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FIFTH SEMESTER B.Sc. DEGREE (SUPPLEMENTARY/IMPROVEMENT) EXAMINATION, NOVEMBER 2016

(UG-CCSS)

Physics

PH 5B 09/AP 5B 11-ELECTRODYNAMICS-II

(2009-2012 Admissions)

me : Three Hours

Maximum: 30 Weightage

Part A

Answer all questions.

Each question carries ¼ weightage.

- 1. A loop is rotating about the y-axis in a magnetic field $B=B_0 \sin wt \, a_x \, Wb/m^2$. The voltage induced in the loop is due to:
 - (a) Motional e.m.f.
 - (b) Transformer e.m.f.
 - (c) Combination of motional and transformer e.m.f.
 - (d) None of these.
- 2. One of the following is not a source of magnetostatic field:
 - (a) Accelerated charge.
 - (b) Permanent magnet.
 - (c) D.C. current in a wire.
 - (d) Charged disk rotating at uniform speed.
- 3. In a good conductor and are in -
- 4. AC measuring instrument measures -
- 5. Power factor is given by the ratio of circuit resistance and :
 - (a) Current.

(b) 'Impedance

(d) Power.

(c) Voltage.

- 6. The selectivity of a series circuit can be increased by :
 - (a) Increasing the Q-value.
- (b) Reducing the resonant frequency.
- (d) Increasing the bandwidth.
- (e) Increasing the resistance.

Turn over

7,	In one	time constant, the current th	rough an	RL circuit decreases l	ıy ;
		69 %.	(b)	D. P. Branch C. St. at Calabor C.	
	(c)	63 %.	(d)	70.7 %.	
8.	At resc	mance the power factor of an	LCR circu	it is:	
		0.707.		1.	
	' (c)	Zero.	(d)	Infinity.	
9.	An idea	al constant current source has		resistance.	
		uctor may store energy in :			
	(a)	Electric field.	(b)	Its coils.	
	(e)	Magnetic field.	(d)	Both electric and m	agnetic fields.
11.	A pulse	of electromagnetic radiation			
	(a)	Acceleration of a charge.			
	(b)	Charge moving with steady	velocity.		
	(e)	Slow variation of current in	a conducto	r.:	
	(d)	All the above.			
12.	A choke	e is used as a resistor in :			
	(a)	d.c. circuit.	(b)	a.c. circuit.	
	(c)	a.c. and d.c. circuit.	(d)	Rectifier.	
			Davi v		$(12 \times 14 = 3 \text{ weak})$
		200	Part E		
		Each quesi	wer all qu	estions. s 1 weightage.	
13.	State B	iot - Savart's law.	CG771E	s 1 weightage,	
14.	Explain	what is meant by a lossy diele	etric 2		
15.		polarization of EM waves.			
16.	Define of	operator j and show it graphics	ally.		
17.	What a	re electromagnetic waves ? Give			
18.	What is	refractive index ? Express ref	ractive ind	ex in terms of μ and E	

19. Define virtual ampere and virtual volt.

D 11552

- What are the characteristics of an a.c. sine wave?
- 21. What is displacement current?

 $(9 \times 1 = 9 \text{ weightage})$

Part C

Answer any five questions. Each question carries 2 weightage.

- 22. Obtain Maxwell's equations for static EM fields.
- 93. Obtain the Helmholtz equations or vector wave equations in the case of a lossy dielectric.
- 24. A condenser of capacity 0.5 MF is discharged through a resistance of 10 megohms. Find the time taken for half the charge on the condenser to escape.
- 25. A rectangular coil of area 5 × 10⁻⁴ m² and 60 turns in pivoted about one of its vertical sides. The coil is in a radial horizontal field of 90 gauss. What is the tensional constant of the hair spring connected to the coil if a current of 0.2 Ma produces an angular deflection of 18 degrees (1 gauss = 10-4T).
- 26. A solenoid of length 0.5 m. has four layers of winding 350 turns each. The radius of the lower layer is 1.4 cm. Calculate the magnitude of B (a) Near the centre of the solenoid, (b) Near the ends (c) outside the solenoid. When a current of 6.0 Amp flows ? $\mu_0 = 4\pi \times 10^{-7}$.
- 27. The self inductance of a coil is 3.0 mH. A current of 5 A flows through it. The current is reduced to zero in 0.1s when switched off. Calculate the induced e.m.f.
- 28. Calculate the force of repulsion between a coil carrying a.c. and a neighbouring conductor.

 $(5 \times 2 = 10 \text{ weightage})$

Part D

Answer any two questions.

Each question carries 4 weightage.

- 3. Discuss the problem of the discharge of a condenser through R and L .Obtain the condition for
- To Draw the circuit of an Anderson's AC bridge. Obtain the condition for the bridge to the balanced.

- Derive expressions for the electric field component and magnetic field component for the reflection
 of a plane wave.
- 32. State and prove : (a) Norton's theorem ; (b) Maximum power transfer theorem.

 $(2 \times 4 = 8 \text{ weightage})$