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Sardar Patel College of Engineering

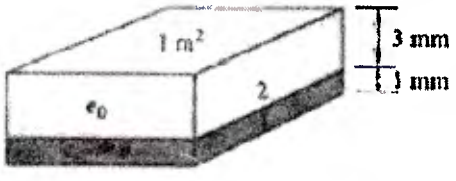
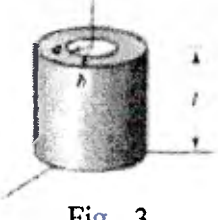
(A Government Aided Autonomous Institute)
Munshi Nagar, Andheri (West), Mumbai – 400058.
Re- Exam (Old)
June.- 2018

Max. Marks:**100** Duration: **3.00 Hrs**
Class: T.Y. **B.Tech. (Electrical)** Semester: **V** Program: **Electrical Engineering**
Name of the Course: **Electromagnetic fields and waves** Course Code :

Instructions:

1. Question No 1 is compulsory.
2. Attempt any four questions out of remaining six.
3. Draw neat diagrams
4. Assume suitable data if necessary

Que. No		Max. Marks	CO No.	Mod. No.
Q1 (a)	Define with an example 1. Line integral 2. Surface integral 3. Volume integral	**05**	**1**	**01**
(b)	Explain the term: 1. The gradient of scaler fields 2. The divergence of a vector fields 3. The curl of a vector fields	**05**	**1**	**01**
(b)	Explain the term "Electrical field intensity". Derive expression for electric field intensity for an infinite line of charge	**10**	**1**	**02**
Q.2(a)	Use the spherical coordinates system to find the area of the strip $\alpha \leq \theta \leq \beta$ on spherical radius 'a'. What results when $\alpha = 0$ and $\beta = \pi$?	**05**	**01**	**01**
(b)	Explain the term potential gradient and establish the relation $\bar{E} = -\overline{\nabla V}$.	**05**	**01**	**02**
(c)	Given, $\bar{D} = D_m Cos(\omega t + \beta z)\overline{a_x}$ in free space. Find E, B and H. Sketch E and H at t=0	**05**	**02**	**05**
(d)	Derive the work done in moving a point charge in an electric field.	**05**	**01**	**02**
Q3(a)	Derive Poisson's and Laplace's equation.	**08**	**02**	**04**
(b)	Identical charges of $Q(C)$are located at the eight corners of a cube with side of $lmeter$ show that coulombs force on each charge has magnitude$\left(\frac{3.29Q^2}{4\pi\epsilon_0 l^2}\right) N$.	**06**	**01**	**02**
(c)	Explain the following term : i) Cylindrical co-ordinate system ii) Spherical co-ordinate system	**06**	**01**	**01**
Q4 (a)	Use Ampere's law to obtain H due to an infinitely long straight filament of current I.	**05**	**02**	**04**

(b)	Find the force on straight conductor of length 0.30 m carrying a current of 5A in the $-\bar{a}_z$ direction where the field is $3.50 \times 10^{-3}(\bar{a}_x - \bar{a}_y)\, T$	**05**	**01**	**03**
(c)	Find the work done in moving a point charge $Q = -20\ \mu C$ from origin to (4,2,0) m in the field $E = 2(x + 4y)a_z + 8xa_y({}^{V}/_{m})$ Along the path $x^2 = 8y$.	**05**	**01**	**02**
(d)	Derive steady magnetic field laws 1. Biot savarts law 2. Amperes circuital law	**05**	**03**	**07**
Q5 (a)	The volume in cylindrical coordinates between r = 2m and r = 4m contains a uniform charge density $({}^{C}/_{m^2})$. Use Gauss's law to find D in all regions.	**05**	**01**	**02**
(b)	Starting with Ampere's circuital law, derive Maxwell's equation in integral form. Obtain the corresponding relation by applying the Stoke's theorem.	**10**	**02**	**03**
(c)	Find the voltage across each dielectric in the capacitor shown in Fig. 2 when the applied voltage is 400 V.  Fig. 2	**05**	**02**	**02**
Q.6(a)	State Maxwell's equation for static fields. Explain how they are modified for time varying electric and magnetic fields.	**10**	**1,2**	**05**
(b)	Find the capacitance of co-axial cable of length 'l', where inner conductor has radius 'a' and the outer conductor has radius 'b' (refer fig. 3)  Fig.. 3	**05**	**02**	**04**
(c)	Show that $\bar{A}.\bar{B} = A_xB_x + A_yB_y + A_zB_z$	**05**	**01**	**01**
Q.7 (a)	State and prove Poynting theorem and give its physical interpretation.	**10**	**01**	**06**
(b)	Derive an expression for potential energy stored in static electric field of n point charges.	**10**	**01**	**02**

