21506

Roll No. _____ Total No of Pages: 3

21506

B. Tech. II Sem. (Main) / B. Tech. I Sem. (Back)
Exam., May - 2019
ESC
2FY3 – 06 / 1FY3 – 06 Programming for Problem Solving

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

Instructions to Candidates:

Part – A: *Short answer questions (up to 25 words) 5 × 2 marks = 10 marks. All five questions are compulsory.*

Part – B: *Analytical/Problem solving questions 4 × 10 marks = 40 marks. Candidates have to answer four questions out of six.*

Part – C: *Descriptive/Analytical/Problem Solving questions 2 × 15 marks = 30 marks. Candidates have to answer two questions out of three.*

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

PART - A

Q.1 What is difference between constant and variable? [2]

Q.2 Convert $(9896)_{10} = (?)_{16}$ [2]

Q.3 Write the notations of flow chart. [2]

Q.4 Perform $(10101)_2 - (01110)_2$ [2]

Q.5 Find the output of following program with valid reason. [2]

```
# include < stdio. h >
Void main ( )
{
Static int var = 5 ;
Print f ("% d", var – –) ;
if (var)
    main ( ) ;
}
```

PART – B

Q.1 What is Pointer? Explain array of pointers. [10]

Q.2 Write a program in 'C' and make a flowchart to find maximum number among 3 numbers. [10]

Q.3 What are data types in 'C'? Explain with examples. [10]

Q.4 Write r's complement of following numbers, where r is radix (base) of those numbers. [10]

(a) $(10111010)_2$

(b) $(34056)_8$

(c) $(8750)_{10}$

(d) $(7f\ 3B)_{16}$

Q.5 Contrast between Parameter Passing in a function, 'By valve' and 'By Reference'? [10]

Q.6 What do you mean by storage devices? Explain the concepts of high level, Assembly and low level languages. [10]

PART – C

Q.1 Write a program in 'C' to read contents of a file and display them in upper case. [15]

Q.2 What do you mean by random, direct and sequential access methods? Explain stored program architecture of computers. [15]

Q.3 What is array and it's types? Explain array of structures with the help of suitable program also describe structure within structure with an example. [15]

21503

tRoll No

Total No of Pages: 4

21503

B. Tech. II Sem. (Main) / B. Tech. I Sem. (Back)
Exam., May - 2019
BSC
2FY2-03 / 1FY2-03 Engineering Chemistry

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

Instructions to Candidates:

Part – A: *Short answer questions (up to 25 words) 10 × 3 marks = 30 marks. All ten questions are compulsory.*

Part – B: *Analytical/Problem solving questions 5 × 10 marks = 50 marks. Candidates have to answer five questions out of seven.*

Part – C: *Descriptive/Analytical/Problem Solving questions 4 × 20 marks = 80 marks. Candidates have to answer four questions out of five.*

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

Q.1 Draw the structure of Paracetamol. [3]

Q.2 Give the chemical reaction of propene and HBr. [3]

Q.3 Why broken pieces of glass are mixed in the raw materials of Tank Furnace? [3]

Q.4 Define the Term Viscosity Index. [3]

Q.5 What is Octane Number? [3]

Q.6 Calculate the hardness of water sample containing 33.3mg of $CaCl_2$ in 300ml volume. [3]

Q.7 Give any two differences between sludge and scale. [3]

Q.8 Galvanization of Food Packaging Articles is not done. Why? [3]

Q.9 Justify the role of adding $CaSO_4.2H_2O$ in the cement. [3]

Q.10 Give the Dulong's formula to calculate the calorific value of a fuel. [3]

PART – B

Q.1 Explain the manufacturing of Coke by Beehive coke oven method. [10]

Q.2 Explain the Deionization process of water by Ion-Exchange process. [10]

Q.3 Write short notes on- [5+5=10]

(a) Cloud and Pour-Point

(b) Borosilicate Glass

Q.4 Describe knocking in Internal Combustion Engine. [10]

Q.5 Write a note on Setting and Hardening of cement. [10]

Q.6 Compare Galvanizing and Tinning methods to prevent corrosion. [10]

Q.7 Explain the SN^2 Mechanism for Nucleophilic Substitution Reactions in Halo-Alkanes. [10]

PART - C

Q.1 (a) Explain the determination of calorific value of a gaseous fuel with the help of Junker's Calorimeter with suitable diagram. [12+8=20]

(b) 2.5g of a sample of coal was analyzed for content of Moisture, Volatile Matter and Ash. From the following data, calculate above quantities. Mass of coal after heating at 110°C = 2.365g.

