Code No: R161208 **R16** SET - 1

I B. Tech II Semester Regular Examinations, April/May - 2017
ELECTRICAL CIRCUIT ANALYSIS – I
(Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answering the question in **Part-A** is Compulsory
3. Answer any **FOUR** Questions from **Part-B**

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PART –A

1. a) State Kirchhoff's laws. (2M)
   b) List out different dual elements for basic electrical elements. (2M)
   c) What is Faraday's law of electromagnetic induction? (2M)
   d) What is the difference between instantaneous power and complex power? (2M)
   e) What is the significance of quality factor in series resonant circuit? (2M)
   f) State Norton's theorem. (2M)
   g) A series RLC circuit has a resonant frequency of 12 kHz. If R=5 ohms and X_L=300 ohms at resonance, what is the bandwidth. (2M)

PART –B

2. a) Distinguish between independent and dependent sources. (4M)
   b) A triangular wave is shown in Figure 1. It is applied to R, L and C individually. Estimate the current in each element. (10M)

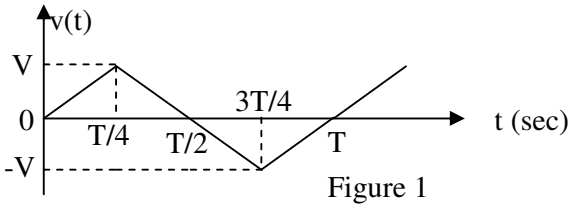

Figure 1

3. a) Explain the concept of duality between two electrical networks. Clearly distinguish between equivalent and dual network. (5M)
   b) Find and draw the maximum possible number of trees for the network shown in Figure 2. (9M)

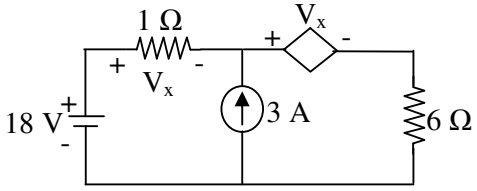

Figure 2
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4. a) Explain the dot convention in coupled circuits. (4M)
   b) The air gap in a magnetic circuit is 1.5 mm long and 2500 mm^2 in cross sectional area. Calculate (i) the reluctance of the air gap (ii) the MMF required to set up a flux of $800x10^{-6}$ Wb in the air gap. (5M)
   c) A mild steel ring having a cross sectional area of 500 m^2 and a mean circumference of 400 mm has a coil of 200 turns wound uniformly around it. Calculate: (i) the reluctance of the ring and (ii) the current required to produce a flux of 800 μ Wb in the ring. Assume that μ_r is 380. (5M)

5. a) A 20 ohms resistance and 30 mH inductance are connected in series and the circuit is fed from 230 V, 50 Hz AC supply. Find (i) Inductive reactance and total impedance (ii) current in the circuit (iii) voltage across resistance and inductance (iv) real, reactive and apparent power (v) Power factor. (7M)
   b) Calculate RMS value, average value, form factor for the saw waveform shown in Figure 3. (7M)

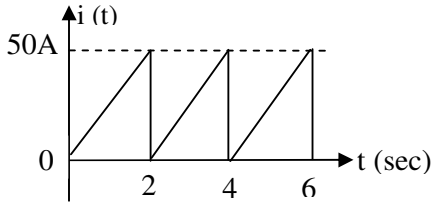

Figure 3

6. a) A variable frequency source of V=200 volt is applied to a series R-L circuit having R=5Ω and L=5 mH. Draw I-locus considering sample frequencies ω=0,500,1000,2000 and 5000 rad/sec. (7M)
   b) Show that the locus of current of a series circuit consisting of resistance and inductance with resistance varies and inductive reactance fixed, when supplied by a constant ac voltage source, lies on a circular path. (7M)

7. a) State and explain Maximum Power Transfer theorem. (7M)
   b) Verify the reciprocity theorem for the following circuit shown in Figure 4. (7M)

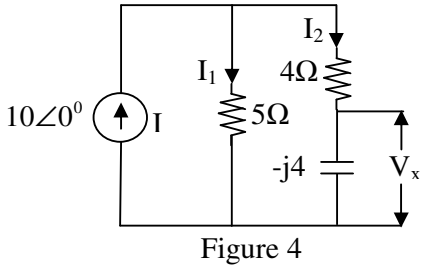

Figure 4

Code No: R161208 **R16** SET - 2

I B. Tech II Semester Regular Examinations, April/May - 2017
ELECTRICAL CIRCUIT ANALYSIS – I
(Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answering the question in **Part-A** is Compulsory
3. Answer any **FOUR** Questions from **Part-B**

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PART –A

1. a) What are the uses of source transformation? (2M)
   b) What are the properties of a tie-set matrix? (2M)
   c) Define MMF and reluctance. (2M)
   d) What is the significance of power factor in AC circuits? (2M)
   e) What is a locus diagram? (2M)
   f) State reciprocity theorem. (2M)
   g) What is the quality factor of a coil of R=10 ohms, L=0.1 H, C=0.1 μF? (2M)

