditioning. [4]

(c) What is a refrigerant? What are desirable properties of refrigerants? [4]

(d) What is the difference between 'unitary air conditioning' and 'central air conditioning'? Explain in brief. [4]

Q.6 (a) Discuss desirable properties of a good molding sand. [4]

(b) Describe different operations in forging process. [4]

(c) What is Brazing? Briefly explain common brazing methods? [4]

(d) Explain any four operations that can be performed on a lathe machines with the help of neat sketches. [4]

Q.7 (a) Why alloying elements are added to steels? Name any three alloying elements and their effect when they are added to steels. [4]

(b) Differentiate between hardening and case hardening. List various case hardening processes. [4]

(c) What are the functions of robot in manufacturing applications? What are the advantages of robots in manufacturing? [4]

(d) What do you mean by Computer Numerical Control (CNC) machine? What are their advantages? [4]

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1E2403

Roll No. _____ Total No of Pages: 3

1E2403

B. Tech. II - Sem. (Main) Exam., May - 2019

BSC

2FY2 – 03 Engineering Chemistry

(Common for all branches

Time: 3 Hours **Maximum Marks: 160**

Instructions to Candidates:

Attempt all ten questions from Part A, five questions out of seven questions from Part B and four questions out of five from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. Calculator (Non Programmable) 2. NIL

PART – A

(Answer should be given up to 25 words only) **[10×3=30]**

All questions are compulsory

Q.1 What are the advantages of break point chlorination? [3]

Q.2 State harmful effects of Scale and Sludge formation in boilers. [3]

Q.3 What are the characteristics of good metallurgical Coke? [3]

Q.4 Name the catalysts used for the synthesis of gasoline by Fischer-Tropsch Method. [3]

Q.5 Define Octane No. of Gasoline. [3]

Q.6 How galvanizing protects iron from corrosion? [3]

Q.7 Why is gypsum added to cement? [3]

Q.8 What is Annealing of glass? Give its importance. [3]

Q.9 Name the additives mixed with lubricant used for Extreme pressure lubrication. [3]

Q.10 What is Nucleophile? [3]

PART – B

(Analytical/Problem solving questions) **[5×10=50]**

Attempt any five questions

Q.1 A water sample contains following impurities: Ca $(HCO_3)_2$ = 16.2 ppm, Mg $(HCO_3)_2$ = 14.6 ppm, $CaCl_2$ = 11.1 ppm, $MgSO_4$ = 12.0 ppm, and HCl = 7.3 ppm. Calculate quantity of lime (90% pure) and soda (85% pure) required for softening of 100,000 litres of hard water using 8.2 ppm of $NaAlO_2$ as a coagulant. [10]

Q.2 What are Zeolites? Explain softening of hard water by Zeolite method with neat and well labeled diagram and reactions. How zeolite bed is regenerated? [10]

Q.3 Ultimate analysis of a fuel gave following results. C = 80%, H = 5%, O = 3%, S = 5%, N = 5%, Ash = 2%. Calculate amount of air required for complete combustion of 1 kg of fuel if 50% excess air is supplied. [10]

Q.4 What is Oil Gas? Give its synthesis, composition, calorific value and uses. [10]

Q.5 What is Flash and Fire point of a lubricating oil? How is it determined by Pensky Martins apparatus? Also give its significance. [10]

Q.6 What is glass? How is glass manufactured by Tank furnace? Explain with neat and well labeled diagram. [10]

Q.7 Write preparation, properties and uses of Paracetamol Drug. [10]

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions) **[4×20=80]**

Attempt any four questions

Q.1 What is hardness of water? Explain determination of hardness of water by complexometric method using EDTA. [20]

Q.2 Define calorific value of fuels. How calorific value of solid fuels is determined by Bomb calorimeter? Describe with neat and well labeled diagram. [20]

Q.3 What is Corrosion? Explain theory of Electrochemical Corrosion. What are the factors affecting corrosion of metals? [20]

Q.4 What are the various raw materials used for manufacturing of cement? Explain manufacturing of Portland cement with neat and well labeled diagram of Rotary Kiln. Also give chemical reactions taking place during the process. [20]

Q.5 What are the different types of organic reactions? Explain reaction mechanism of addition reactions with suitable examples. [20]

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1E2205

Roll No. _____ Total No of Pages: 3

1E2205

B. Tech. II Sem. (Main/Back) Exam., May - 2019

CY – 101 Engineering Chemistry

Time: 3 Hours **Maximum Marks: 80**

Min. Passing Marks: 28

Instructions to Candidates:

*Attempt any **five questions** including Question No. 1, which is compulsory. All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.*

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL 2. NIL

Q.1 Compulsory, Answers for each sub-question be given in about 25 words. [8×2=16]

(a) What is the basic principle applied to remove the hardness of water by Lime – Soda process?

(b) Why chloramine is preferred over bleaching powder during chlorination?

(c) What is the reason for knocking in a petrol engine?

(d) What is the purpose of determining the fixed carbon in coal?

(e) What is PET? What are the advantages of blending PET with wool and cotton?

(f) Define Viscosity and Viscosity Index.

(g) Copper equipment should not possess steel bolt. Give reasons.

(h) What are refractory materials? How are they classified?

Q.2 (a) What is the principle of EDTA titration? Briefly describe estimation of hardness of water by EDTA method. [8]

(b) Calculate the amount of lime (80% pure) and soda (90% pure) required for treatment of 25,000 litres of water, whose analysis is as follows: [8]

$Ca(HCO_3)_2$ = 40 ppm ; $Mg(HCO_3)_2$ = 36 ppm ;

$MgSO_4$ = 30 ppm ; $CaSO_4$ = 34 ppm ;

$CaCl_2$ = 27 ppm ; and NaCl = 10 ppm ;

Also calculate temporary and permanent hardness of water sample.

Q.3 (a) Why is coke, but not coal, used as a fuel in metallurgical processes? Discuss in detail the by – product coke oven process for the manufacture of coke and mention the by – products recovered in the process. [8]

(b) A sample of coal was found to have the following percentage composition. [8]

C = 70% ; H = 5% ; O = 12% ; S = 1.2% ; N = 3% ; and rest is ash.

Calculate the minimum amount of air necessary for complete combustion.

Q.4 (a) Describe the principle and procedure involved in the Ion – Exchange process for the treatment of water. What are the limitations, advantages and disadvantages of the process? [8]

(b) What are elastomers? Give the preparation and uses of: [8]

(i) Buna – N

(ii) Butyl rubber

(iii) Neoprene rubber

Q.5 (a) Describe the fractional distillation of crude petroleum with the help of a neat diagram. Write uses of various products obtained in this process. [8]

(b) What are lubricants? How are they classified? Explain following properties of lubricants and give their significance. [8]

(i) Flash and Fire Point

(ii) Cloud and Pour Point

Q.6 (a) Why do metals corrode? How does temperature and humidity affect the corrosion rate? What is the difference between chemical and electrochemical corrosion? [8]

(b) What is Cathodic protection? How is Cathodic protection of iron different from its galvanization? [8]

Q.7 (a) Draw labelled diagram of rotary kiln used for manufacture of Portland cement by wet process and explain various steps involved in this technology. [8]

(b) What is glass? Describe the manufacturing process of borosilicate glass. Why borosilicate glass is preferred in chemical laboratory? [8]

2E2004

Roll No. _____ Total No of Pages: 3

2E2004

B. Tech. II Sem. (Main/Back) Exam., May - 2019

204 Chemistry & Environmental Engineering

Time: 3 Hours

Maximum Marks: 80
Min. Passing Marks: 26

nstructions to Candidates:

*Attempt any **five questions,** selecting **one question** from **each unit.** All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL 2. NIL

UNIT- I

Q.1 (a) What is the hardness of water? Explain temporary and permanent hardness by complexometric method. [8]

(b) 5gm $CaCO_3$ dissolved in dil. HCl and make it up to 1 ltr to prepare standard hard water (SHW). 20ml of this standard hard water consumed 18ml of EDTA on titration using EBT as an indicator. Similarly 20ml of Hard water and boiled water each consumed 15ml and 12ml of EDTA respectively. Calculate temporary, permanent and total hardness of water. [8]

OR

Q.1 (a) What are the requisites of potable water? How will you purify municipal water mentioning different steps? [8]

(b) Write notes on the following (any two)- [8]

(i) Break point chlorination

(ii) Sedimentation with coagulation Disinfection

UNIT- II

Q.2 (a) Describe the Bomb calorimeter for the determination of calorific value of s fuel.