Mass of coal after heating covered crucible at 950°C = 1.165g.

Constant Mass obtained at the end of experiment = 0.460g.

Q.2 Explain the manufacturing of cement by Rotary Kiln Technology with suitable diagram and chemical reactions. [8+6+6=20]

Q.3 Describe the softening of hard water by lime soda process in following sub-parts- [20]

(a) Chemical Reactions with lime and/or soda.

(b) Labelled diagram of hot lime soda process.

(c) Formula to calculate lime requirement and soda requirement.

Q.4 (a) Discuss the Rearrangement Reactions in organic compounds with suitable examples. [10+10=20]

(b) Discuss the formation, structure and geometry of carbocation's with any two reactions in which these are formed.

Q.5 Write Notes on the following- [5×4=20]

(a) Cathodic Protection Method

(b) Pitting Corrosion.

(c) Extreme Pressure Lubrication

(d) Red Wood Viscometer

21502

Roll No. _____ Total No of Pages: 4

21502
B. Tech. II Sem. (Main) / B. Tech. I Sem. (Back)
Exam., May - 2019
BSC
2FY2-02 / 1FY2-02 Engineering Physics

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

Instructions to Candidates:

Part – A: *Short answer questions (up to 25 words) 10 × 3 marks = 30 marks. All ten questions are compulsory.*

Part – B: *Analytical/Problem solving questions 5 × 10 marks = 50 marks. Candidates have to answer five questions out of seven.*

Part – C: *Descriptive/Analytical/Problem Solving questions 4 × 20 marks = 80 marks. Candidates have to answer four questions out of five.*

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

Q.1 What is the role of compensating plate in Michelson's experiment? [3]

Q.2 Find the possible maximum numbers of orders observable with grating. [3]

Q.3 What is the De – Broglie's Hypothesis? [3]

Q.4 How will you explain orthogonal wave functions? [3]

Q.5 Light of wavelength 4800Å has a length of 25 waves. What is the coherent time? [3]

Q.6 What are essential requirements to produce a laser? [3]

Q.7 Explain the effect of temperature on Fermi – Dirac distribution function. [3]

Q.8 Distinguish between covalent and metallic bonds. [3]

Q.9 State Gauss's divergence and Stokes' theorem. [3]

Q.10 Explain the displacement current. [3]

PART – B

Q.1 What will be effect on Newton's rings if –

(a) The Plano convex lens is raised by height h from the surface of plane glass plate. [5]

(b) A Plano convex lens of small radius of curvature is used. [5]

Q.2 A set of 10 parallel equidistant slits of width 0.50 cm and opaque space 1.4 cm are used to study Fraunhofer diffraction of wavelength 0.60 cm falling normally on the planes of slits. Calculate –

(a) Angular positions and half width of first maxima. [5]

(b) The effect of covering up alternative slits on angular position and half width of first maxima. [5]

Q.3 The wave function of a certain particle is $\Psi = A\cos^2 x$ for $-\frac{\pi}{2} < x < \frac{\pi}{2}$ [5+5=10]

(a) Find the value of A

(b) Find the probability that the particle be found between $x = 0$ and $x = \frac{\pi}{4}$

Q.4 Calculate the coherence time and coherence length of white light of wavelength range from 3500Å to 6500Å. [5+5=10]

Q.5 In He – Ne laser, what is the function of the He atoms? Explain the answer with the help of energy level diagram for He – Ne laser. Describe with a neat sketch the working of He – Ne laser. [2+3+5=10]

Q.6 What is Hall Effect? Obtain the expression for Hall coefficient, Hall voltage and Hall mobility. [2+4+2+2=10]

Q.7 The electric field intensity of EM wave in free space is given by [10]

$$\vec{E} = E_0 \cos w\left(t - \frac{2}{v}\right) \hat{a}y$$

Determine the magnetic field intensity.