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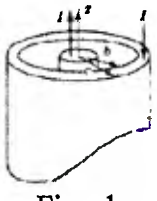
Re- Exam (New)
June.- 2018

Max. Marks:**100** Duration: **3.00 Hrs**
Class: T.Y. **B.Tech. (Electrical)** Semester: **V** Program: **Electrical Engineering**
Name of the Course: **Electromagnetic fields and waves** Course Code : **BTE301**

Instructions:

1. Question No 1 is compulsory.
2. Attempt any four questions out of remaining six.
3. Draw neat diagrams
4. Assume suitable data if necessary

Que. No		Max. Marks	CO No.	Mod. No.
Q1 (a)	Derive an expression for magnetic field intensity due to a linear conductor of infinite length carrying current I at a distance, point P. Assume R to be the distance between conductor and point P. Use Biot-Savart's Law.	**10**	**1**	**03**
(b)	Explain the term "Electrical field intensity". Derive expression for electric field intensity for an infinite line of charge	**10**	**1**	**02**
Q.2(a)	Use the spherical coordinates system to find the area of the strip $\alpha \leq \theta \leq \beta$ on spherical radius 'a'. What results when $\alpha = 0$ and $\beta = \pi$?	**05**	**01**	**01**
(b)	Current in the inner and outer conductors of fig.1 are uniformly distributed. Use Ampere circuital law to derive expression of magnetic field intensity (H) for $b \leq r \leq c$  Fig.: 1	**05**	**01**	**03**
(c)	Given, $\overline{D} = D_m Cos(\omega t + \beta z)\overline{a_x}$ in free space. Find E, B and H. Sketch E and H at t=0	**05**	**02**	**05**
(d)	Derive the work done in moving a point charge in an electric field.	**05**	**01**	**02**
Q3(a)	Derive Poisson's and Laplace's equation.	**08**	**02**	**04**
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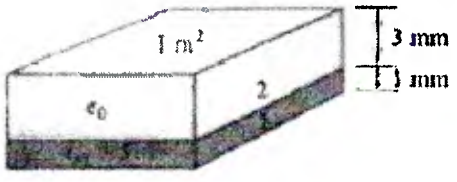
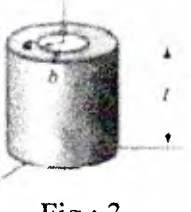
(c)	Explain the following term : i) Cylindrical co-ordinate system ii) Spherical co-ordinate system	**06**	**01**	**01**

Q4 (a)	Use Ampere's law to obtain H due to an infinitely long straight filament of current I.	**05**	**02**	**04**
(b)	Find the force on straight conductor of length 0.30 m carrying a current of 5A in the $-\bar{a}_z$ direction where the field is $3.50 \times 10^{-3}(\bar{a}_x - \bar{a}_y)\, T$	**05**	**01**	**03**
(c)	Find the work done in moving a point charge $Q = -20\,\mu C$ from origin to (4,2,0) m in the field $$E = 2(x + 4y)a_z + 8xa_y(^V/_m)$$ Along the path $x^2 = 8y$.	**05**	**01**	**02**
(d)	Explain FEM method. How to find capacitance of two parallel plate capacitor using FEM technique?	**05**	**03**	**07**
Q5 (a)	The volume in cylindrical coordinates between r = 2m and r = 4m contains a uniform charge density $\left(^C/_{m^2}\right)$. Use Gauss's law to find D in all regions.	**05**	**01**	**02**
(b)	Starting with Ampere's circuital law, derive Maxwell's equation in integral form. Obtain the corresponding relation by applying the Stoke's theorem.	**10**	**02**	**03**
(c)	Find the voltage across each dielectric in the capacitor shown in Fig. 2 when the applied voltage is 400 V.  Fig. 2	**05**	**02**	**02**
Q.6(a)	State Maxwell's equation for static fields. Explain how they are modified for time varying electric and magnetic fields.	**10**	**1,2**	**05**
(b)	Show that $$\bar{A}.\bar{B} = A_xB_x + A_yB_y + A_zB_z$$	**05**	**01**	**01**
(c)	Find the capacitance of co-axial cable of length 'l', where inner conductor has radius 'a' and the outer conductor has radius 'b' (refer fig. 3)  Fig.: 3	**05**	**02**	**04**
Q.7 (a)	State and prove Poynting theorem and give its physical interpretation.	**10**	**01**	**06**
(b)	Derive an expression for potential energy stored in static electric field of n point charges.	**10**	**01**	**02**

