

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) 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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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 R₄M₄ 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) Discuss 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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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) Discuss 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? Discuss about geothermal energy. (6M)



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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? (6M)
Explain by taking Poly acetylene as an example.
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)

I B. Tech II Semester Regular Examinations, April/May - 2017
BASIC ELECTRICAL AND ELECTRONICS ENGINEERING
 (Com. to ME, AE, AME, MM, MET)

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Max. Marks: 70

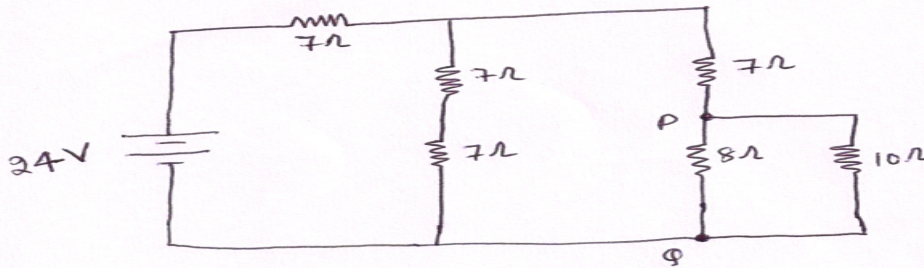
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PART -A

1. a) A 100Ω resistance is directly switched on across a 10 V battery. What is the current through resistor? How much is the power loss? Also find the energy consumed in 5 Sec. (2M)
- b) Explain the effect of temperature on resistance. (2M)
- c) List and give the applications of different types of DC machines. (2M)
- d) Define voltage regulation of a transformer. (2M)
- e) In an Induction motor, slip is always Positive, Why? (2M)
- f) What is an Ideal diode? Draw its characteristics. (2M)
- g) Explain in brief about feedback amplifier. (2M)

PART -B

2. a) Prove that the energy stored in a capacitor is $\frac{1}{2} C V^2$. (6M)
- b) Find the voltage drop across the 10Ω resistor for the network shown below: (8M)



3. a) Explain the constructional features of a DC machine. (7M)
- b) The wave connected armature of a two-pole 200 V generator has 400 conductors and runs at 300 rpm. Calculate the useful flux per pole. (7M)
4. a) What are the losses that occur in a transformer and how can these losses be reduced? (7M)
- b) Explain the necessity for conducting OC and SC tests on a single phase transformer and give its outcome. (7M)
5. a) Derive the expression for torque developed by an Induction motor. (7M)
- b) A 4 pole, three phase induction motor is connected to a 50 Hz supply. Calculate the synchronous speed, the rotor speed when slip is 4 %, and the rotor frequency when the rotor is running at 1425 rpm. (7M)
6. Explain with a neat diagram the operation of a Full wave rectifier and also draw its output wave forms. (14M)
7. a) Explain the working principle of an n-p-n transistor. (8M)
- b) Explain the working of a single-stage common emitter practical amplifier. Describe the importance of dynamic characteristics. (6M)

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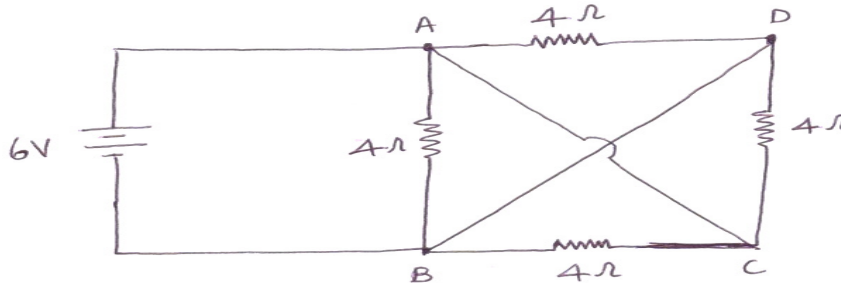
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PART -A

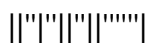
1. a) Explain the basic property of a capacitance. (2M)
- b) Explain the significance of Open circuit characteristics of a dc generator. (2M)
- c) List the different types of losses that occur in a dc motor. (2M)
- d) What is eddy current loss and how it can be reduced? (2M)
- e) List the applications of Synchronous motor. (2M)
- f) Describe the characteristics of an ideal Op Amp. (2M)
- g) What is forward bias of a PN junction? (2M)