PART -B

2. a) The current is 15 mH inductor can be expressed as $i(t)=(2-e^{-1000t})$ mA. Find (i) voltage across the inductor (ii) instantaneous power. (7M)
   b) Two groups of resistances, one consisting of 4 ohms, 6 ohms and 12 ohms in parallel and other consisting of 3 ohms and 6 ohms in parallel are connected in series with a source of 10 V having an internal resistance of 1 ohm. Calculate the resistance of entire circuit, the potential drop across each group and current in each resistance. (7M)

3. Find out currents through and voltages across all branches of the network shown in Figure 1, with the help of its tie-set schedule. (14M)

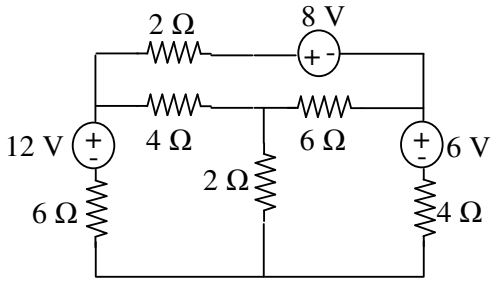

Figure 1
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4. a) Derive an expression for co-efficient of coupling in a magnetic circuit. (5M)
   b) Explain Faradays Laws of Electro magnetic Induction. (3M)
   c) Two coils having 750 and 1200 turns, respectively, are wound on a common non-magnetic core. The leakage flux and mutual flux, due to a current of 7.5A in coil 1, is 0.25 mWb, and 0.75 mWb, respectively. Calculate: i) Self Inductance, ii) Mutual Inductance, iii) coefficient of coupling. (6M)

5. a) A voltage of 200 V is applied to a series circuit consisting of a resistance, a choke coil and a capacitance. If the respective voltages across these components are 170 V, 150 V and 100 V. The current in the circuit is 4 A. Find the power factor of the circuit. (7M)
   b) A time varying current, with a periodic wave form is shown in Figure 2, flows through an 8W resistor. Determine (i) mean value (ii) rms value (iii) heat dissipated in 5 minutes. (7M)

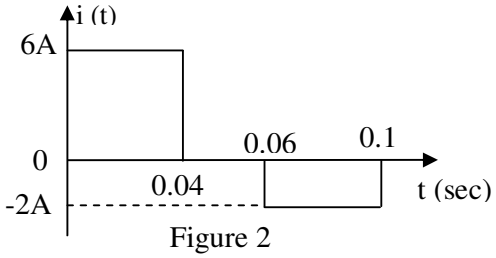

Figure 2

6. a) For a given series RLC circuit with R=120Ω, L=0.6H and C=70μF, Calculate the resonance, lower and upper half power frequencies. (7M)
   b) Show that the resonant frequency ω_0 of an RLC series circuit is the geometric mean of $\omega_1$and ω_2, the lower and upper half-power frequencies respectively. (7M)

7. a) State and explain Millman's theorem. (6M)
   b) Find Thevenin's and Norton's equivalent circuits for the network shown in Figure 3. (8M)

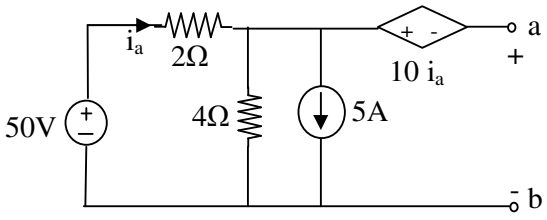

Figure 3

Code No: R161208 **R16** SET - 3

I B. Tech II Semester Regular Examinations, April/May - 2017
ELECTRICAL CIRCUIT ANALYSIS – I
(Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answering the question in **Part-A** is Compulsory
3. Answer any **FOUR** Questions from **Part-B**

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PART –A

1. a) What are the differences between dependent and independent sources? (2M)
   b) What are the properties of a cut-set matrix? (2M)
   c) What is the significance of coefficient of coupling in magnetic circuits? (2M)
   d) Draw the power triangle and represent real, reactive power and apparent power. (2M)
   e) Define bandwidth and selectivity. (2M)
   f) State superposition theorem. (2M)
   g) A series circuit has R=4 ohms, L=25 mH, and C=150 μF. What is the bandwidth? (2M)

PART –B

2. a) State and explain KVL and KCL with an example. (5M)
   b) Draw the waveforms for i_R, i_L, i_C for the circuit shown in Figure 1, when it is excited by a voltage source having a waveform shown in Figure 2. (9M)

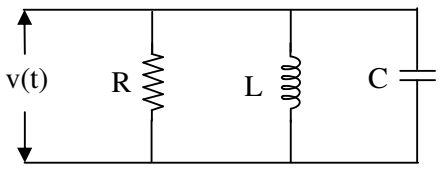

Figure 1

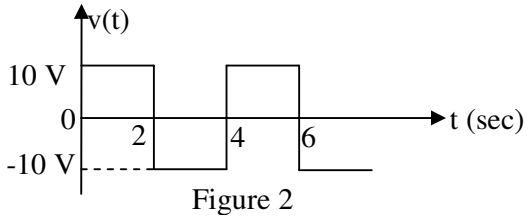

Figure 2

3. a) What is duality? Explain the procedure to obtain the dual of the given planar network. (6M)
   b) Find the current in each branch and voltage across each branch of the network shown in Figure 3, using tie-set schedule. (8M)