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Sardar Patel College of Engineering

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ODD SEM REXAMINATION
JUNE 2018

Max. Marks: 100 Duration: 3 Hr.
Class: T.Y. (Electrical) Semester: ~~VI~~ V Program: B.Tech
Name of the Course: ELECTRICAL MACHINES II Course Code: BTE 303

Instructions: Please answer any 5 out of 7. Please write to the point answer and elaborate wherever is required.

Q. No	Questions	Max Marks
Q1)	a) Explain the working of Shaded pole Induction motor. Also give its applications in detail.	10
	b) Derive the expression for the power developed in a cylindrical rotor synchronous motor in terms of load angle & synchronous impedance.	10
Q2)	a) Explain the 'Blondel's two reaction Theory for salient pole synchronous generator. Draw the phasor diagram for lagging load power factor and also derive the equation for EMF induced.	10
	b) A 3 phase, star connected, 400V, 50 Hz, 4 pole Induction motor has the following per phase constants in ohms referred to stator: r1 = 0.15, X1 = 0.45, r2 = 0.12, X2 = 0.45, Xm = 28.5 Fixed losses = 400W Calculate, 1) Stator current 2) Rotor speed 3) Output torque 4) Efficiency when motor is operated at rated voltage & frequency at a slip 4%.	10
Q3)	a) Explain the different stepping modes for the stepper motor with proper truth tables.	10
	b) Explain the development of power circle for a cylindrical rotor synchronous motor. Show that, 1) Zero power circle passes through origin. 2) Efficiency at maximum power output = 50%	10

Q4)	a) Explain capacitor start & capacitor run motor in detail	10
	b) A 20 MVA, 3 phase star connected 11 KV, 12 pole, 50 Hz salient pole Synchronous motor with negligible armature resistance has reactance of Xd = 5Ω and Xq = 3Ω. At full load unity power factor and rated voltage, Calculate, 1) The excitation voltage 2) Power 3) Synchronising power per electrical degree and corresponding Torque 4) Synchronising power per mechanical degree and corresponding Torque	
Q5)	a) Explain how the excitation and power circles can be superimposed to obtain V curves of a cylindrical rotor synchronous motor. Hence show that, 1) Minimum & maximum currents for any power at unity power factor 2) Minimum power factor for any load power occurs when the line current is tangent to the power circle for that load.	10
	b) The speed regulation of two 500 KW alternators A & B running in parallel are 100% to 104% and 100% to 105% from full load to no load respectively. How will the two alternators share a load of 800 KW and also find the load at which one machine ceases to supply any portion of the load.	10
Q6)	a) Why Synchronous motor is not self starting. Discuss any one method of starting the motor	10
	b) Explain the working of variable Reluctance motor and also explain the driver circuit to control it.	10
Q7)	Write short notes on Any two	20
	1) Crawling and cogging 2) Split phase Induction Motor 3) Stepper motor	

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KT EXAMINATION
June 2018

Program : T Y. B.Tech. Electrical Engineering. Semester : V
Course code : **BTE 304** Duration :01 Hr
Name of the Course :**POWER SYSTEM ANALYSIS** Maximum Marks : 100

Instructions:

1. **Attempt any 5 questions from 7 (Qs.I to QsVII).**
2. **Assume suitable data if necessary.**
3. **Draw relevant neat circuit diagrams wherever required.**