PART -B

2. a) Explain in detail about Kirchoff's Current and Voltage Law. (6M)
- b) Calculate the current supplied by the battery for the network shown below: (8M)



3. a) Explain the principle of operation of a DC Generator. (7M)
- b) A 500 V shunt motor takes a current of 5A on no-load. Calculate the efficiency of the motor when it takes 100 A. Take $R_a = 0.5\Omega$ and $R_f = 250\Omega$. (7M)
4. a) Derive the emf equation of a transformer. (7M)
- b) The maximum flux density in the core of a 1100/220V, 50 Hz, 100 KVA transformer is 3.5 Wb/m^2 . Calculate the area of cross section of the core and the number of turns of the primary and secondary windings if the EMF per turn is 5.5 V. (7M)
5. a) What is meant by slip of an Induction motor? What is the value of slip at starting and at synchronous speed? (7M)
- b) Explain the different types of losses that occur in an Induction motor. (7M)
6. a) What are P-type and n-type semiconductors? Draw and explain the V-I characteristic of a p-n junction diode. (7M)
- b) Explain in detail and give the realization of Op – Amp as an Integrator. (7M)
7. a) Draw and explain the common –emitter transistor characteristics. (7M)
- b) Explain in detail about the frequency response of CE Amplifier. (7M)



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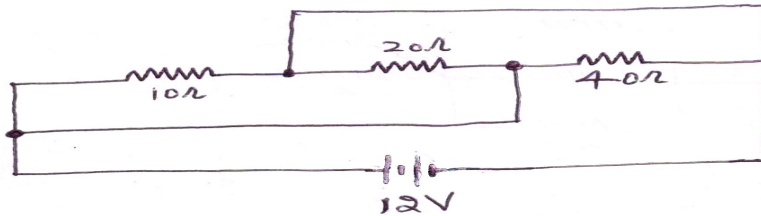
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PART -A

1. a) State and explain ohms law. (2M)
- b) Explain the working principle of a DC Motor. (2M)
- c) Explain the significance of a starter for a DC Motor. (2M)
- d) Why is the core of a transformer made of magnetic material? (2M)
- e) List the applications of Induction Motors. (2M)
- f) What do you mean by forward biasing and reverse biasing of a p-n junction? (2M)
- g) Explain the significance of saturation current in a p – n junction. (2M)

PART -B

2. a) Prove that in series combination of resistances the equivalent resistance in the d.c circuit is the simple sum of individual resistances. (6M)
- b) Calculate the current supplied by the battery for the circuit shown below: (8M)



3. a) Derive the emf equation of a dc machine. (7M)
- b) Explain the significance of Swinburne test and What you can attain from this test. (7M)
4. a) Draw and explain the equivalent circuit of a transformer. (7M)
- b) Explain the procedure to conduct short circuit test on a transformer. What are the parameters that can be obtained from this test? (7M)
5. a) Explain with sketches the constructional features of an alternator. (7M)
- b) Explain the working principle of a synchronous motor. (7M)
6. a) Explain the formation of depletion region in a p-n junction. What is barrier voltage? (7M)
- b) Explain the avalanche effect in a semiconductor device. (7M)
7. a) Discuss the advantages of negative feedback in amplifiers. (7M)
- b) Compare between PNP and NPN transistors. (7M)

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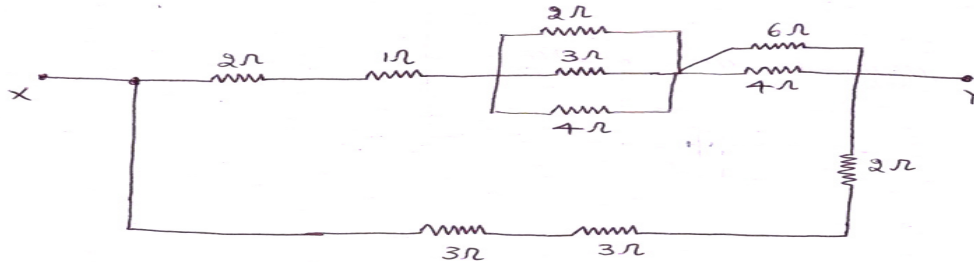
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PART -A