PART – C

Q.1 What is the plane transmission grating? Show that the intensity of light diffracted from a plane transmission grating is given by - [4+12+4=20]

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

Symbols carry their usual meanings. Find the possible maximum numbers of orders observable with a grating.

Q.2 Derive time independent Schrodinger equation for a free particle. Find the eigen values and eigen functions of a particle confined in one dimensional box of size a. [10+5+5=20]

Q.3 What do mean by Numerical aperture of an optical fibre? Find the expression for the Numerical aperture of a step index fibre. Discuss the use of optical fibre in : [4+8+4+4=20]

(a) Fibro scope

(b) Optical gyroscope

Q.4 Explain energy band theory of crystals. On its basis bring out the difference between insulators, semiconductors and metals. The electron and hole concentrations in a sample of semiconductor are $5\times10^{19}/m^3$ and $8\times10^{20}/m^3$ respectively. If the mobility of electron and hole are 0.09 $m^2v^{-1}s^{-1}$ and 0.05 $m^2v^{-1}s^{-1}$ respectively, then calculate the hall coefficient of the semiconductor. [6+8+6=20]

Q.5 Derive all four Maxwell's equations for electromagnetics. Write a short note on propagation of electromagnetic wave in free space. [12+8=20]

21501

Roll No.

Total No of Pages: 4

21501

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

BSC

2FY2-01 Engineering Mathematics - II

Time: 3 Hours

Maximum Marks: 160

Instructions to Candidates:

Part – A: *Short answer questions (up to 25 words) 10 ×3 marks = 30 marks. All ten questions are compulsory.*

Part – B: *Analytical/Problem solving questions 5 ×10 marks = 50 marks. Candidates have to answer five questions out of seven.*

Part – C: *Descriptive/Analytical/Problem Solving questions 4 ×20 marks = 80 marks. Candidates have to answer four questions out of five.*

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

Q.1 State rank nullity theorem. [3]

Q.2 Determine a, b and c so that A is orthogonal matrix, where – [3]

$$A = \begin{bmatrix} 0 & 2b & c \\ a & b & -c \\ a & -b & c \end{bmatrix}$$

Q.3 Find the integrating factor (I.F.) of differential equation – [3]

$$(x + 2y^3)\, dy = y\, dx$$

Q.4 Write the Clairaut's form of differential equation and solve – [3]

$$\sin px \cos y = \cos px \sin y + p$$

Q.5 Find the solution of differential equation – [3]

$$\frac{d^4y}{dx^4} + y = 0$$

Q.6 Write the Legendre and Bessel differential equations. [3]

Q.7 Form the partial differential equation by elimination of constants a and b from the equation $z = ax + a^2y^2 + b$ [3]

Q.8 Solve the partial differential equation – [3]

$$y - p = (x - q^2)$$

Q.9 Classify the second order partial differential equation – [3]

$$4\frac{\partial^2 u}{\partial x^2} - 16\frac{\partial^2 u}{\partial x\, \partial y} + 9\frac{\partial^2 u}{\partial y^2} = 0$$

Q.10 Write the one dimensional heat and wave equations. [3]

PART – B

Q.1 Reduce the matrix – [10]

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

in its normal form and hence find its rank.

Q.2 Verify Cayley – Hamilton theorem for the matrix – [10]

$$A = \begin{bmatrix} 2 & 1 & 1 \\ 0 & 1 & 0 \\ 1 & 1 & 2 \end{bmatrix}$$

Hence, find A^{-1}.

Q.3 Solve: $y = 3px + 6p^2y^2$, where $p = dy/dx$ [10]

Q.4 Solve : $\frac{dx}{dt} - 7x + y = 0$, [10]

$$\frac{dy}{dt} - 2x - 5y = 0$$

Q.5 Solve the differential equation by changing the independent variable – [10]

$$\cos x \frac{d^2y}{dx^2} + \sin x \frac{dy}{dx} - 2y \cos^3 x = 2 \cos^5 x$$

Q.6 Solve the differential equation using Lagrange method – [10]

$$(y^2 + z^2 - x^2)\, p - 2xyq + 2xz = 0$$

Q.7 Solve $\frac{\partial^2 u}{\partial x^2} = \frac{\partial u}{\partial y} + 2u$

by method of separation of variables.