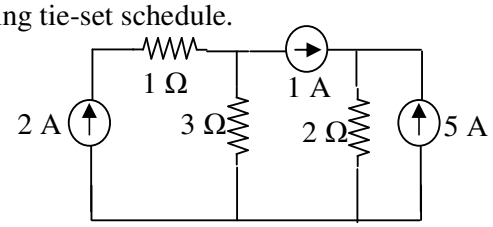

Figure 3
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4. a) Prove that for series magnetic circuit having different reluctance segments, total reluctance will be the sum of individual reluctances. (4M)
   b) Define (i) self inductance (ii) mutual inductance (iii) MMF(vi)Flux (v) Reluctance (4M)
   c) Two coils have a mutual inductance of 0.4 H, if the current in one coil is varied from 4A to 2A in 0.5sec, calculate (i) The average e.m.f induced in the second coil (ii) The rate of change of flux linked with the second coil assuming that it is wound with 300 turns. (6M)

5. a) A coil of power factor 0.9 is in series with a 120 μF capacitor. When the circuit is connected to a 50 Hz supply, the potential difference across the coil is equal to the potential difference across the capacitor. Find the resistance and inductance of the coil. (7M)
   b) Find the RMS value and average value of the waveform shown in Figure 4. (7M)

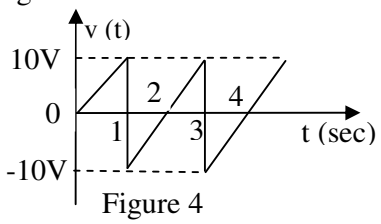

Figure 4

6. a) A coil of 2.2Ω resistance and 0.01H is connected in series with a capacitor across 220V mains. Find the value of capacitance such that the maximum current flows in the circuit at a frequency of 100Hz. Also, find the current and voltage across the capacitor. (7M)
   b) Find C which results in resonance in the circuit shown in Figure 5, when ω=5000rad/s. (7M)

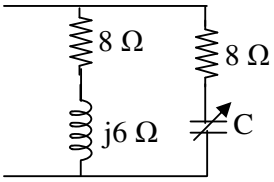

Figure 5

7. a) State and explain Norton's theorem. (6M)
   b) Using Thevenin's theorem, find the current flowing through 1.5 ohms resistance between A and B for the network shown in Figure 6. (8M)

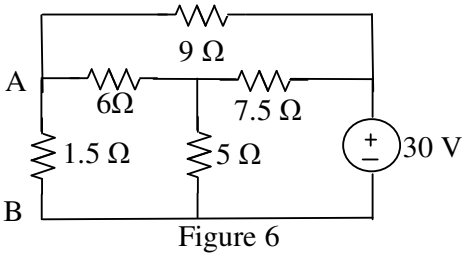

Figure 6

Code No: R161208 **R16** SET - 4

I B. Tech II Semester Regular Examinations, April/May - 2017
ELECTRICAL CIRCUIT ANALYSIS – I
(Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answering the question in **Part-A** is Compulsory
3. Answer any **FOUR** Questions from **Part-B**

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PART –A

1. a) Write the V-I relations of R, L and C parameter. (2M)
   b) What are the properties of a tree in electrical circuits? (2M)
   c) Write the analogy between electrical and magnetic circuits. (2M)
   d) Define average value and form factor. (2M)
   e) What is the difference between series and parallel resonance? (2M)
   f) State compensation theorem. (2M)
   g) Give the differences between tie-set and cut-set. (2M)

PART –B

2. a) Explain the star – delta and delta – star transformation by deriving relevant expressions. (6M)
   b) Find the current through each branch of the circuit shown in Figure 1, using mesh analysis. (8M)

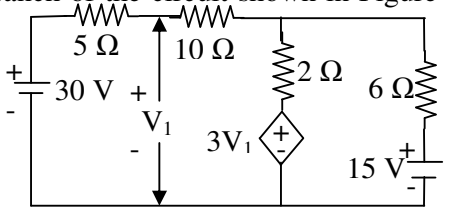

Figure 1

3. For the given network shown in Figure 2, obtain the oriented graph of the network. Write the cut-set of the graph and determine the loop currents. (14M)

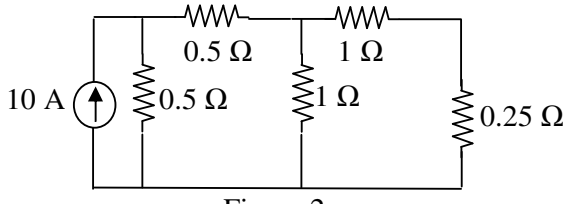

Figure 2
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4. a) The number of turns in two coupled coils are 600 and 1700, respectively. When a current of 6A flows in coil 2, the total flux in this coil is 0.8 mWb, and the flux linking the first coil is 0.5mWb. Calculate L_1, L_2, M and K. (7M)
   b) Two coils with a coefficient of coupling of 0.6 between them, are connected in series so as to magnetize i) in one combination in the same direction and ii) in another combination in the opposite direction. The corresponding values of equivalent inductance are 1.8 H and 0.8 H respectively. Find the self inductance of the two coils and the mutual inductance between them. (7M)