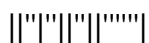
1. a) Explain the basic property of an inductance. (2M)
- b) Explain the different speed control methods of DC Motors. (2M)
- c) Distinguish between core type and shell type transformers. (2M)
- d) Explain why the frequency of output voltage is the same as input voltage in a transformer. (2M)
- e) What is rotor frequency and how come it is different from stator frequency in a Three phase Induction motor? (2M)
- f) Distinguish between Intrinsic and Extrinsic Semiconductors. Give examples. (2M)
- g) Explain the significance of current gain in Transistors. (2M)

PART -B

2. a) Distinguish between an ideal voltage source and a practical Voltage source. (6M)
- b) Find the equivalent resistance across X – Y for the circuit shown below (8M)



3. a) Derive the Torque equation for a DC Motor. (7M)
- b) Explain the working of a Three Point starter with a neat diagram. (7M)
4. a) Explain the principle of operation of a transformer in detail. (7M)
- b) A 25 KVA, 2000/200 V transformer has constant loss i.e., iron loss of 350 W and full –load copper loss called the variable loss of 400 W. Calculate the efficiency of the transformer at full load and at half load 0.8 power factor lagging. (7M)
5. a) What is meant by synchronous speed? Establish the relation $N_s = 120f/P$, where N_s is the synchronous speed, f is the frequency, and P is the number of poles. (7M)
- b) Draw and Explain the Torque – Slip characteristics of a Three Phase Induction Motor. (7M)
6. a) List the specification parameters of a Diode. (5M)
- b) Explain the basic configuration of a Non-Inverting amplifier with a neat diagram. (9M)
7. a) Show how a transistor can be used as a static Switch. (7M)
- b) Explain with the help of diagrams various types of circuit configurations, which can be obtained from a bipolar junction transistor. (7M)



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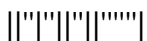
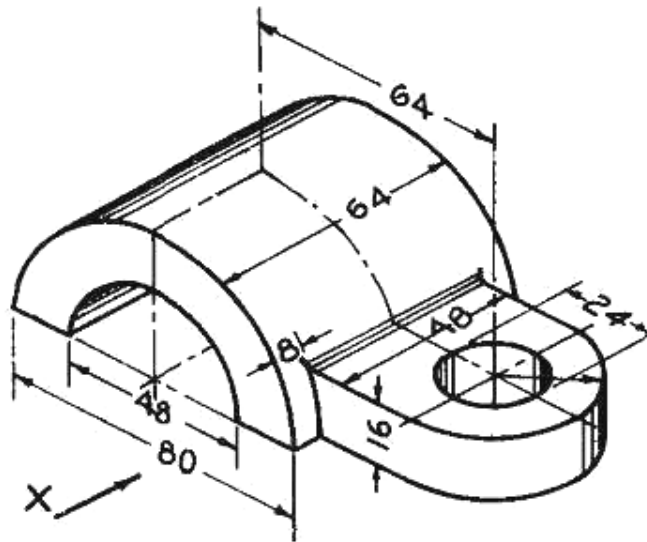
**PART -A**

1. a) Draw an ellipse having the major axis of 70 mm and the minor axis of 40 mm. (6M)
- b) Draw the projections of the following points on the same ground line, keeping the Projectors 20 mm apart. (4M)
  - (i) Point A, 25 mm above the H.P. and 50 mm in front of V.P.
  - (ii) Point B, on the H.P. and 30 mm below the V.P.
- c) An equilateral triangle plane ABC of side 40 mm has its plane parallel to VP and 20 mm away from it. Draw the projections of the plane when one of its side is perpendicular to HP. (4M)

**PART -B**

2. a) Construct an ellipse with its major axis is 90 mm and minor axis is 55 mm using arc and circles method. (7M)
- b) Construct a plain scale of R.F. 1:50000 to show kilometers and hectometers and long enough to measure up to 10 kilometers. Measure a distance of 84 hectometers on your scale. (7M)
3. a) A point at 35 mm above the reference line XY is the front view of two points P and Q. The top view of P is 35 mm behind VP and the top view of Q is 40 mm in front of VP. Draw the projections of the points and state their positions relative to the planes of projection and the quadrants in which they lie. (7M)
- b) A line of 80 mm long is parallel to and 40 mm above HP. Its two ends are 35 mm and 50 mm in front of VP respectively. Find its inclination with VP. (7M)