(b) A coal sample found to have following composition-

C = 76%, H = 8.0%, O = 5.4%, S = 3.5%, N = 3.0%, Ash = rest.

Calculate minimum amount of oxygen and air required (by weight) for comp combustion of 1kg of coal. Calculate amount of air required if 50% excess a supplied.

OR

Q.2 (a) Explain high and low calorific value of fuel. How will you determine calo value of gaseous fuel by Junker's calorimeter?

(b) Write short noes on the following- (Any two)

(i) Flue gas analysis by Orsat's apparatus

(ii) Proximate Analysis

(iii) Sludge and Scale

UNIT- III

Q.3 (a) What is EIA? Explain methodology and necessity of EIA.

(b) Gives Environmental Acts and regulations in India.

OR

Q.3 (a) What is the major sources of Renewable energy? Explain Bio-energy.

(b) Write the notes on following-

(i) Carbon cycle

(ii) Biodiversity

UNIT- IV

Q.4 (a) Discuss the Acid Rain and Green House effect.

(b) What is Air pollution? What are the major sources of Air pollution? Discuss adverse effects of Air pollution. How can Air pollution be minimized?

OR

(a) What is ozone depletion? Discuss the mechanism of depletion of ozone layer. What are the harmful effect of Ozone Depletion? [8]

(b) What is solid waste management? Explain the classification and disposal of solid waste management. [8]

UNIT- V

(a) What is Rain Water Harvesting? Discuss the Rain water harvesting methods. [8]

(b) Explain the methodology of waste water treatment. [8]

OR

What is Corrosion? Discuss the mechanism of electrochemical corrosion. Explain cathodic protection methods to minimize corrosion. [16]

2E1026

Roll No. _____ Total No of Pages: 3

2E1026

B. Tech. II Sem. (Back) Exam., May - 2019
206 (O) Engineering Chemistry - II

ıe: 3 Hours

Maximum Marks: 80
Min. Passing Marks: 26

ructions to Candidates:

*Attempt any **five questions,** selecting **one question** from **each unit.** All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

NIL

2. NIL

UNIT- I

1 (i) What is carbonization of coal? [8]

(ii) Explain the manufacturing of metallurgical coke by Beehive Oven method. [8]

OR

1 Write notes on following - [8+8=16]

(i) Knocking and Anti-knocking properties

(ii) Manufacturing of synthetic petrol by Bergius process

UNIT- II

Q.2 Determine the calorific value of solid fuel by Bomb calorimeter and derive the fo

of HCV and LCV after all corrections.

OR

Q.2 Explain following - [8+

(i) Orsat's apparatus

(ii) Proximate analysis

UNIT- III

Q.3 What is phase rule? Explain one component system by water cycle.

OR

Q.3 Explain Bi – cd bi – component system and gives its industrial applications.

UNIT- IV

Q.4 Write notes on – [8+8

(i) Fullerenes

(ii) Properties, preparation and uses of super conductors.

OR

.4 What is optical fibers? Explain the properties, preparation, grade and uses of optical fibers. [16]

UNIT- V

.5 (i) What is corrosion? Explain the mechanism of chemical corrosion. [8]

(ii) Explain the different types of protective coatings. [8]

OR

.5 (i) Explain the mechanism of wet corrosion. [8]

(ii) Explain anodic sacrificial protection to minimize corrosion. [8]

2E2305

Roll No. _____

Total No of Pages: 3

2E2305

B. Tech. II Sem. (Back) Exam., May - 2019

CE – 103 Elective-Basic Civil Engineering

ne: 3 Hours

Maximum Marks: 80

Min. Passing Marks: 26

tructions to Candidates:

*Attempt any **five questions** including Question No. 1, which is compulsory. All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly. Use of following supporting material is permitted during examination. (Mentioned in form No. 205)*

NIL

2. NIL

Compulsory, Answers for each sub – questions be given in about 25 words. [8×2=16]

(a) What is levelling?

(b) Name the different types of foundation.

(c) What is the main principle of surveying?

(d) What is true meridian?

(e) Write down the names of various modes of transportation.

(f) Write down the various causes of accidents.

(g) Define Plinth Area.

(h) Write names of different fields of specialization in Civil Engg.

Q.2 (a) Explain briefly the role of a civil engineer.

(b) Describe plane and geodetic surveying.

(c) What are the components of building?

Q.3 (a) Write down the names of traffic signs with neat sketches.

(b) What is the significance of ventilation in a building?

(c) The length of survey line was measured with a 30m chain and found to be 128.6

Later it was observed that the chain was 0.02m short. Find the true length of line.

Q.4 (a) What are the essential properties of a good brick? Explain.

(b) Explain briefly the modes of transportation.

(c) Describe the different types of chain.

Q.5 (a) What are the different types of building? Explain.

(b) What do you mean by soundness of cement? Explain.

(c) Mention the uses of cement.

6 (a) Explain construction and working of Rotary Kiln for cement manufacturing with the help of neat sketches. [8]

(b) What is the difference between prismatic and surveyor compass? [4]

(c) Write a short note on total station. [4]

7 (a) What are the building bye-laws and their objectives? [8]

(b) What are the qualities of a good stone? [4]

(c) Explain the basic concept of R.C.C. [4]

1E2408

Roll No. _____ Total No of Pages: 4

1E2408

B. Tech. II - Sem. (Main) Exam., May - 2019

ESC

2FY3 – 08 Basic Electrical Engineering

Common for all Branches

ime: 2 Hours Maximum Marks: 80

structions to Candidates:

Attempt all five questions from Part A, four questions out of six questions from Part B and two questions out of three from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

. NIL _____ 2. NIL _____

PART – A

(Answer should be given up to 25 words only) **[5×2=10]**

All questions are compulsory

Q.1 The current in a 2H inductor varies at a rate of 2 A/s. Find the voltage across the inductor and the energy stored in the magnetic field after 2s.

Q.2 Explain the average power delivered to the circuit.

Q.3 Define Transformer losses.

Q.4 Explain PN Junction diode.

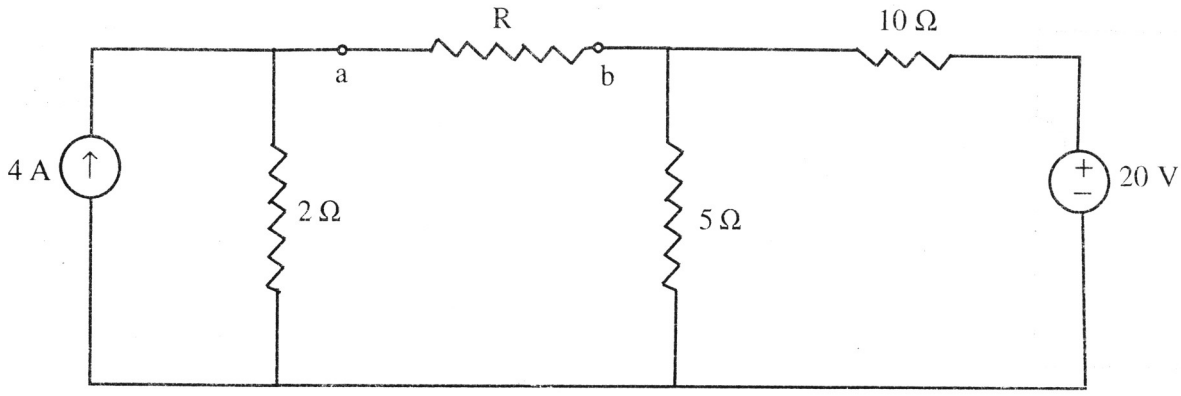
Q.5 Draw and explain MCB.

PART – B

(Analytical/Problem solving questions) **[4×10=**

Attempt any four questions

Q.1 What should be the value of R such that Maximum power transfer can take place fr the Rest of the Network to R. Obtain the amount of this power?



Q.2 Explain in detail the construction, working principle and emf equation of a single pha transformer.

Q.3 Distinguish between self-excited and separately excited DC machine. How the sel excited DC machines are classified.

Q.4 Explain the construction, of three phase induction motor with suitable diagrams.