5. a) A coil having a resistance of 10 ohms and an inductance of 0.2 H is connected in series with a 100 μF capacitor are fed with 230 V, 50 Hz AC supply. Calculate (i) active and reactive components of current (ii) voltage across the coil. Draw the phasor diagram. (7M)
   b) Find the rms and average value of the trapezoidal waveform shown in Figure 3. (7M)

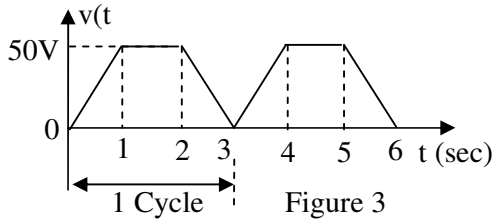

Figure 3

6. a) A constant inductance L is in parallel with a series R-C circuit in which R varies from zero to infinity. This combination is connected to a constant voltage, constant frequency supply. Show that the circuit takes a constant current from the source at all power factors between zero lagging and zero leading, if $X_c=X_L/2$. Draw the relevant locus diagram. (7M)
   b) An inductive coil having a resistance of 30 ohm and inductance of 0.03H is connected in series with 0.03 μF capacitor. Calculate i) Q of the coil ii) Resonant frequency and iii) the half-power frequencies. (7M)

7. a) State and explain Thevenin's theorem. (6M)
   b) Use superposition theorem to find v_0 in Figure 4. (8M)

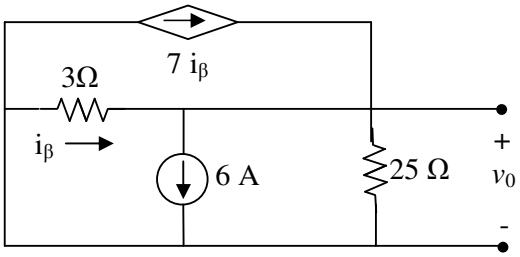

Figure 4

Code No: R161211 **R16** SET - 1

I B. Tech II Semester Regular Examinations, April/May - 2017
APPLIED CHEMISTRY
(Com. to ECE, CSE, EIE, IT, ECC)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answering the question in **Part-A** is Compulsory
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PART –A

1.	a)	Differentiate emulsion and suspension polymerization with examples.	(2M)
	b)	Why net calorific value (NCV) is less than gross calorific value (GCV)?	(2M)
	c)	Explain differential aeration corrosion with one example.	(2M)
	d)	Draw and explain the structure of fullerene.	(2M)
	e)	Write the applications of Hall-Effect.	(2M)
	f)	What are electrical insulators? Give their applications.	(2M)
	g)	Write the principle involved in Batteries.	(2M)

PART –B

2.	a)	Bring out the difference between thermoplastics and thermosetting plastics with suitable examples.	(8M)
	b)	Explain the following i) Biodegradable polymers ii) Vulcanization of natural rubber.	(6M)
3.	a)	Name the different types of coals? Explain the proximate analysis of coal and write its significance.	(8M)
	b)	Define the octane number of gasoline .what is its significance and how is it measured? Why ethylene di bromide is added when TEL is used as an antiknock reagent?	(6M)
4.	a)	What are nano materials? How to characterise nano materials by BET and TEM methods?	(8M)
	b)	Explain the following i) Green synthesis principles ii) Applications of Super conductors	(6M)
5.	a)	Explain the construction, working and applications of photo voltaic cell.	(8M)
	b)	Which type of non conventional energy source you prefer for the generation of energy? How to construct it and its importance?	(6M)
6.	a)	What are the insulators? Write about electrical and electronic applications of Insulators?	(10M)
	b)	What are semiconductors and P-n junction diode?	(4M)
7.	a)	What are batteries ?Explain the principle ,construction, working and application of Ni-metal hydride cell.	(8M)
	b)	Write about cathodic protection methods to control corrosion? Explain with suitable examples. Differentiate galvanizing and tinning.	(6M)
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Code No: R161211 **R16** SET - 2

I B. Tech II Semester Regular Examinations, April/May - 2017
APPLIED CHEMISTRY
(Com. to ECE, CSE, EIE, IT, ECC)