4. A line AB 90 mm long is inclined  $45^{\circ}$  to the HP and  $30^{\circ}$  to the VP. Its end A is in HP and 40 mm in front of the VP. Draw its projections and determine the traces. (14M)
5. Draw the projections of a circle of 40 mm diameter resting in the HP on a point A on the circumference, its plane inclined at  $45^{\circ}$  to the HP and  
a) The top view of the diameter AB making  $30^{\circ}$  angle with the VP.  
b) The diameter AB making  $30^{\circ}$  angle with the VP. (14M)
6. A square pyramid base 35 mm side and axis 80 mm long has a triangular face in the HP and the vertical plane containing the axis makes an angle of  $45^{\circ}$  with the VP. Draw its projections. (14M)
7. Draw the Front View, Top view & both side views of the figure shown below. All dimensions are in mm. (14M)



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**PART -A**

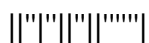
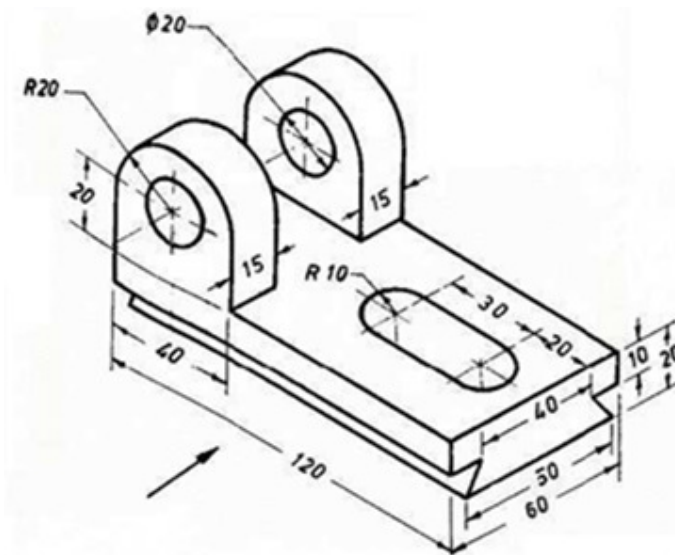
1. a) Draw the projections of a 70 mm long straight line, in the following positions (4M)
  - (i) Inclined at  $30^0$  to VP, in HP and one end on VP.
  - (ii) Perpendicular to the H.P, 35 mm in front of the V.P and its one end 25 mm above the H.P.
- b) Draw the projections of the following points on the same ground line, keeping the Projectors 30 mm apart. (4M)
  - (i) Point A, 30 mm above the H.P. and in the V.P.
  - (ii) Point B, 45 mm above the H.P. and 50 mm behind the V.P.
- c) Draw the isometric view of a square prism, with side of base 45 mm and length of axis 90 mm, when its axis is horizontal. (6M)

**PART -B**

2. a) The R.F of the scale is 1/400. Construct a scale to measure a maximum distance of 50 m and show a distance of 37.6 m on it. (7M)
- b) Construct a scale to be used with a map, the scale of which is 1cm = 500 m. The maximum length to be read is 7 km. Mark on the scale a distance of 5.35 km (7M)
3. a) A point A is 25 mm above HP and 50 mm in front of VP. Another point B is 30 mm below the HP and 25 mm behind the VP. The distance between the projectors of the points measured parallel to XY is 75mm. Draw the projections of the points. Draw the lines joining their front views and top views. (7M)
- b) A line of 80 mm long is parallel to and 20 mm in front of VP. Its one end is in HP while the other end is 30mm above HP. Find its inclination with HP. (7M)



4. A line AB, 100 mm long, is inclined at  $45^\circ$  to the HP and its top view makes an angle of  $60^\circ$  with the VP. The end A is in the HP and 10 mm in front of the VP. Draw its front view and find its true inclination with the VP. (14M)
5. A circular plane of 50 mm diameter rests on V.P. on a point A on its circumference. Its plane is inclined at  $45^\circ$  to V.P. Draw the projections of the plane when  
 (a) The front view of the diameter AB makes  $35^\circ$  with H.P. and  
 (b) The diameter AB itself makes  $45^\circ$  with H.P. (14M)
6. A pentagonal pyramid of base edge 25mm and altitude 55 mm rests on one of its edges of the base on HP such that this edge is inclined at  $40^\circ$  to VP and the slant face of the pyramid containing that edge is perpendicular to HP. Draw the projections of the solid. (14M)
7. Draw the Front View, Top view & both side views of the figure shown below. All dimensions are in mm. (14M)