Qs No.		Max. Mark	CO	Module No.
Qs I.	a. What do you understand by symmetrical components and how can it be used in power system analysis?	**10**	**01**	**01**
	b. Obtain the sequence networks of transmission line and transformers.	**10**	**01**	**01**
Qs II.	a. Write the algorithm for short circuit studies.	**10**	**03**	**02**
	b. For a double line-to-ground (LLG) fault through impedance Z^f derive the equivalent sequence network diagram and the respective currents.	**10**	**03**	**02**
Qs III.	a. For a power system network, show that $Y_{bus} = A^T Y A$ Where Y_{bus} = Bus admittance matrix Y = Primittive admittance matrix A = Bus incidence matrix.	**10**	**02**	**03**
	b. Consider the power system shown in Fig.2.23. each generator and the line impedence of (0.2+j0.2) pu and (0.5+j0.5) pu respectively. Neglect the line charging admittances.			
	i) Draw the oriented graph	02	02	03
	ii) Formulate element-node incidence matrix $\hat{A}$.	02		
	iii) Obtain the bus incidence matrix, **A**.	01		
	iv) Form the bus admittance matrix. Y_{bus} by direct inspection method.	05		

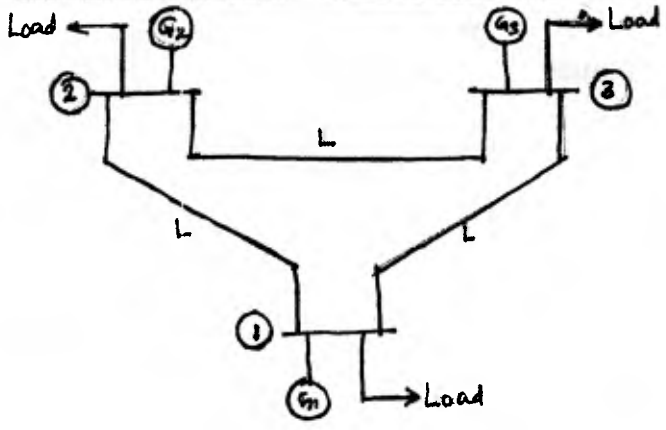
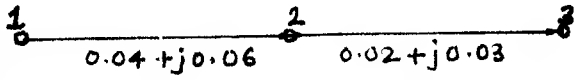


Fig. 2.23: Power system network.

Qs IV	a. For the network shown in Fig.4.1, obtain the complex bus bar voltage at bus 2 at the end of first iteration using Gauss-Seidel method. Line impedances shown in Fig.4.1 are in pu. Bus1 is a slack bus with $V_1=1.0\angle 0^\circ$. $P_2 + jQ_2 = -5.96 + j1.46$, $\|V_3\|= 1.02$. Assume $V_1^{\bullet}=1.02\angle 0^\circ$ and $V_2^{\bullet}=1.0\angle 0^\circ$.	10	03	03
	 Fig.4.1			
	b. Write the algorithm for load flow analysis using N-R method.	10	03	05
Qs V.	a. Obtain the basic relation governing the dynamics of rotor of a synchronous machine.	10	03	05
	b. A 50Hz, 4pole, turbogenerator rated 100 MVA, 11 kv has an inertia constant of 8.0 MJ/MVA. (i) Find the stored energy in the rotor at synhronous speed. (ii) If the mechanical input is suddenly increased to 80 MW for an electrical load of 50 MW, find rotor acceleration, neglecting mechanical and electrical losses. (iii) If the acceleration calculated in part (ii) is maintained for 10 cycles, find the change in torqueangle and rotor speed in rpm at the end of this period.	10	03	05

Qs VI	a. Obtain the condition for stability of a power system using Equal area criterion.	10	03	06
	b. Explain the proceedure to determine the stability of a multimachine system using poin-by-point solution of swing equation.	10	03	06
Qs VII	Explain any two from the following:	10	04	07
	a. Bewley Lattice diagram.	10	02	04
	b. Compre of De-ccupled and Fast De-coupled method of Load flow analysis.	10	03	06
	c. Factors affecting transient stability.			