Time: 3 hours Max. Marks: 70

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2. Answering the question in **Part-A** is Compulsory
3. Answer any **FOUR** Questions from **Part-B**

~~~~~~

PART –A

1. a) Why conducting polymers shows conductivity? Give examples. (2M)
   b) What is power alcohol? Write its applications. (2M)
   c) What is electrode potential? What is the effect of electrolyte concentration on electrode potential? (2M)
   d) Define R_4M_4 principle of green synthesis. (2M)
   e) Differentiate Ferro and Ferri magnetism. (2M)
   f) What is tidal energy? Write any two conditions to generate tidal energy. (2M)
   g) Discuss the phenomenon of metal Cladding with suitable examples. (2M)

PART –B

2. a) Explain chain growth and step growth polymerization with suitable examples. (8M)
   b) What are Elastomers? Explain preparation, properties and engineering applications of Thiokol rubber. (6M)

3. a) Differentiate HCV and LCV? Explain with neat diagram how to determine calorific value by bomb calorimeter. (10M)
   b) What are explosives? Explain the classification and discuss about RDX and TNT (4M)

4. a) What are nano materials? How to prepare Nano materials with chemical reductions method? Explain how Nano materials are taking major role in medical field. (8M)
   b) What are the super conductors? Explain properties of type-1 and type-2 super conductors (6M)

5. a) Explain differences between conventional and non conventional energy sources. (8M)
   b) Explain the construction, working and applications of methanol – oxygen fuel cell. Write short notes on Biofuels. (6M)

6. a) Explain Hall effect and its applications. (8M)
   b) Discus the structure of cesium chloride with neat diagram. (6M)

7. a) What is electro chemical series? Discuss its significance. (8M)
   b) Explain the principle involved in batteries. Differentiate electroplating and electro less plating of corrosion control. (6M)
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Code No: R161211 **R16** SET - 3

I B. Tech II Semester Regular Examinations, April/May - 2017
APPLIED CHEMISTRY
(Com. to ECE, CSE, EIE, IT, ECC)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answering the question in **Part-A** is Compulsory
3. Answer any **FOUR** Questions from **Part-B**

~~~~~~

PART –A

1. a) What is heterogeneous polymerization? Explain about suspension polymerization. (2M)
   b) Differentiate between HDPE and LDPE. (2M)
   c) What is refining? Why petroleum is subjected to refining? (2M)
   d) Write the composition of LPG and CNG. (2M)
   e) What is electro less plating? What are its advantages over electroplating? (2M)
   f) Define Hall Effect. (2M)
   g) What are the applications of solar energy? (2M)

PART –B

2. a) Discus about the preparation and engineering applications of Teflon, Bakelite and Thiokol rubber. (8M)
   b) Write a note on biodegradable polymers. (6M)

3. a) Define L.C.V and H.C.V. How these are related. A gas has the following composition by volume H_2 =22%, CH_4=4%, CO=20%, CO_2=6%, O_2=3% and N_2=45%. If 25 % excess air is used. Find the actual weight of air supplied per m^3 of this gas. (8M)
   b) How explosives are classified? Write about RDX, TNT. (6M)

4. a) Write about the construction and working of calomel electrode. Give a neat sketch. (8M)
   b) Explain about (6M)
      i) Water line corrosion.
      ii) Sacrificial anodic protection.
      iii) Electro less plating

5. a) How do you characterise nonomaterials by BET method? (8M)
   b) How green chemical methods are superior over conventional methods in organic synthesis? Explain with examples. (6M)

6. a) What are magnetic materials? Explain. (8M)
   b) Explain with suitable examples about the BCC, FCC structure and spinels. (6M)

7. a) What is photo voltaic cell? Explain the principle of working. (8M)
   b) What are the non-conventional energy sources? Discus about geothermal energy. (6M)
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Code No: R161211 **R16** SET - 4

I B. Tech II Semester Regular Examinations, April/May - 2017
APPLIED CHEMISTRY
(Com. to ECE, CSE, EIE, IT, ECC)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answering the question in **Part-A** is Compulsory
3. Answer any **FOUR** Questions from **Part-B**

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PART –A

1. a) What are plastics? How do they differ from fibers and elastomers? (2M)
   b) What are conducting polymers? Give the applications of conducting polymers. (2M)
   c) What is RDX and TNT? Write their uses. (2M)
   d) Give about cetane number. (2M)
   e) Write any three differences between galvanic cell and electrolytic cell. (2M)
   f) What are electrical insulators? Give their applications. (2M)
   g) Give the importance of photo voltaic cells. (2M)

PART –B

2. a) How are the plastics fabricated by compression and injection molding methods? (8M)
   b) What are the conducting polymers? Why the polymers becomes conducting? Explain by taking Poly acetylene as an example. (6M)

3. a) What are the advantages of liquid fuels? (8M)
   b) Explain about Fisher-Tropsch's process. What are rocket fuels? Give examples. (6M)

4. a) Explain about cathodic protection methods with suitable examples. (10M)
   b) What are the characteristic of a battery? Explain Ni-Cd cell, its constructions and working. (4M)

5. a) What are CNTs? Give their applications. (8M)
   b) Explain the principles of green synthesis. (6M)

6. a) How is the semi conductors prepared? (8M)
   b) Write a note on electrical and electronic applications of insulators. Give the applications of Ferro magnetic materials. (6M)

7. a) Give the applications of solar energy. (8M)
   b) How do non-conventional energy sources differ from conventional energy sources? Write about tidal wave power. (6M)
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Code No: R161232 **R16** SET - 1

I B. Tech I Semester Regular Examinations, April/May - 2017
ELEMENTS OF MECHANICAL ENGINEERING
(Civil Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answering the question in **Part-A** is Compulsory
3. Answer any **FOUR** Questions from **Part-B**

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PART –A

1.	a)	List the Primary requirements of a Steam Boiler.	(2M)
	b)	What are the distinguishing features between a Casting and a Pattern?	(2M)
	c)	Define (i) Brake Power; (ii) Indicated Thermal Efficiency, of an Internal Combustion Engine.	(2M)
	d)	Define "Ton of Refrigeration (TR)".	(2M)
	e)	Define: (i) Velocity ratio; (ii) slip of a belt drive.	(2M)
	f)	What is pressure line and pressure angle of a gear?	(2M)
	g)	What is the difference between Double helical and Herringbone gears?	(2M)