PART – C

Q.1 Find the Eigen values and Eigen vectors of the matrix $A = \begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$ [20]

Also, find the matrix which transforms the matrix A to a diagonal form.

Q.2 Solve the differential equation – [20]

$$(3x + 2y^2)\, y\, dx + 2x\,(2x + 3y^2)\, dy = 0$$

Q.3 Solve : $x^2 \frac{d^2y}{dx^2} + x\frac{dy}{dx} - y = x^2 e^x$ by the method of Variation of parameters. [20]

Q.4 Find the complete integral of $(p^2 + q^2)\, y = qz$ using Charpit's method. [20]

Q.5 Find the solution of one – dimensional wave equation by method of separation of variables. [20]

21504

Roll No. _____ Total No of Pages: 4

21504
B. Tech. II Sem. (Main) / B. Tech. I Sem. (Back)
Exam., May - 2019
HMSC
2FY1-04 / 1FY1-04 Communication Skills

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

Instructions to Candidates:

Part – A: *Short answer questions (up to 25 words) 5 × 2 marks = 10 marks. All five questions are compulsory.*

Part – B: *Analytical/Problem solving questions 4 × 10 marks = 40 marks. Candidates have to answer four questions out of six.*

Part – C: *Descriptive/Analytical/Problem Solving questions 2 × 15 marks = 30 marks. Candidates have to answer two questions out of three.*

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

PART - A

Q.1 What is the importance of 'feedback' in the cycle of communication? [2]

Q.2 What is report? [2]

Q.3 What was the feeling of the narrator at the end of the story 'The Night Train at Deoli'. [2]

Q.4 What is Rabindra Nath Tagore's concept of true freedom in the poem 'Where the mind is without fear'? [2]

Q.5 Give two uses of 'can' modal verb with example. [2]

PART – B

Q.1 'Whether the organisation is small or large, it is communication that binds the organisation'. In the light of above statement, discuss in detail formal channel of communication. [10]

Q.2 Describe the process of communication in detail. Draw the communication cycle to support your answer. [7+3=10]

Q.3 Do as directed – [1×10=10]

(1) Do yoga daily. (Make Passive)

(2) You must not drop litter on the street. (Make passive)

(3) All trust an honest man. (Make Passive)

(4) If you eat junk food daily..... (Complete the conditional)

(5) If I had not wasted my time on internet ..... (Complete the conditional)

(6) If I were a bird ..... (Complete the conditional)

(7) She said to me, "What will you do after B.Tech?" (Change speech)

(8) The teacher said to the student, "Be on time." (Change speech)

(9) He is slow. He is sure. (Join with conjunction)

(10) I am getting good grades ..... I study every day. (Fill conjunction)

Q.4 Draft a job application letter with C.V. in response to the following advertisement :

"Vacancy existing for the post of Assistant Manager in Mumbai Engineering Works Limited, Mumbai. Minimum qualification is B.Tech from a recognized institute. The candidate must have excellent communication skills. Application should be addressed to chief executive officer".

Q.5 'Greed is the root of all evils'. Justify on the basis of the story "How much land does a man need?" by Leo Tolstoy. [10]

Q.6 Write the critical summary of the poem 'No Men are foreign'. [10]

PART – C

Q.1 Explain in detail – [7.5×2=15]

(a) Qualities of effective communication

(b) Non – verbal communication

Q.2 Write a paragraph on any one of the following : [15]

(a) Benefits of early rising

(b) Human values : A necessary part of curriculum

(c) Importance of Time Management for students

Q.3 'The poem 'If' by Rudyard Kipling is an advice by a father to his son.' What are the instructions given by the poet to become a perfect man? [15]

21507

Roll No. _____ Total No of Pages: 4

21507

B. Tech. II Sem. (Main) / B. Tech. I Sem. (Back)

Exam., May - 2019

ESC

2FY3-07 / 1FY3-07 Basic Mechanical Engineering

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

Instructions to Candidates:

Part – A: *Short answer questions (up to 25 words) 5 × 2 marks = 10 marks. All five questions are compulsory.*