Q.5 Draw the input and output characteristics of common emitter configuration and explai active saturation and cut-off region.

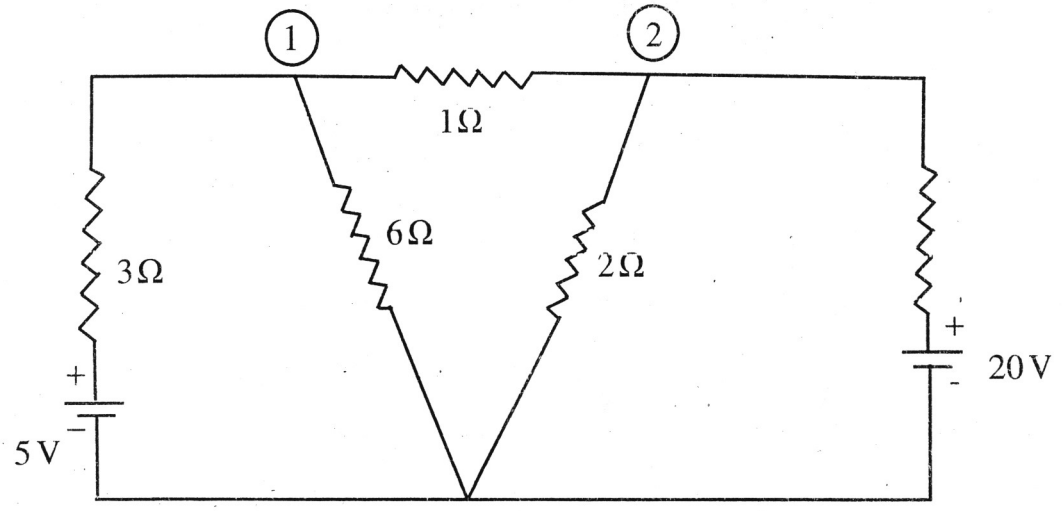
Q.6 Explain the switch fuse unit (SFU), ELCB and MCCB.

PART – C

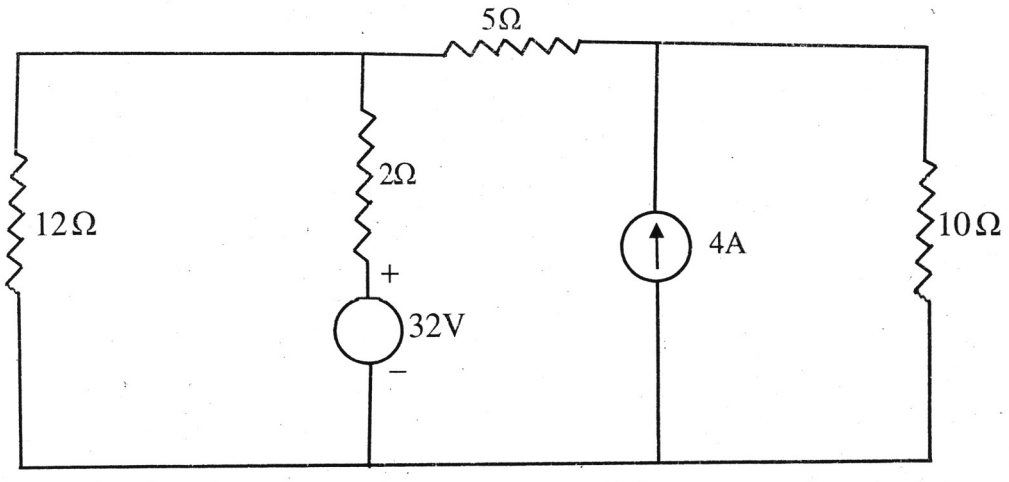
(Descriptive/Analytical/Problem Solving/Design Questions) **[2×15=30]**

Attempt any two questions

(a) Find the current through the 1Ω resistor node voltage method for the circuit shown below. [8]



(b) Compute the power dissipated in 9Ω Resistor by applying superposition in circuit of fig. [7]



Q.2 (a) A 400 V, three – phase supply feeds an unbalanced three-wire star-connecte

The branch impedances of the load are $Z_R = (4 + j8)\Omega$. $Z_Y = (3 + j4)\ \Omega$ and

$Z_B = (15 + j20)\Omega$. Find the line current and voltage across each phase impe

Assume R Y B phase sequence.

(b) Write down star to delta and delta to star transformation.

Q.3 Write short notes on the following :

(a) Ideal Transformer on load

(b) Commutator

(c) DC – DC Converter

1E2409

Roll No. _____ Total No of Pages: 3

1E2409

B. Tech. II - Sem. (Main) Exam., May - 2019

ESC

2FY3 – 09 Basic Civil Engineering

Time: 2 Hours Maximum Marks: 80

Instructions to Candidates:

Attempt all five questions from Part A, four questions out of six questions from Part B and two questions out of three from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL 2. NIL

PART – A

(Answer should be given up to 25 words only) **[5×2=10]**

All questions are compulsory

Q.1 Differentiate between Plinth and Carpet area. [2]

Q.2 Write down the principles of Surveying. [2]

Q.3 Write down the instruments used for linear measurement. [2]

Q.4 List the type of foundation used in construction. [2]

Q.5 Define the term contour and contour maps. [2]

PART – B

(Analytical/Problem solving questions) [4×10

Attempt any four questions

Q.1 Define the role of Civil Engineer in society.

Q.2 Write down the various tape correction applied in linear measurement.

Q.3 Describe the various types of building and their purposes.

Q.4 Explain in detail various modes of transportation with their characteristics.

Q.5 Define air pollution and discuss about the various air pollutants.

Q.6 Explain in detail various cause of accidents and their preventing measures.

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions) [2×15=

Attempt any two questions

Q.1 (a) Describe levelling and various types of instrument used for levelling.

(b) The following readings are taken from a level; 0.502, 1.335, 1.865, 2.555, 0.3
0.910, 1.935, 2.875, 0.560, 1.825 and 2.775. Instrument is shifted after secc
fourth and ninth reading. Compute the reduced level of all stations using rise
fall method. The first reading was taken on benchmark of 100m. [

a) What is noise? Describe briefly the effects of noise pollution. [10]

b) Discuss the preventions for noise pollution. [5]

a) Convert the following quadrantal bearings to whole circle bearing - [2]

(i) N 38° 28′ E (ii) S 79° 10′ W (iii) S 45° 47′ E (iv) N 10° 11′ W

b) Differentiate between fore bearing and back bearing. [3]

c) Which factors we need to consider while selecting a site for building? [10]

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2E2003

Roll No. _____ Total No of Pages: 3

2E2003

B. Tech. II Sem. (Main/Back) Exam., May - 2019

203 Engineering Physics - II

Time: 3 Hours **Maximum Marks: 80**

Min. Passing Marks: 24

Instructions to Candidates:

*Attempt any **five questions,** selecting **one question** from **each unit.** All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL 2. NIL

UNIT- I

Q.1 (a) Discuss the Compton theory of scattering. Derive the relations for Compton shift, the direction and energy of scattered electron. [8]

(b) Define the terms normalization and orthogonality of a wave function. [2+2=4]

(c) A photon of energy 1.02 MeV is scattered through 90° by Compton scattering. Calculate the energy of photon and electron after interaction. [4]

OR

Q.1 (a) Write down the time independent and time dependent Schrödinger equation for a free particle. Solve time independent Schrödinger equation for a particle confined in 1-D box and show that energy spectrum is discrete. [2+8=10]

(b) Determine the expectation value of position and momentum for a particle trapped in 1-D box of side 'a'. [6]

UNIT- II

Q.2 (a) Explain quantum mechanical tunneling with suitable diagram and theory. Give one example of quantum mechanical tunneling. [6+2=8]

(b) Define degeneracy of an energy level. What is degeneracy of second excited state for a particle trapped in a cubical box? [2+2=4]

(c) Electrons of Energy 2eV are incident on a potential barrier of height 5eV and width 5Å. Find transmission probability of these electrons. [4]

OR

Q.2 (a) Write the basic postulates of Sommerfield free electron gas model. Obtain an expression for density of states for a Fermi gas and hence explain Fermi Energy Level. [8]

(b) Calculate the Fermi energy in Copper assuming that each Copper atom contributes one free electron to electron gas. Given density of Copper 8.94×10^{-3} kg/m^3 and atomic mass of Copper is $63.5\times1.67\times10^{-27}$ kg. [8]