PART -B

2.	a)	Explain the construction and working of Babcock and Wilcox Boiler with a neat sketch.	(7M)
	b)	Enumerate the factors which should be considered for the selection of a boiler.	(7M)
3.	a)	Briefly Explain the principle of Rolling with a neat sketch.	(5M)
	b)	Can dissimilar metals be welded by using resistance welding? Explain.	(4M)
	c)	Distinguish between arc welding and gas welding processes in detail.	(5M)
4.	a)	Enumerate different ways of producing refrigeration. Explain in detail about any two refrigeration systems.	(7M)
	b)	Derive the equation for work done per kg of air compressed in a single stage single acting reciprocating compressor without cylinder clearance.	(7M)
5.	a)	Compare in detail the Four Stroke and Two Stroke engines. Bring out clearly their relative merits and demerits.	(7M)
	b)	A four cylinder, four stroke, spark ignition engine has a bore of 80 mm and a stroke of 80 mm. The compression ratio is 8. Calculate the cubic capacity of the engine and the clearance volume of each cylinder.	(7M)
6.	a)	Derive the equation to find out the length of the belt in an Open belt drive.	(7M)
	b)	The pulleys of two parallel shafts that are 8 m apart are 600 mm and 800 mm in diameters and are connected by a open belt drive. Calculate the length of the belt drive and the angle of contact between the belt and each pulley.	(7M)
7.	a)	What is the difference between a simple gear train and a compound gear train? Explain with the help of neat sketches.	(7M)
	b)	With neat sketches explain briefly the following with their merits and demerits i) Spur gear ii) Helical gear iii) Bevel Gear.	(7M)
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Code No: R161232 **R16** SET - 2

I B. Tech I Semester Regular Examinations, April/May - 2017
ELEMENTS OF MECHANICAL ENGINEERING
(Civil Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answering the question in **Part-A** is Compulsory
3. Answer any **FOUR** Questions from **Part-B**

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PART –A

1. a) What is the function of Boiler Mountings? Can a Boiler work without mountings? (2M)
   b) What do you understand by the following Casting terms: (i) Sprue; (ii) Runner. (2M)
   c) Define (i) Indicated Power; (ii) Specific Fuel Consumption of an Internal Combustion Engine. (2M)
   d) Discuss the elements of refrigeration systems. (2M)
   e) State the advantages of Belt drive. (2M)
   f) What do you understand by Pitch circle and pitch point of a gear? (2M)
   g) What do you understand by Reverted Gear train? (2M)

PART -B

2. a) Explain the construction and working of Lancashire Boiler with a neat sketch. (6M)
   b) With the help of a neat sketch explain (i) Fusible plug; (ii) Water level Indicator. (8M)

3. a) Explain in detail, how Extrusion is compared with Rolling? (7M)
   b) Name the various patterns that are encountered in Foundry practice. Sketch an example showing the Cope and Drag type Pattern. (7M)

4. a) Discuss in detail the classification of air compressors. (7M)
   b) Explain the working of vapour compression refrigeration system with neat sketch. (7M)

5. a) Discuss in detail the differences between Compression Ignition and Spark Ignition engines. (6M)
   b) A four stroke, compression ignition engine with four cylinders develops an indicated power of 125 kW and delivers a brake power of 100 kW. Calculate (i) frictional power; (ii) mechanical efficiency of the engine. (8M)

6. a) Derive the equation to find out the length of the belt in a Cross belt drive. (7M)
   b) Two pulleys mounted on two parallel shafts that are 2 m apart are connected by a crossed belt drive. The diameters of the two pulleys are 500 mm and 240 mm. Find the length of the belt and the angle of contact between the belt and each pulley. (7M)

7. a) Sketch two teeth of a gear and show the following: (i) Face; (ii) Flank; (iii) Addendum; (iv) Dedendum; (v) Face width; (vi) Circular Pitch. (8M)
   b) A Compound gear train consists of 4 gears, A, B, C, and D having 20, 30, 40, and 60 teeth respectively. A is key to the driver shaft, and D is keyed to the driver shaft. B and C are compound gears. B meshes with A and C meshes with D. Sketch the arrangement using simple circles. If A rotates at 180 rpm. What is the rpm of D? (6M)

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Code No: R161232 **R16** SET - 3

I B. Tech I Semester Regular Examinations, April/May - 2017
ELEMENTS OF MECHANICAL ENGINEERING
(Civil Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answering the question in **Part-A** is Compulsory
3. Answer any **FOUR** Questions from **Part-B**

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PART –A

1. a) Discuss how Boiler Accessories differ from Mountings? (2M)
   b) What do you understand by the following Casting terms: (i) Gate; (ii) Riser. (2M)
   c) Define (i) Friction Power; (ii) Brake Thermal Efficiency of an Internal Combustion Engine. (2M)
   d) Define (i) Theoritical COP and (ii) Relative COP of a refrigeration system. (2M)
   e) What do you mean by Initial Tension in a Belt Drive? (2M)
   f) What do you understand by Module and Gear ratio of a gear? (2M)
   g) What do you understand by a Compound Gear train? (2M)