Part – B: *Analytical/Problem solving questions 4 × 10 marks = 40 marks. Candidates have to answer four questions out of six.*

Part – C: *Descriptive/Analytical/Problem Solving questions 2 × 15 marks = 30 marks. Candidates have to answer two questions out of three.*

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

PART - A

Q.1 Explain Zeroth law of thermodynamics. [2]

Q.2 Discuss difference between two and four stroke engine. [2]

Q.3 Explain Principle of arc welding with diagram. [2]

Q.4 Discuss difference between water tube and fire tube boilers. [2]

Q.5 How cast iron differs from steel? [2]

PART – B

Q.1 What is a steam turbine? Explain the working principle of turbine with neat sketch. [10]

Q.2 What is an Internal Combustion engine? Give the classification of IC Engine and working also. [10]

Q.3 Explain the following terms : [10]

(i) Ton of refrigeration

(ii) Coefficient of performance

(iii) Relative humidity

(iv) Function of evaporator in refrigeration

(v) Refrigerant

Q.4 Derive the expression for the length of belt for an open belt drive. [10]

Q.5 What are patterns? Name the various patterns. Explain the various pattern allowances. [10]

Q.6 Draw the diagram showing general classification of welding processes. Describe the principle of oxy-acetylene gas welding and mention its applications. [10]

PART – C

Q.1 (a) Following particulars refer to a petrol engine working on the Otto four cycle principle: [10]

Diameter of cylinder = 8.0 cm

Stroke (s) = 11.0 cm

Clearance volume = 80 cm^3

I.H.P = 28.0 (20.59 kW)

Petrol consumption = 5.5 kg/hr

Calorific volume of fuel = 10,500 kcal/kg (43961.4 kJ/kg)

Calculate :

(a) Actual thermal efficiency

(b) Air standard efficiency

(c) Relative efficiency

(b) Compare SI and CI engine. [5]

Q.2 Explain the following manufacturing process in detail: [5×3=15]

(i) Green sand molding

(ii) Soldering and brazing

(iii) Forging

(iv) Drawing

(v) Extrusion

Q.3 (a) Two pulleys, one 450 mm diameter and other 200 mm diameter are on parallel shafts 2.00 m apart and are connected by a crossed belt. Find the length of the belt required. What power can be transmitted by the belt when larger pulley rotates at 200 rpm, if the maximum permissible tension in the belt is 100 kg, and the co-efficient of friction between the belt and pulley is 0.25. [10]

(b) Explain the various types of engineering materials and their classification. [5]

21508

Roll No. _____ Total No of Pages: 4

21508

B. Tech. II Sem. (Main) / B. Tech. I Sem. (Back)
Exam., May - 2019
ESC
2FY3-08 / 1FY3-08 Basic Electrical Engineering

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

Instructions to Candidates:

Part – A: *Short answer questions (up to 25 words) 5 ×2 marks = 10 marks. All five questions are compulsory.*

Part – B: *Analytical/Problem solving questions 4 ×10 marks = 40 marks. Candidates have to answer four questions out of six.*

Part – C: *Descriptive/Analytical/Problem Solving questions 2 ×15 marks = 30 marks. Candidates have to answer two questions out of three.*

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

PART - A

Q.1 Write the condition for maximum power transfer to load. [2]

Q.2 What is the phase-difference between $v_1(t)$ and $v_2(t)$, given as follows? [2]

$$v_{1\,(t)} = 220\sqrt{2}\sin(314t)$$

$$v_{2\,(t)} = 220\sqrt{2}\cos(314t + 20°)$$

Q.3 What are the difference between the ideal transformer and practical (real) transformer? [2]

Q.4 What is slip in an induction motor? [2]

Q.5 What is the difference between holding current and latching current in SCR? [2]

PART – B

Q.1 Determine the current in the 14Ω resistance in the circuit shown in fig. 1 using Thevenin's theorem. [10]