UNIT- III

Q.3 (a) Define Coherence and explain temporal and spatial coherence. How size of source relate to Spatial Coherence? Explain. [4+4=8]

(b) The Spectral line width of red Cadmium light of wavelength 694.3 nm is 0.001 nm. Calculate spectral purity factor, Coherence length and Coherence time. [8]

OR

Q.3 (a) What is an optical fiber? Explain Numerical Aperture and maximum acceptance angle for an optical fibre. Find an expression of numerical aperture for step index fibre. [4+4+4=12]

(b) The refractive index of core of an optical fibre is $\eta_1 = 1.45$ and the refractive index difference is 0.01. Find the numerical aperture and maximum acceptance angle. [4]

UNIT- IV

Q.4 (a) Explain the construction and working of He-Ne Laser with neat and labelled diagram. What is role of He in this Laser? [8]

(b) Explain the basic properties of a laser light. [4]

(c) Find the population density of the excited states of a laser material which produces light of wavelength 6328Å at 3000 K. Population density of the lower state is 10^{20} atoms per unit volume. [4]

OR

Q.4 (a) Describe briefly construction and reproduction of a hologram. [8]

(b) What do you understand by Q-switching and mode locking of a laser? [6]

(c) State the applications of holography. [2]

UNIT- V

Q.5 (a) Explain dead time of a GM counter. How problem can be solved in GM counter? [4]

(b) Explain with neat diagram construction and working of a proportional counter. [8]

(c) Find the number of ion pairs by 10 MeV proton. The multiplication factor of proportional counter is 10^3, current pulse duration is 10μs and resistance between electrodes is $10^4\Omega$, find pulse height. The amount of energy required to produce one ion pair is 34 eV. [4]

OR

Q.5 (a) Describe principle, construction and working of a scintillation counter. [8]

(b) A GM counter reads 5000 counter per minute. If the dead time of the counter is 300μs, then find actual count rate. [8]

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1E2204

Roll No. _____ Total No of Pages: 4

1E2204

B. Tech. II Sem. (Main/Back) Exam., May - 2019

PY – 101 Engineering Physics

Time: 3 Hours **Maximum Marks: 80**

Min. Passing Marks: 28

Instructions to Candidates:

*Attempt any **five questions** including Question No. 1, which is compulsory. All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly. Use of following supporting material is permitted during examination. (Mentioned in form No. 205)*

1. NIL 2. NIL

Q.1 Compulsory, Answer for each sub-question be given in about 25 words. [8×2=16]

(a) When will you observe circular fringes in Michelson Interferometer?

(b) What is phase retardation plate in polarization?

(c) Define resolving power of an optical instrument.

(d) What is Bragg's Law?

(e) Write down Schrodinger's time dependent wave equation.

(f) Define Coherence.

(g) What is active medium in Laser?

(h) Differentiate between photography and holography.

Q.2 (a) With schematic diagram, explain the construction and working of a Michelson's Interferometer. How will you use it to measure wavelength separation between two closely spaced spectral lines say D_1 and D_2 lines of sodium lamp? [2+2+2+2=8]

(b) Write short note on anti-reflection coating in interference. [4]

(c) When movable mirror in Michelson's interferometer is moved through a distance of 0.0589mm, a shift of 200 fringes is observed. What is wavelength of light used? [4]

Q.3 (a) What is plane transmission grating? Show that the intensity of light diffracted from a plane transmission grating is given by

$$I = I_0 \left(\frac{\sin \alpha}{\alpha}\right)^2 \left(\frac{\sin N\beta}{\sin \beta}\right)^2$$

Where the symbols have their usual meanings. [2+6=8]

(b) What is optical activity? Write the laws of optical activity of optically active solution. [2+2=4]

(c) Two crossed polaroids A and B are placed in the path of light beam. In between these a third polaroid C is placed whose plane of transmission makes an angle of 30° with the plane of transmission of the polaroid A. If the intensity of the unpolarized light incident on polaroid A is $32 W/m^2$, then what will be the intensity of light emerging out of polaroid B? [4]

Q.4 (a) Based on band theory of solids, distinguish between conductors, semiconductors and insulators. [3]

(b) Explain Hall effect with suitable diagram. Show that the Hall coefficient R_H is given by $R_H = -\frac{1}{ne}$ where n is number of charge carriers per unit volume. [3+4=7]

(c) The first order diffraction is found to occur at a glancing angle of 9°. Calculate the wavelength of X-ray and the glancing angle for second order diffraction if the spacing between the adjacent plane is 2.51Å. [3+3=6]

Q.5 (a) What is Compton scattering? Explain why Compton effect is not observed experimentally for visible rays. [2+2=4]

(b) Write down the Schrödinger's wave equation for a particle of mass m trapped in one-dimensional box of side a. Solve it for energy eigen values and eigen functions. [2+3+3=8]

(c) Show that the expectation values of position and momentum of a particle in 1-D box are a/2 and 0 respectively. Here a is the width of the box. [2+2=4]

Q.6 (a) What is spectral purity? Derive an expression for coherence length and coherence time in term of wavelength and frequency. [2+4=6]

(b) How does an optical fibre function in transporting electromagnetic energy? Show that the numerical aperture of a step index fibre is given by -

$$NA = n_1\sqrt{2\Delta}$$

Where the symbols have their usual meanings. [2+4=6]

(c) Calculate the numerical aperture and acceptance angle of optical fibre of refractive indices for core and cladding as 1.62 and 1.52 respectively. [2+2=4]

Q.7 (a) What is meant by holography? Discuss construction and reproduction of hologram with suitable diagrams. [2+3+3=8]

(b) With a suitable diagram explain the construction and working of a semiconductor laser. [4+4=8]

1E2402

Roll No. _____ Total No of Pages: 3

1E2402

B. Tech. II - Sem. (Main) Exam., May - 2019

BSC

2FY2 – 02 Engineering Physics

(Common for all branches)

Time: 3 Hours **Maximum Marks: 160**

Instructions to Candidates:

Attempt all ten questions from Part A, five questions out of seven questions from Part B and four questions out of five from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL 2. NIL

PART – A

(Answer should be given up to 25 words only) **[10×3=30]**

All questions are compulsory

Q.1 Write two differences between Haidinger fringes and Fizeau fringes.

Q.2 Explain the role of compensating glass plate in Michelson's Interferometer.

Q.3 Enumerate the difference between Fresnel and Fraunhofer class of diffraction.

Q.4 Why a semiconductor behaves like an insulator at 0K temperature?

Q.5 Explain the meaning of zero point energy.

Q.6 Write any two advantages and applications of an optical fibre.

Q.7 What do you understand by term pumping in LASER system?

Q.8 What is Hall Effect? Write expression for Hall coefficient.

Q.9 Define Fermi distribution function & show the dependence of it on temperature.

Q.10 Define divergence & its physical significance.

PART – B

(Analytical/Problem solving questions) **[5×10=50]**

Attempt any five questions

Q.1 Write a short note on resolving power. What do you understand by geometrical & spectral resolving power?

Q.2 Light containing two wavelengths λ_1 and λ_2 falls normally on a Planoconvex lens of radius of curvature R resting on a glass plate. If the n^{th} dark ring due to λ_1 coincides with $(n+1)^{th}$ dark ring due to λ_2, then prove that the radius of n^{th} dark ring of λ_1 is given by,

$$r_n = \left(\frac{\lambda_1\lambda_2 R}{\lambda_1-\lambda_2}\right)^{1/2}$$

Q.3 Calculate first two energy levels of an electron confined in a rigid potential box of width 1Å.

Q.4 Write the expression for visibility and show that visibility is a measure of coherence.

Q.5 Explain the term "Bonding in Solids". What do you mean by metallic bonding?

Q.6 What is the difference between spontaneous and stimulated emission? Why is spontaneous radiation incoherent?

Q.7 Write short note on:-

(i) Displacement current

(ii) Poynting vector

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions) **[4×20=80]**

Attempt any four questions

Q.1 Derive the following expressions for plane transmission grating

(i) $I = I_0 (\sin\alpha/\alpha)^2 . (\sin N\beta/\sin\beta)^2$

(ii) Angular width of n^{th} principal maxima, $2d\theta n = 2 \tan\theta / nN$

Q.2 Derive the Schrödinger's time dependent & independent wave equations. Write down the equation for a free particle confined in a one dimensional box of size 'a'. Obtain Eigen values and normalized wave function for this particle.