Bharatiya Vidya Bhavan's

Sardar Patel College of Engineering

(Govt. Aided Autonomous Institute under University of Mumbai)

Academic Year 2017 – 18

Re-Examination [June 2018]

Program: B. Tech. Electrical
Course: Digital Signal Processing
Total Marks: 100

Class: T. Y. Sem. V
Course Code: BTE305
Date: 7th June 2018

Note: Solve any **FIVE** questions of the following. All questions carry equal marks.

Que. No.		Question	CO No. / Mod. No.	Points
1	*a*	Design a Butterworth digital IIR highpass filter using bilinear transformation by taking T = 0.5 sec, to satisfy following specifications: $0.707 \le \left\|H\left(e^{j\omega}\right)\right\| \le 1.0 \quad ; 0.65\pi \le \omega \le \pi$ $\left\|H\left(e^{j\omega}\right)\right\| \le 0.2 \quad ; 0 \le \omega \le 0.45\pi$	3/7	(10)
	b	Design an analog lowpass filter using inverse Chebyshev approximation to meet following specifications: $A_p \le 1$ *dB* for $\Omega_p \le 4$ *rad/s* and $A_s \ge 20$ *dB* for $\Omega_s \ge 8$ *rad/s.*	3/7	(10)
2	*a*	Determine 8-point DFT of the sequence $x(n)=\{2,1,2,1,1,2,1,2\}$ using radix-2 DIT FFT algorithm.	2/4	(10)
	b	Determine IDFT of the following sequence: $X(k)=\{7,-0.707-j0.707,-j,0.707-j0.707,1,0.707+j0.707,j,-0.707+j0.707\}$	2/4	(10)
3	*a*	Using Hanning Window Function, design a sixth order linear phase FIR lowpass filter having cutoff frequency of $\frac{\pi}{4}$ rad.	3/6	(10)
	b	Using frequency sampling method determine the coefficients and draw realization diagram of a linear-phase FIR filter of length 15 which has a symmetric unit sample response and a frequency response that satisfies the condition, $H\left(\frac{2\pi k}{15}\right)=\begin{cases}1, & k=0,1,2,3\\ 0.4, & k=4\\ 0, & k=5,6,7\end{cases}$	3/6	(10)

4	*a*	Design an equivalent digital filter from an analog filter $H(s)=\frac{1}{s^2+\sqrt{2}s+1}$ using *impulse invariance method.* Assume $T = 1$ sec.	**3/7**	**(10)**
	b	Derive the bilinear *z*-transformation mapping of *s*-plane poles and zeros into *z*-plane poles and zeros. Discuss the advantages and drawbacks of this mapping.	**3/7**	**(10)**
5	*a*	The sequence $x(n)=4\delta(n)+3\delta(n-1)+2\delta(n-2)+\delta(n-3)$ has 8 – point DFT $X(k)$. Determine the sequence $y(n)$ that has 8 – point DFT $Y(K)=W_8^{4k}X(K)$ and sequence $w(n)$ that has 8 – point DFT $W(K)=0.5\left[X(K)+X(-K)\right]$.	**2/3**	**(10)**
	b	Using DFT based approach, determine circular convolution of following sequences: $x_1(n)=\{1,2,3,4\}$ and $x_2(n)=\{1,2,3,2\}$. [**Note:** Calculate DFT using DIT FFT and IDFT using DIF FFT algorithm.]	**1, 2 / 3, 1**	**(10)**
6	*a*	Determine and sketch the magnitude and phase response of the system given below: $y(n)=x(n)+0.9x(n-2)-0.4y(n-2)$. [**Note:** Plot the magnitude and phase response on a graph paper only.]	**1/ 1, 2**	**(10)**
	b	A linear phase FIR filter has transfer function $H(z)=1+2z^{-1}+3z^{-2}+2z^{-3}+z^{-4}$. Determine response of this filter to the input, $x(n)=\delta(n)+\delta(n-1)-\delta(n-3)-\delta(n-4)$ using circular convolution approach.	**2/3**	**(10)**
7	*a*	Determine the transfer function and sketch poles and zeros of an LTI system described by the equation, $y(n)=x(n)+0.8x(n-1)+0.8x(n-2)-0.49y(n-2)$. Comment on the stability of this system.	**3/6**	**(10)**
	b	Discuss symmetry properties of DFT for a signal with following cases: *i.* real (even and odd) and *ii.* purely imaginary (even and odd).	**3/7**	**(10)**

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