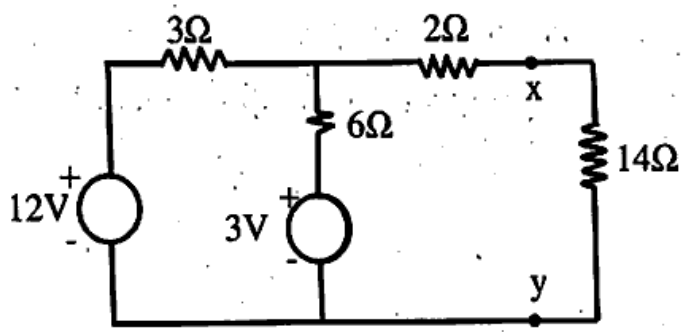

fig.1

Q.2 In the circuit shown in fig.2 below, find the total impedance, current I and voltage across each element. [10]

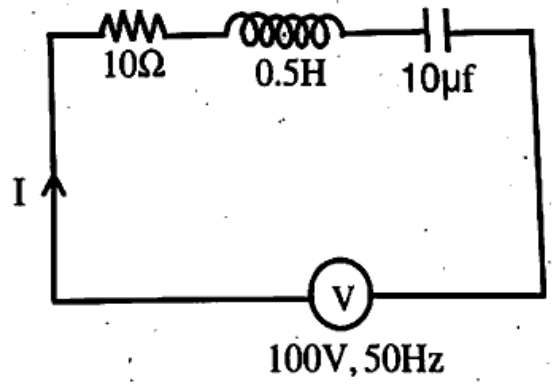

fig.2

Q.3 Draw and explain the phasor-diagram of an ideal transformer at No-load and On-load. [10]

Q.4 Describe the torque-slip characteristics of an induction motor. [10]

Q.5 Describe the characteristics of silicon controlled Rectifier (SCR) [10]

Q.6 What are the functions of earthing? Explain any one type of earthing in detail. [10]

PART – C

Q.1 (a) Find the current in 2Ω resister in the circuit shown in fig.3 using nodal analysis. [9]

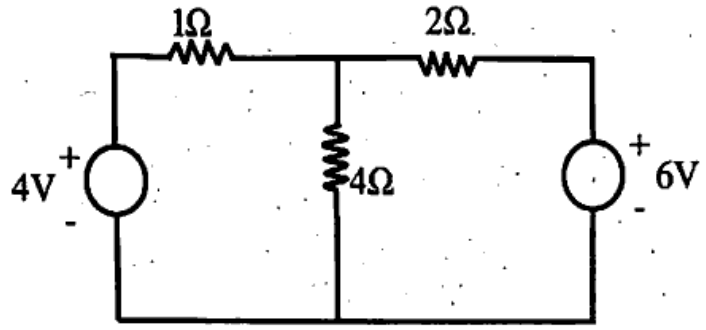

fig.3

(b) Derive the e.m.f. equation of transformer. [6]

Q.2 (a) Find the average value of voltage, v(t)| shown in fig.4 below. Using integration of one-cycle. [9]

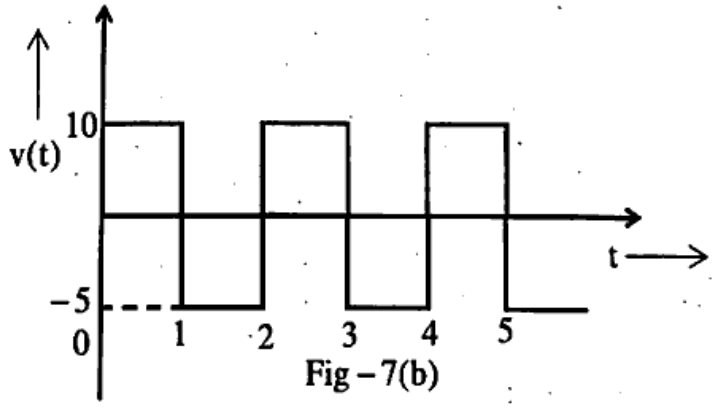

Fig – 7(b)

(b) A three-phase 6-pole induction motor runs by a voltage of 50Hz with the speed of 960rpm. Calculate the slip of the motor and frequency of rotor current. [6]

Q.3 (a) Describe the two-wattmeter method for the measurement of three-phase active power and power factor of the load. [9]

(b) Write a short-note on DC-DC converter. [6]