Q.3 Explain the term absorption, spontaneous and stimulated emission. Also derive the relation between Einstein's coefficients for laser action and discuss the results. Describe the construction and working of He – Ne laser with neat labelled diagram.

Q.4 Classify the solid as conductor, semiconductor and insulator according to band structure. Derive an expression for electrical conductivity in intrinsic semiconductors. How is the electrical conductivity modified in extrinsic semiconductors?

Q.5 What are Maxwell's equations? Derive Maxwell's equation in an isotropic medium and in free space.

2-19

1E2203

Roll No. _____ Total No of Pages: 3

1E2203

B. Tech. II Sem. (Back) Exam., May - 2019

HU – 103 Human Values

Time: 3 Hours **Maximum Marks: 80**

Min. Passing Marks: 28

Instructions to Candidates:

*Attempt any **five questions** including Question No. 1, which is compulsory. All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.*

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL 2. NIL

Q.1 Compulsory, Answers for each sub – questions be given in about 25 words. [8×2=16]

(a) What is meant by 'Natural Acceptance'?

(b) Define Sanyam.

(c) Differentiate between 'Trust' and 'Respect'.

(d) What is Undivided Society?

(e) Write in brief about activities of 'I'.

220

(f) How you define meaning of 'Happiness'?

(g) Explain self – regulation in nature.

(h) Why 'Ethical Human Conduct' is importance in profession?

Q.2 Write your views about experimental validation - as the mechanism for self-exploration. [16]

Q.3 What are the needs of self 'I'? Write about enjoyer as 'I'. [16]

Q.4 Differentiate between -

(a) Intension and Competence [8]

(b) Respect and differentiation [8]

Q.5 Explain harmony in the nature. Define holistic perception of harmony at all levels of existence. [16]

Q.6 Write short notes on - [4×4=16]

(a) Samadhan

(b) Samridhi

(c) Abhay

(d) Samman

Q.7 Define strategy for transition from the present state to universal human order. How professional ethics are important for business. [16]

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1E2404

Roll No. _____ Total No of Pages: 4

1E2404

B. Tech. II - Sem. (Main) Exam., May - 2019

HSMC

2FY1 – 04 Communication Skills

Time: 2 Hours **Maximum Marks: 80**

Instructions to Candidates:

Attempt all five questions from Part A, four questions out of six questions from Part B and two questions out of three from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL 2. NIL

PART – A

(Answer should be given up to 25 words only) **[5×2=10]**

All questions are compulsory

Q.1 Define communication and mention the types of communication.

Q.2 What are the advantages of written communication?

Q.3 What do you mean by 'Linking – words'? Give examples.

Q.4 Where did the writer invite the lady? What kind of restaurant was it?

Q.5 What is the central idea of the poem, "No men Are Foreign" by James Kirkup?

PART – B

(Analytical/Problem solving questions) **[4×10=40]**

Attempt any four questions

Q.1 Attempt any two of following sections – [2×5=10]

(A) Change into Reported speech:-

(i) "Where are you going"? He said to me.

(ii) He says, "I want to be an actor".

(iii) "Are you making a new dish today"? Rahul said to his mother.

(iv) Galileo said, "The earth moves round the sun".

(v) The writer said to me, "I wrote this story in my young age".

(B) Insert suitable Modals:-

(i) You .....reduce your sugar intake. (Suggestion)

(ii) We .....obey our elders. (Moral duty)

(iii) .....you like to join us for dinner. (Polite request)

(iv) You .....leave smoking. (Necessary)

(v) He ran as fast as he ..... (Past ability)

(C) Change into passive:-

(i) Who has painted this picture?

(ii) A stone struck me on the head.

(iii) Without efforts nothing can be gained.

(iv) They discovered all new inventions.

(v) Close all these windows.

(D) Complete the conditional sentences by using suitable verb:-

(i) If it rains, I ..... (wear) a rain coat.

(ii) He would pass the exam, if he ..... (learn) more.

(iii) If they had enough money. They..... (buy) a new car.

(iv) I .....(go) to the party, if you come with me.

(v) If the teacher .....(speak) clearly, he would understand more.

Q.2 Write an application for the post of Junior Engineer in a reputed company with your updated resume with essential details. [5+5=10]

Q.3 What is Interpersonal Communication? How can we improve it in an organization? [5+5=10]

Q.4 What is the significance of the title "How Much Land Does A Man Need"? [5+5=10]

Q.5 What do you understand with formal communication? How does a grapevine communication work? [5+5=10]

Q.6 What is the theme of the poem "If"? Enlist all the advices given by a father to his son to become a perfect man. [5+5=10]

2-2-5

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions) **[2×15=30]**

Attempt any two questions

Q.1 "There never can be perfect communication". Mention the various types of Barriers in effective communication. How can we overcome them? [5+5+5=15]

Q.2 What are the good qualities of communication? Explain the process of communication with Verbal and Non – Verbal communication. [5+10=15]

Q.3 Bring out the emotions and mystery the envelops the story "The Train At Deoli Station". [10+5=15]

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1E2405

Roll No. _____ Total No of Pages: 3

1E2405

B. Tech. II - Sem. (Main) Exam., May - 2019

HSMC

2FY1 – 05 Human Values

Time: 2 Hours **Maximum Marks: 80**

Instructions to Candidates:

Attempt all five questions from Part A, four questions out of six questions from Part B and two questions out of three from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL 2. NIL

PART – A

(Answer should be given up to 25 words only) **[5×2=10]**

All questions are compulsory

Q.1 What is the need for Value Education? [2]

Q.2 Write any three advantages of self-control. [2]

Q.3 Define 'ETHICS'. [2]

Q.4 What is Co-existence? [2]

Q.5 'Happiness is composed by two parts.' Name them. [2]

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PART – B

(Analytical/Problem solving questions) **[4×10=40]**

Attempt any four questions

Q.1 What is self-exploration? Explain the process and mechanism of self-exploration? [5+5=10]

Q.2 What are the four orders in Nature? How does each other participate in harmony in nature? [5+5=10]

Q.3 Describe briefly the criteria for evaluation of holistic technology? Support your answer with an example. [5+5=10]

Q.4 What is Prosperity? What is the difference between prosperity and wealth? [5+5=10]

Q.5 What is the program to fulfill the basic human aspiration? [5+5=10]

Q.6 "Human being is the co-existence of the self and the body." Explain this statement taking yourself as an example. [5+5=10]

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions) **[2×15=30]**

Attempt any two questions

Q.1 What are the programs needed to achieve the comprehensive human goals? List and define briefly. [10+5=15]

Q.2 What is 'Justice'? What are its four elements? Is it a continuous or a temporary need? Explain Justice with the help of diagram. [5+5+5=15]

Q.3 "Existence is Co-existence". Give your opinion. [10+5=15]

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1E2202

Roll No. _____ Total No of Pages: 4

1E2202

B. Tech. II Sem. (Main / Back) Exam., May - 2019

HU – 101 Communications Skills

Time: 3 Hours **Maximum Marks: 80**

Min. Passing Marks: 28

Instructions to Candidates:

*Attempt any **five questions** including Question No. 1, which is compulsory. All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.*

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL 2. NIL

Q.1 Compulsory, Answers for each sub – questions be given in about 25 words. [8×2=16]

(a) Define the term Communication.

(b) What is the difference between Verbal and Non – verbal communication?

(c) What was author's subtle revenge in the end of the story 'The Luncheon'?

(d) Define 'Modals'.

(e) What is the importance of reports?

(f) What is a C.V.?

(g) Describe briefly any two qualities Tagore wants to inculcate in his countrymen.

(h) What are the advantages of town life as listed in the story "How Much Land Does a Man Need"?

Q.2 (a) Write the importance of Written Communication and its advantages. [6]

(b) What were the early modes of Communication? [5]

(c) Explain the cycle of Communication. [5]

Q.3 (a) What are the characteristics of an Effective Communication? [8]

(b) What are the various barriers in effective listening? How can they be overcome? [8]

Q.4 (a) Change the following sentences into Passive Voice - [4]

(i) Piyush had written a novel.

(ii) Help your sister.

(iii) I know the principal of this college.