PART –B

2. a) Explain the construction and working of Cochran Boiler with a neat sketch. (6M)
   b) With the help of a neat sketch explain (i) Feed Check Valve; (ii) Air Pre-heater. (8M)

3. a) Distinguish between Brazing and soldering from the point of view of the filler metals used, applications and the strength of the joint obtained. (7M)
   b) Explain the principle underlying the resistance welding process. Discuss the advantages and disadvantages of Resistance Welding process. (7M)
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4. a) Describe with a neat sketch, the construction and working of a single stage, single acting reciprocating air compressor. (7M)

   b) Air to be compressed in a single acting reciprocating compressor from 1.013 bar and 15^0C to 7 bar, neglecting clearance. Calculate the indicated power required for a free air delivery of 0.3 m^3/min, when the compression process is (i) Isentropic; (ii) Polytropic with n=1.25. (7M)

5. a) Explain with suitable sketches, the working of a Four Stroke Spark Ignition Engine. (6M)

   b) A two stroke compression ignition engine delivers 5000 kW, while using 1000 kW to overcome friction losses. It consumes 2300 kg of fuel per hour at an air fuel ratio of 20:1. The heating value of fuel is 42000 kJ/kg. Find the (i) Indicated power; (ii) Brake power; (iii) Indicated thermal efficiency; (iv) Brake thermal efficiency. (8M)

6. a) Derive the relation for the ratio of belt tensions in a flat belt drive. (7M)

   b) Show that the centrifugal tension is independent of the tight and slack side tensions and depends only on the velocity of the belt over the pulley. (7M)

7. a) What are the main tooth profiles of gear teeth which fulfill the law of gearing? Compare them. (7M)

   b) State the advantage of compound gear train over a simple gear train. (7M)

Code No: R161232 **R16** SET - 4

I B. Tech I Semester Regular Examinations, April/May - 2017
ELEMENTS OF MECHANICAL ENGINEERING
(Civil Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answering the question in **Part-A** is Compulsory
3. Answer any **FOUR** Questions from **Part-B**

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PART –A

1. a) Explain the working principle of a Steam Turbine. (2M)
   b) What do you understand by the following Casting terms: (i) Cope; (ii) Drag. (2M)
   c) Define (i) Compression ratio; (ii) Mechanical Efficiency of an Internal Combustion Engine. (2M)
   d) What are the applications of compressed air? (2M)
   e) What is the difference between Open belt drive and a Crossed belt drive? (2M)
   f) Explain Addendum and Dedendum of a gear. What is clearance? (2M)
   g) What do you understand by a Simple Gear train? (2M)

PART –B

2. a) Explain the construction and working of Cornish Boiler with a neat sketch. (7M)
   b) With the help of a neat sketch explain (i) Economiser; (ii) Blow-off Cock. (7M)

3. a) How is an arc obtained in arc welding? Briefly explain the process of carbon arc-welding. (7M)
   b) In detail, discuss the classification of Lathes. Give their applications. (7M)

4. a) Discuss the differences between Reciprocating and Rotary air compressors. (6M)
   b) A single acting, single stage reciprocating air compressor takes 1 m^3 of air per minute at 1.013 bar, 288 K and delivers at 7 bar. Assuming the law of compression $pv^{1.35}$=constant, and neglecting clearance, calculate the Indicated power required. If the compressor is running at 300 rpm, find the diameter and stroke of the compressor taking L/D=1.5. (8M)
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5. a) Explain with suitable sketches, the working of a Two Stroke Spark Ignition Engine. (7M)

   b) A diesel engine develops 5 kW. It's indicated thermal efficiency is 30% and mechanical efficiency is 57%. Estimate (i) the fuel consumption of the engine in kg/hr; (ii) Indicated specific fuel consumption; (iii) Brake specific fuel consumption. (7M)

6. a) Derive the condition for maximum power transmission by a belt drive considering the effect of centrifugal tension. (7M)

   b) The smaller pulley of a flat belt drive has a radius of 220 mm and rotates at 480 rpm. The angle of lap is 155^0. The initial tension in the belt is 1.8 kN and the coefficient of friction between the belt and the pulley is 0.3. Determine the power transmitted by the belt. (7M)

7. a) State and derive the law of gearing. (7M)

   b) A compound gear train consists of four gears. The number of teeth on gears A, B, C and D are 54, 75, 36 and 81 respectively. Gears B and C constitute a Compound gear. Determine the torque on the output shaft if the gear A transmits 9 kW at 300 rpm. (7M)

Subject Code: R13202/R13 **Set No - 1**

I B. Tech II Semester Supplementary Examinations April/May - 2017
MATHEMATICS-III
(Common to All Branches)

Time: 3 hours **Max. Marks: 70**

Question Paper Consists of **Part-A** and **Part-B**
Answering the question in **Part-A** is Compulsory,
Three Questions should be answered from **Part-B**

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PART A

1. a) Reduce the matrix $\begin{pmatrix} 5 & 3 & 4 \\ 2 & 2 & 1 \\ 1 & -1 & 2 \end{pmatrix}$ into Echelon form and hence find its rank.

