



Programme: B.Sc.(CS)

Branch/Specialisation: Computer Science

Enrollment No.....

Faculty of Science

End Sem (Even) Examination May-2018

BC3CO16 Physics-IV

Duration: 3 Hrs.

Maximum Marks: 60

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d.

- Q.1 i. The force on a charge q placed in a uniform electric field E will be : **1**
 (a) E/q (b) qE (c) E (d) q/E
- ii. The dipole moment of a dipole formed due to charges $-q$ and $+q$ separated by a distance l is : **1**
 (a) $2ql$ (b) ql (c) $ql/2$ (d) $2q/l$
- iii. Magnetic field is never produced by: **1**
 (a) A uniformly moving charge (b) A static charge
 (c) An accelerated charge (d) A decelerated charge
- iv. An electron moving towards the east enters a magnetic field directed towards the north. The force on the electron will be directed: **1**
 (a) Vertically upward (b) Vertically downward
 (c) Towards the west (d) Towards the south
- v. Kirchoff's law is based on: **1**
 (a) Conservation of charge (b) Conservation of mass
 (c) Conservation of current (d) Conservation of momentum
- vi. The time constant of L-R circuit is: **1**
 (a) L/R (b) R/L (c) RL (d) $1/RL$
- vii. Kinetic energy of an electron accelerated to a potential difference of 1000 V will be: **1**
 (a) 1000 J (b) 0.001 J (c) 1.6×10^{-16} J (d) 9.1×10^{-26} J
- viii. When a charge particle moves normally in a magnetic field, the force acting on the particle makes it to move along a path which is a: **1**
 (a) Helix (b) Straight line (c) Circle (d) Parabola

- ix. Henry is a unit of: **1**
 (a) Capacity (b) Magnetic field (c) Magnetic flux (d) Inductance
- x. On passing 4 A current in a coil of 50 mH, the energy stored will be: **1**
 (a) 0.4 J (b) 4 J (c) 0.8 J (d) 0.04 J

- Q.2 i. What is Gauss law? **2**
 ii. Show that $\mathbf{E} = -\text{grad } V$ **3**
 iii. Deduce expression for intensity of electric field due to uniformly conducting spherical shell at a point situated **5**
 (a) Outside (b) On the surface and (c) Inside it.

- OR iv. State Clausius-Mossotti equation and derive it **5**

- Q.3 i. State Biot Savart law in vector form. **2**
 ii. What is gyromagnetic ratio? Show that the ratio of magnetic moment to its angular momentum due to rotation of a uniformly charged body is equal to $q/2m$. **8**

- OR iii. Prove that $\text{curl } \mathbf{B} = \mu_0 \mathbf{J}$ **8**

- Q.4 i. State and explain Kirchoff's laws of electrical network **3**
 ii. Establish equation for the growth of the current in a circuit containing a resistance and inductance and solve it. Explain time constant of the circuit and find its value. **7**

- OR iii. Compare between the series and parallel resonant circuit **7**

- Q.5 i. Explain Linear particle accelerator. **4**
 ii. Describe the construction and working of CRO with proper diagram. State few uses of it. **6**

- OR iii. Explain the construction and working of cyclotron. Obtain expression for the maximum kinetic energy. Also discuss its limitations **6**

- Q.6 Attempt any two: **5**
 i. Explain construction and working of transformers. What are the causes of loss of energy in a transformer? How are they minimised. **5**
 ii. What is pointing vector? Explain its significance **5**
 iii. Derive Maxwell equations. **5**

P.T.O.

Marking Scheme BC3CO16 Physics-IV

Q.1	i. The force on a charge q placed in a uniform electric field E will be : (b) qE	1	OR	(i) Out Side	2 marks
	ii. The dipole moment of a dipole formed due to charges $-q$ and $+q$ separated by a distance l is : (a) $2ql$	1		(ii) On the surface	1 marks
	iii. Magnetic field is never produced by: (b) A static charge	1		(iii) Inside	2 marks
	iv. An electron moving towards the east enters a magnetic field directed towards the north. The force on the electron will be directed: (b) Vertically downward	1		iv. State Clausius-Mossotti equation and derive it Equation	2 marks
	v. Kirchoff's law is based on: (a) Conservation of charge	1		Derivation	3 marks
	vi. The time constant of L-R circuit is: (a) L/R	1		Q.3 i. State Biot Savart law in vector form. Statement	1.5 marks
	vii. Kinetic energy of an electron accelerated to a potential difference of 1000 V will be: (c) 1.6×10^{-16} J	1		Mathematical notation	0.5 mark
	viii. When a charge particle moves normally in a magnetic field, the force acting on the particle makes it to move along a path which is a: (c) Circle	1		ii. What is gyromagnetic ratio? Show that the ratio of magnetic moment to its angular momentum due to rotation of a uniformly charged body is equal to $q/2m$. Gyromagnetis Ratio	2 marks
	ix. Henry is a unit of: (d) Inductance	1		Derivation	6 marks
	x. On passing 4 A current in a coil of 50 mH, the energy stored will be: (a) 0.4 J	1		OR iii. Prove that $\text{curl } \mathbf{B} = \mu_0 \mathbf{J}$ (Each main Step 2 Marks)	8 (2 marks * 4)
Q.2	i. What is Gauss law? Statement	1.5 marks	OR	Q.4 i. State and explain Kirchoff's laws of electrical network Statement	1 mark
	Mathematical notation	0.5 marks		Explanation	2 marks
	ii. Show that $\mathbf{E} = -\text{grad } V$ Each step 0.5 Marks	3 (0.5 mark*6)		ii. Establish equation for the growth of the current in a circuit containing a resistance and inductance and solve it. Explain time constant of the circuit and find its value. Equation	1 mark
iii. Deduce expression for intensity of electric field due to uniformly conducting spherical shell at appoint situated	5	Q.5 i. Explain Linear particle accelerator. Diagram	1 mark	7 (1 mark * 7)	
		Construction	1 mark		
		Working	2 marks		

- ii. Describe the construction and working of CRO with proper diagram. **6**
 State few uses of it.
- | | |
|--------------|---------|
| Diagram | 2 marks |
| Construction | 2 marks |
| Working | 1 mark |
| Uses | 1 mark |

- OR iii. Explain the construction and working of cyclotron. Obtain expression **6**
 for the maximum kinetic energy. Also discuss its limitations
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|--------------|-----------|
| Diagram | 1 mark |
| Construction | 1 mark |
| Working | 1.5 marks |
| Expression | 1.5 marks |
| Limitation | 1 mark |

Q.6 Attempt any two:

- i. Explain construction and working of transformers. What are the **5**
 causes of loss of energy in a transformer? How are they minimised.
- | | |
|--------------|---------|
| Diagram | 1 mark |
| Construction | 2 marks |
| Working | 1 mark |
| Causes | 1 mark |
- ii. What is pointing vector? Explain its significance **5**
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|-----------------|---------|
| Pointing vector | 2 marks |
| Significance | 3 marks |
- iii. Derive Maxwell equations. **5**
 Each equation 1.25 Marks (1.25 marks * 4)