(iv) He is suspected of selling fake medicines.

(b) Convert these sentences into indirect speech – [4]

(i) John said to Tom, "Will you give me your book"?

(ii) Anita said to her brother, "I had finished my work".

(iii) He said to me, "Let's go to see cricket match".

(iv) My brother said to me, "Please do not disturb me".

(c) Complete the following sentences with conditional sentences - [4]

(i) If you had played well .....

(ii) If you drive without license .....

(iii) If she started earlier .....

(iv) If Ravi had worked hard .....

(d) Fill in the blanks with correct modals - [4]

(i) Rohan ..... pass the examination. (Possibility)

(ii) ..... the Almighty shower his blessing on you. (Wish)

(iii) We ..... obey the laws of our country. (obligation)

(iv) He ..... speak English fluently. (ability)

Q.5 (a) Write a job application to 'The Manager' (Recruitment) Marg construction, B/20, IV Enclave Green Lane Road, New Delhi 110001, for the post of a Project Engineer. Attach your C. V. to the application. [8]

(b) Draft an order letter requesting the supplier of stationary to supply certain items of stationary. [4]

(c) Develop following idea in paragraph.

'Air Pollution is a Health Hazard" [4]

Q.6 (a) Explain the following lines with reference and context. Remember, we who take arms, against each other it is the human earth that we defile. [5]

(b) Elucidate the following lines- [5]

Where the world has not been broken

up into fragments by narrow domestic walls.

Where words come out from [6]

the depth of truth.

Q.7 (a) Locate instances of irony in the story 'The Luncheon'. [5]

(b) Describe how greed ruins Pahom. [5]

(c) Write the summary of the story, "The Night Train at Deoli". [6]

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2E2001

Roll No. _____ Total No of Pages: 3

2E2001

B. Tech. II Sem. (Back) Exam., May - 2019

201 Communication Techniques

Time: 3 Hours **Maximum Marks: 80**

Min. Passing Marks: 26

Instructions to Candidates:

*Attempt any **five questions,** selecting **one question** from **each unit.** All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL 2. NIL

UNIT- I

Q.1 Explain the objectives of communication. [16]

OR

Q.1 Why is downward communication regarded so important? [16]

UNIT- II

Q.2 Write a note on importance of oral communication. [16]

OR

Q.2 Clearly distinguish between the formal and informal channels of communication. [16]

UNIT- III

Q.3 Explain barriers to communication. [16]

OR

Q.3 Discuss in detail interpersonal communication and the ways to improve it. [16]

UNIT- IV

Q.4 Fill in the appropriate conjunctions -

(a) ..... he is rich, he wants to get more money. (though, than, because) [4]

(b) He is neither a gambler ..... a thief. (or, nor, and) [4]

(c) The Principal fined him ..... he had broken the glass door. (although, besides, because) [4]

(d) We should produce more food grain ..... we will starve. (and, otherwise, though) [4]

OR

Q.4 Combine the following sentences –

(a) I have to support my family.

I want to find a job. [4]

(b) She works hard.

She wants to pass the test. [4]

(c) He was betrayed by his partner.

He suffered huge losses. [4]

(d) Winston Churchill was a great politician.

He also won the nobel prize for literature. [4]

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UNIT- V

Q.5 You are B-Tech. A faculty position in a reputed coaching is vacant in your town. Apply for this position with resume. [16]

OR

Q.5 Write a sales letter to a company, promoting a specific featured mobile phone, with your company manufactures. [16]

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1E2407

Roll No. _____ Total No of Pages: 3

1E2407

B. Tech. II - Sem. (Main) Exam., May - 2019

ESC

2FY3 – 07 Basic Mechanical Engineering

Time: 2 Hours **Maximum Marks: 80**

Instructions to Candidates:

Attempt all five questions from Part A, four questions out of six questions from Part B and two questions out of three from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL 2. NIL

PART – A

(Answer should be given up to 25 words only) **[5×2=10]**

All questions are compulsory

Q.1 Explain the isolated system. [2]

Q.2 What is IP & BP in the Internal Combustion Engine? [2]

Q.3 Define the coefficient of performance of Refrigerator. [2]

Q.4 What is pattern in casting process? [2]

Q.5 What is computer aided manufacturing? [2]

PART – B

(Analytical/Problem solving questions) **[4×10=40]**

Attempt any four questions

Q.1 Explain the velocity triangle for single stage impulse turbine. [10]

Q.2 Describe the four stroke Spark – Ignition engine with suitable diagram. [10]

Q.3 Define construction & working of vapour compression refrigeration system with diagrams. [10]

Q.4 A belt is a running over a pulley of diameter 100 cm at 300 rpm. The angle of contact is 150° and coefficient of friction between the belt and pulley is 0.3. If the maximum tension in the belt is 3000N, find the power transmitted by the belt. [10]

Q.5 Explain the various operations of drilling machine with diagrams. [10]

Q.6 Explain the various stages of Heat treatment process. [10]

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions) **[2×15=30]**

Attempt any two questions

Q.1 What is Diesel power plant? Explain Operation, Layout, Requirement and advantage and disadvantage of Diesel power plant. [15]

Q.2 3 kW of power is transmitted by an open belt drive. The linear velocity of the belt is 3 m/s. The angle of lap on the smaller pulley is 150°. The coefficient of friction is 0.3. Determine the effect on power transmission in the following cases – [15]

(a) Initial tension in the belt is increased by 10%.

(b) Initial tension in the belt is decreased by 10%.

(c) Angle of lap is increased by 10% by the use of an idler pulley, for the same speed and the tension on the tight side.

(d) Coefficient of friction is increased by 10% by suitable dressing to the friction surface of the belt.

Q.3 Why testing of an internal combustion engine is required? Explain the various testing parameters briefly. [15]

1E2406

Roll No. _____ Total No of Pages: 3

1E2406

B. Tech. II - Sem. (Main) Exam., May - 2019

ESC

2FY3 – 06 Programming for Problem Solving

Common for all Branches

Time: 2 Hours **Maximum Marks: 80**

Instructions to Candidates:

Attempt all five questions from Part A, four questions out of six questions from Part B and two questions out of three from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL 2. NIL

PART – A

(Answer should be given up to 25 words only) **[5×2=10]**

All questions arc compulsory

Q.1 Writc the difference between compiler and interpreter. [2]

Q.2 What is type casting? [2]

Q.3 Explain primary memory and secondary storage. [2]

Q.4 Write the difference between random access and sequential access method. [2]

Q.5 What is structure? Write syntax of structure declaration. [2]

PART – B

(Analytical/Problem solving questions) **[4×10=4**

Attempt any four questions

Q.1 What is recursion? Write a program to find factorial of a given number usir recursion. [1(

Q.2 Draw a block diagram of basic architecture of a computer system. [1(

Q.3 What do you mean by function? Also explain types of functions available in C. [1(

Q.4 Write a program to find the given number is palindrome or not. [10

Q.5 Write a program to swap two numbers using call by value and call by referenc method. [10

Q.6 Perform the following- [5×2=10

(a) $9387_{(10)} = ?_{(16)}$

(b) $A15C_{(16)} = ?_{(2)}$

(c) $(10101)_2 - (01110)_2$

(d) $(651.24)_{(8)} = ?_{(10)}$

(e) $(111101011)_2 = ?_{(8)}$

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions) **[2×15=30]**

Attempt any two questions

What is array? Explain types of array with suitable example. [15]

What do you understand by file handling? Explain various file handling functions used in C language. [15]

What is looping? Explain types of loop available in C. Also write a program to check the input number is prime or not. [15]

2E2006

Roll No. _____ Total No of Pages: 3

2E2006

B. Tech. II Sem. (Back) Exam., May - 2019

206 Fundamentals of Computer Programming

ne: 3 Hours **Maximum Marks: 80**

Min. Passing Marks: 26

tructions to Candidates:

*Attempt any **five questions,** selecting **one question** from **each unit.** All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

NIL 2. NIL

UNIT- I

1 (a) What are the various operators in C? Discuss each of them with suitable illustration. [10]

(b) Explain the terms variables and constants? How much type of variables and constants are supported in C? [6]

OR

1 (a) Explain various storage classes in C with the help of example. [10]

(b) Write a short note on type casting. [6]

UNIT- II

Q.2 (a) Explain the importance of switch case statement. In which situation is a swit case desirable? Explain the usefulness default statement in switch case stateme with the help of program.