   b) If λ is an eigen value of A, then prove that the eigen value of $B = a_0A^2 + a_1A + a_2I$ is $a_0\lambda^2 + a_1\lambda + a_2$.

   c) Evaluate $\iiint_V (xy + yz + zx)dV$ where V is the region of space bounded by $x = 0, x = 1, y = 0, y = 2, z = 0, z = 3$.

   d) Evaluate $\int_0^{\frac{\pi}{2}} \sin^{\frac{7}{2}}\theta \cos^{\frac{3}{2}}\theta d\theta$.

   e) If $\overline{F} = xy^2\bar{i} + 2x^2yz\bar{j} - 3yz^2\bar{k}$ find $div\overline{F}$ at $(1,-1,1)$.

   f) Find work done by a force $\overline{F} = (x^2 - y^2 + x)\bar{i} - (2xy + y)\bar{j}$ which moves a particle in xy – plane from $(0,0)$ to $(1,1)$ along the parabola $y^2 = x$.

(4M+3M+4M+3M+4M+4M)

PART B

2. a) Find the rank of the matrix by reducing it to normal form $\begin{bmatrix} 1 & 2 & 2 & 4 \\ 2 & 3 & 4 & 6 \\ 3 & 5 & 6 & 10 \\ -1 & 1 & -2 & -2 \end{bmatrix}$.

   b) Using Gauss Seidel method to solve 27x + 6y -z = 85, 6x + 15y +2 z = 72, x + y +54z = 110. (8M+8M)

3. a) Find the eigenvalues and the corresponding eigen vectors of $\begin{bmatrix} 1 & 2 & -2 \\ 1 & 1 & 1 \\ 1 & 3 & -1 \end{bmatrix}$.

   b) Reduce the quadratic form $x^2 + 4y^2 + z^2 + 4xy + 6yz + 2zx$ to canonical form. Also find signature and rank of the quadratic form. (8M+8M)

4. a) Find the length of the curve $3x^2 = y^3$ between y=0 and y=1.

   b) Evaluate $\int_0^a \int_0^{\sqrt{a^2-x^2}} \sqrt{a^2 - x^2 - y^2}\, dy dx$. (8M+8M)

5. a) Evaluate $\int_0^{\frac{\pi}{2}} \sin^5\theta \cos^{7/2}\theta d\theta$ using Beta and Gamma functions.

   b) Show that $B(m, ½) = 2^{2m-1} B(m,m)$. (8M+8M)

6. a) Find the angle of intersection of the spheres $x^2 + y^2 + z^2 = 39$ and $x^2 + y^2 + z^2 + 4x - 6y - 8z + 52 = 0$ at the point (4, -3, 2).

   b) Prove that $\text{curl}(\bar{a} \times \bar{b}) = \bar{a}\, div\bar{b} - \bar{b}\, div\bar{a} + (\bar{b}.\nabla)\bar{a} - (\bar{a}.\nabla)\bar{b}$. (8M+8M)

7. a) Evaluate $\int_C \bar{F}.dr$ where $\bar{F} = 3xy\bar{i} - y^2\bar{j}$ and C is the curve $y = 2x^2$ in xy-plane from (0, 0) to (1, 2).

   b) Evaluate $\iint_S \bar{F}.\bar{n}\, ds$ where $\bar{F} = 12x^2 y\bar{i} - 3yz\bar{j} + 2z\bar{k}$ and S is the portion of the plane $x + y + z = 1$ included in the first octant. (8M+8M)

Subject Code: R10203/R10 **Set No - 1**

I B. Tech II Semester Supplementary Examinations April/May - 2017
ENGINEERING PHYSICS-II
(Common to All Branches)

Time**:** 3 hours Max. Marks**:** 75

Answer any **FIVE** Questions
All Questions carry equal marks
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1. (a) Apply Schrodinger's wave equation to a particle in one dimensional box and obtain the eigen values and eigen functions.
   (b) Write short notes on Classical bits and Qu bits. [10+5]

2. (a) On the basis of classical free electron theory, derive an expression for electrical conductivity.
   (b) Write the expression for Fermi distribution function and explain with suitable diagram, discuss its variation with temperature. [10+5]

3. (a) Classify solids on the basis of band theory of solids.
   (b) Explain the concept of effective mass of an electron. [10+5]

4. (a) Explain the domain theory of ferromagnetism. Using that theory, explain the phenomenon of hysteresis in ferromagnetic materials.
   (b) Differentiate a soft magnetic material from a hard magnetic material. [10+5]

5. (a) What is Meissner effect? Prove that all the superconductors are perfect diamagnets in the superconducting state.
   (b) Briefly explain i) SQUIDS ii) BCS theory. [7+8]

6. (a) Explain electronic polarization in atoms and obtain an expression for electronic polarizability in terms of the radius of atom.
   (b) Explain dielectric breakdown and loss in dielectric materials. [10+5]

7. (a) Explain the terms conduction band and valence band of an intrinsic semiconductor with a diagram.
   (b) Derive an expression for density of electrons in conduction band. [5+10]

8. (a) How do nanomaterials differ from bulk materials? Explain the preparation of nanomaterials by chemical vapour deposition method and describe the important properties of nanomaterials.
   (b) Discuss any five applications of nanomaterials. [10+5]
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