(b) What is array? Why are they needed? Write a C program to enter n elements in array and find second smallest number from an array.

OR

Q.2 (a) What are the similarities and differences between while and do – while loop al give the example of both?

(b) What is structure? Define a structure called book with book name, author nai and price. Write a C program to read the details of book name, author name a price of 200 books in a library and display the total cost of the books and the bo details whose price is above ₹ 500.

UNIT- III

Q.3 (a) What is an array of pointers? How is it different from pointer to an array? Can assign a pointer variable to another pointer variable? Justify your answer with t help of an example.

(b) How do you create an array using dynamic memory allocation? Give example a also list benefits of this scheme.

OR

Q.3 What is a file? Why do we need to store the data in files? Write short note on t following functions. For each function, give a program code that demonstrate usage. [4×4=1

(a) fopen ( )

(b) fclose ( )

(c) fgetc ( )

(d) fputc ( )

UNIT- IV

a) Define function, why are they needed? Differentiate between call by value and call by reference with the help of an example. [8]

b) What is recursive function? Write a C program using recursive function to print n terms of Fibonacci series. [8]

OR

Write a short note on – [8×2=16]

a) Array of structure

b) Void Pointer

UNIT- V

Convert the following numbers from one system to another – [4×4=16]

a) $(123.63)_{10} = (?)_2$

b) $(111.000L)_2 = (?)_{16}$

c) $(AB20\ C.00C)_{16} = (?)_{10}$

d) $(1010.267)_8 = (?)_2$

OR

a) What is pseudo code? How does it differ from flowchart? Draw and explain various symbols of flowchart and also draw the flowchart for finding a greatest among three numbers. [8]

b) Write a short note on – [4×2=8]

(i) Difference between Primary and Secondary Memory.

(ii) Basic organization of a computer with the help of block diagram.

2E2303

Roll No. _____ Total No of Pages: 3

2E2303

B. Tech. II Sem. (Back) Exam., May - 2019

CS – 103 Computer Programming - II

Time: 3 Hours

Maximum Marks: 80
Min. Passing Marks: 28

Instructions to Candidates:

*Attempt any **five questions** including Question No. 1, which is compulsory. All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly. Use of following supporting material is permitted during examination. (Mentioned in form No. 205)*

1. NIL

2. NIL

Q.1 Compulsory, Answers for each sub –question be given in about 25 words.

(a) What do you mean by freeware? [2]

(b) Why loader is used in computer system? [2]

(c) What is difference between application and system software? [2]

(d) What is a difference Size of Array and Index of Array? [2]

(e) What are pointers? [2]

(f) What is dynamic memory allocation? [2]

(g) Explain various file operations. [2]

(h) What is command line argument? [2]

Q.2 What are peripherals? Differentiate input and output devices used in comp system.

Q.3 Explain the following –

(1) Firmware

(2) Open – source

(3) Compiler

(4) Loader

Q.4 (a) How do you create array using dynamic memory allocation? Give example also list benefits of this scheme.

(b) Write a program in C language for swapping two numbers using pointers.

Q.5 (a) What is difference b/w structure and union?

(b) Write a program to define structure with tag state with fields – state name, no districts and total population. Read and display the data.

(c) Define union with example.

Q.6 (a) Write a program to check weather a given character is vowel on not?

(b) What do you mean by function? How many type of functions are available in C?

Write short note on –

1) Macro [4]

2) Malloc and Calloc [4]

3) Multi file handling [4]

4) Inline function [4]

2E2401

Roll No. _____ Total No of Pages: 3

2E2401

B. Tech. II - Sem. (Main) Exam., May - 2019

BSC

2FY2 – 01 Engineering Mathematics - II

me: 3 Hours **Maximum Marks: 160**

structions to Candidates:

Attempt all ten questions from Part A, five questions out of seven questions from Part B and four questions out of five from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

NIL 2. NIL

PART – A

(Answer should be given up to 25 words only) **[10×3=30]**

All questions are compulsory

1 State the rank – nullity theorem.

2 Determine whether the set {(3, 2, 4)}, (1, 0, 2) (1, –1, –1)} of vectors is linearly independent.

3 Write the Bernoulli's equation.

4 Write the Clairaut's equation.

5 Write the Euler – Cauchy equation.

6 If the roots of A.E. are $100 \pm \sqrt{500}$ then C.F. is .....

7 What is the order and degree of the ODE $\frac{d^4y}{dx^4} = \cos\left(\frac{d^3y}{dx^3}\right)$?

Q.8 When is a nonlinear PDE semilinear?

Q.9 What is the homogeneous PDE?

Q.10 Classify the following PDE as to type in the second quadrant of the xy – plane

$$\sqrt{x^2+y^2}\,u_{xx} + 2(x-y)u_{xy} + \sqrt{x^2+y^2}\,u_{yy}$$

PART – B

(Analytical/Problem solving questions) [5×1(

Attempt any five questions

Q.1 Find the rank of the following matrix by reducing it to the normal form:

$$A = \begin{pmatrix} 1 & 2 & 3 & 4 \\ 2 & 1 & 4 & 5 \\ 1 & 5 & 5 & 7 \\ 8 & 1 & 14 & 17 \end{pmatrix}$$

Q.2 Solve the differential equation –

$$(3x^2y^3e^y + y^3 + y^2)dx + (x^3y^3e^y - xy)dy = 0$$

Q.3 Solve: $p^2 + 2py \cot x = y^2$, where $p = \frac{dy}{dx}$.

Q.4 Solve: $(D^3+1)y = (e^x + 1)^2$, where $D \equiv \frac{d}{dx}$.

Q.5 Solve: $D^2x + m^2y = 0$; $D^2y - m^2x = 0$, where $D \equiv \frac{d}{dt}$.

Q.6 Find the general solution of the partial differential equation-

$$xy^2p + y^3q = (zxy^2 - 4x^3)$$

Q.7 Solve: $z^2(p^2 + q^2) = x^2 + y^2$

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions) [4×2(

Attempt any four questions

Q.1 Examine whether the following matrix A is diagonalizable. If so, obtain the r P such that $P^{-1}AP$ is a diagonal matrix.

$$A = \begin{pmatrix} -2 & 2 & -3 \\ 2 & 1 & -6 \\ -1 & -2 & 0 \end{pmatrix}$$

Solve by the method of variation of parameters:

$$x^2\frac{d^2y}{dx^2} - 2x(1+x)\frac{dy}{dx} + 2(1+x)y = x^3$$

Solve in series:

$$x\frac{d^2y}{dx^2} + \frac{dy}{dx} + xy = 0$$

Find the complete integral of the partial differential equation:

$$px + qy + z = xq^2$$

Use the method of separation of variables to solve the following PDE:

$\frac{\partial^2 z}{\partial x^2} = \frac{1}{k}\frac{\partial z}{\partial t}$, where $z = z(x, t)$ with the conditions $z(0, t) - z(1, t) = 0$ for all t.

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2E2002

Roll No. _____ Total No of Pages: 3

2E2002

B. Tech. II Sem. (Main/Back) Exam., May - 2019

202 Engineering Mathematics - II

Time: 3 Hours **Maximum Marks: 80**

Min. Passing Marks: 26

Instructions to Candidates:

*Attempt any **five questions,** selecting **one question** from **each unit.** All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL 2. NIL

UNIT- I

Q.1 (a) A sphere of constant radius k passes through the origin and meets the axes in A, B, C. Prove that the locus of the centroid of the triangle ABC is $9(x^2 + y^2 + z^2) = 4k^2$. [8]

(b) Find the equation of the sphere which touches the plane $3x + 2y - z + 2 = 0$ at the point $(1, -2, 1)$ and cuts the sphere $x^2 + y^2 + z^2 - 4x + 6y + 4 = 0$ orthogonally. [8]

OR

Q.1 (a) Find the equation of right circular cone generated by straight line drawn from the origin and cut the circle through the three point (1, 2, 2) (2, 1, –2) and (2, –2, 1). [8]

(b) Find the equation of right circular cylinder whose guiding circle is $x^2 + y^2 + z^2 = 9$, $x - 2y + 2z = 3$. [8]

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UNIT- II

Q.2 (a) Find the rank of the following matrix by reducing it to normal form - [8]

$$\begin{bmatrix} 2 & 3 & -1 & -1 \\ 1 & -1 & -2 & -4 \\ 3 & 1 & 3 & -2 \\ 6 & 3 & 0 & 7 \end{bmatrix}$$

(b) State Cayley-Hamilton Theorem, verify it for the following matrix: [8]

$$\begin{bmatrix} 2 & 1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$$

OR

Q.2 (a) Examine the consistency of the following equation and solve them if they are consistent. [8]

$x + y + z = 6,\ 2x + y + 3z = 13,\ 5x + 2y + z = 12,\ 2x - 3y - 2z = -10$

(b) Find the Eigen value and Eigen vectors of the following matrix. [8]

$$\begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$$

UNIT- III

Q.3 (a) A particle moves along the curve $x = t^3 + 1$, $y = t^2$, $z = 2t + 5$, where t is the time. Find the components of its velocity and acceleration at $t = 1$ in the direction of $(\hat{i} + \hat{j} + \hat{k})$. [8]

(b) (i) If $\vec{A}$ is a vector point function and ϕ is a scalar point function, prove that [4]

$$\nabla.(\phi\vec{A}) = \nabla\phi.\vec{A} + \phi(\nabla.\vec{A})$$

(ii) A fluid motion is given by – [4]

$$\vec{A} = (y + z)\hat{i} + (z + x)\hat{j} + (x + y)\hat{k}$$

Is this motion irrotational? If so, find the Velocity Potential.

2.53

OR

Q.3 (a) Prove that – [8]

$$\nabla \times \left(\frac{\vec{r}\times\vec{a}}{r^3}\right) = \frac{\vec{a}}{r^3} - \frac{3}{r^5}(\vec{r}.\vec{a})\vec{r}$$

(b) $\iint_S \vec{F}.\hat{n}\, ds$, where $\vec{F} = (x + y^2)\hat{i} - 2x\hat{j} + 2yz\hat{k}$ and s is the surface of the plane $2x + y + 2z = 6$ in the first octant. [8]

UNIT- IV

Q.4 (a) Verify Stokes theorem for $(x^2 + y^2)\hat{i} - 2xy\hat{j}$ taken round the rectangular region bounded by $x = \pm a, y = 0, y = b$ [8]

(b) Verify Gauss divergence theorem for the functions $\vec{F} = y\hat{i} + x\hat{j} + z^2\hat{k}$ over the cylindrical region bounded by $x^2 + y^2 = 9, z = 0$ and $z = 2$. [8]

OR

Q.4 (a) Find the Fourier series for $f(x) = x + x^2, -\pi < x < \pi$. Hence show that $\frac{\pi^2}{6} = 1 + \frac{1}{2^2} + \frac{1}{3^2} + \ldots\ldots\ldots\ldots$ [8]

(b) Obtain the expansion for y from the following table up to the first Harmonic. [8]

x	0	1	2	3	4	5
y	9	18	24	28	26	20

UNIT- V

Q.5 (a) Solve in series – [8]

$$x\frac{d^2y}{dx^2} + \frac{dy}{dx} + xy = 0$$

(b) Solve –

(i) $(y^2 + z^2 - x^2)\, p - 2xy\, q = -2xz$ [4]

(ii) $(p^2 + q^2) = x + y$ [4]

OR

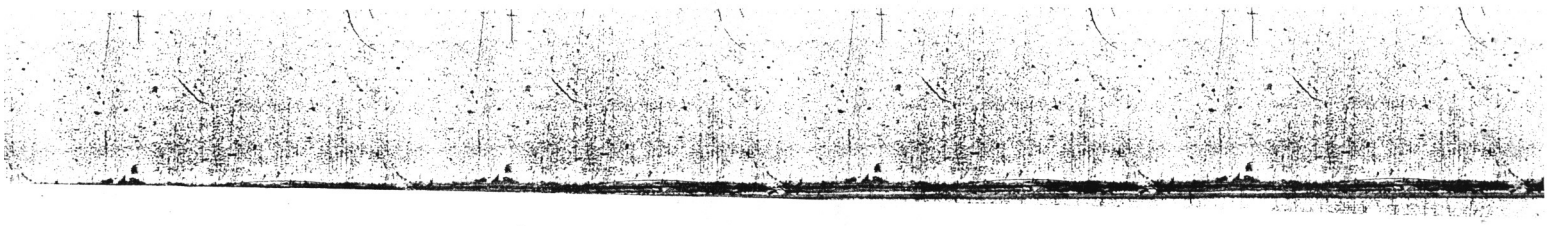
Q.5 (a) Solve - [8]

$(x^2 + y^2)\,(p^2 + q^2) = 1$

(b) Find the complete integral of : [8]

$$(p + q)\,(px + qy) = 1$$

by using charpit's method.



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2E2301

Roll No. _____ Total No of Pages: 3

2E2301

B. Tech. II Sem. (Main/Back) Exam., May - 2019

MA – 102 Engineering Mathematics - II

Time: 3 Hours **Maximum Marks: 80**

Min. Passing Marks: 28

Instructions to Candidates:

*Attempt any **five questions** including Question No. 1, which is compulsory. All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL 2. NIL

Q.1 Compulsory, Answer for each sub-question be given in about 25 words –

(a) Suppose a matrix A has rank 5 and we find a matrix B after applying elementary column operations on A. What will be the rank of B? [2]

(b) A 3×3 matrix has Eigen values 2, 3, 4, then find the Eigen values of adj (A). [2]

(c) Define periodic functions. [2]

(d) Write Dirichlet's conditions for Fourier series. [2]

(e) Identify the functions p (t) and q (t) if the differential equation - [2]

$$\frac{dx}{dt} = \frac{x+t^2-2x\sqrt{t}}{t}$$

is written in the form dx / dt + p (t) x = q (t).

(f) Find solution of the initial value problem $y'^2 + y^2 = 0$, y (0) = 5. [2]

(g) What is the difference between Complete solution and General solution of a partial differential equation? [2]

(h) Write the general linear partial differential equation of first order having two independent variables and one dependent variable. [2]

Q.2 (a) If A be a 3×3 matrix with real entries whose eigenvalues are 1, -1, 2. [8]

Suppose that for $\alpha, \beta, \gamma \in R$

$$\alpha A^{-1} = -A^2 + \beta A + \gamma I$$

where I is the 3×3 identity matrix, then find values α, β, γ.

(b) Obtain the Fourier series for the function $f(x) = x^2$, $-\pi < x < \pi$. Hence show that

$$\frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} + \cdots = \frac{\pi^2}{6}.$$ [8]

Q.3 (a) If $f(x) = \begin{cases} x, & 0 < x < \pi/2 \\ \pi - x, & \frac{\pi}{2} < x < \pi \end{cases}$ [8]

Then find half range sine series.

(b) Solve :

(i) $(xy \sin xy + \cos xy)\, y\, dx + (xy \sin xy - \cos xy)\, x\, dy = 0$

(ii) $(x + 2y^2)\, (dy/dx) = y$ [8]

Q.4 (a) Solve the following system of equations : [8]

$27x + 6y - z = 85$

$6x + 15y + 2z = 72$

$x + y + 54z = 110$

(b) Solve : [8]

$(D^2 - 2D + 1)y = xe^x \sin x.$

Q.5 (a) Apply the method of variation of parameters to solve [8]

$$\frac{d^2y}{dx^2} + 2\frac{dy}{dx} + y = e^{-x} \log x.$$

(b) Apply Charpit's method to find complete integral of [8]

$z^2 (p^2 z^2 + q^2) = 1.$

Q.6 (a) Solve [8]

$$\frac{d^2y}{dx^2} - (2 \tan x)\frac{dy}{dx} + 5y = (\sec x)\, e^x.$$

(b) Find the Eigen values and the corresponding Eigen vectors of the matrix [8]

$$A = \begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$$

Q.7 (a) Using harmonic analysis, obtain the first three terms in the Fourier series expansion of y, as given below : [8]

x	0	1	2	3	4	5
y	9	18	24	28	26	20

(b) Determine the values of k such that the rank of matrix A is 3, where [8]

$$A = \begin{bmatrix} 1 & 1 & -1 & 0 \\ 4 & 4 & -3 & 1 \\ k & 2 & 2 & 2 \\ 9 & 9 & k & 3 \end{bmatrix}$$