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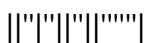
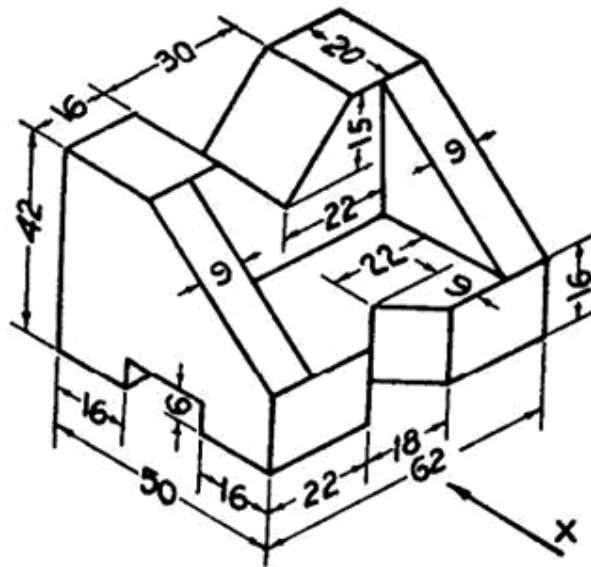
**PART -A**

1. a) Draw the projections of a 50 mm long straight line, in the following positions (4M)
  - (i) Perpendicular to HP, 30 mm in front of VP and one end on HP.
  - (ii) Inclined at  $45^0$  to the V.P, in the H.P. and its one end in the V.P.
- b) Draw the projections of the following points on the same ground line, keeping the Projectors 25 mm apart. (4M)
  - (i) Point A, 50 mm below the H.P. and in the V.P.
  - (ii) Point B, 45 mm below the H.P. and 30 mm in front of the V.P.
- c) Draw the projections of a cone, base 50 mm diameter and axis 75 mm long resting on HP on its base. (6M)

**PART -B**

2. a) The major axis and minor axis of an ellipse are 70 mm and 45 mm long respectively. Construct an ellipse by Arc and circles method. (7M)
- b) The distance between two points on a map is 15 cm. The real distance between them is 20 km. Draw a diagonal scale to measure up to 25 km and show a distance of 13.6 km on it. (7M)
3. a) A point P is 25 mm above the H.P. and 20 mm in front of the V.P. Another point Q is 20 mm behind the V.P. and 30 mm below the H.P. Draw projections of P and Q keeping the distance between their projectors equal to 80 mm. Draw straight lines joining (i) their top views and (ii) their front views. (7M)
- b) The front view of a line which is inclined at  $30^0$  to VP is 65 mm long. Draw the projections of the line when it is parallel to and 30 mm above HP; its one end being 30 mm in front of VP. (7M)

4. A line PQ, 90 mm long measures 72 mm in front view and 65 mm in top view. (14M)  
Draw the two views of the line if it fully lies in the first quadrant. Find the true inclinations of the line. Point P lies at a distance 20 mm from the reference plane.
5. A regular hexagon of 30 mm has a corner in the HP. Its surface is inclined at  $45^{\circ}$  (14M)  
to the HP and the top view of the diagonal through the corner which is in the HP  
makes an angle of  $60^{\circ}$  with the VP. Draw its projections.
6. A cylinder of 30 mm base diameter and 60 mm axis rests on HP with a point of (14M)  
its base such that the axis is inclined at  $30^{\circ}$  to HP. Draw its projections.
7. Draw the Front View, Top view & side view of the figure shown below. All (14M)  
dimensions are in mm.



**I B. Tech II Semester Regular Examinations, April/May - 2017****ENGINEERING DRAWING**

(Com. to ME, CHEM, AE, AME, MM, PE, PCE, MET)

Time: 3 hours

Max. Marks: 70

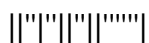
- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)  
 2. Answering the question in **Part-A** is Compulsory  
 3. Answer any **FOUR** Questions from **Part-B**
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**PART -A**

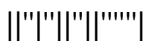
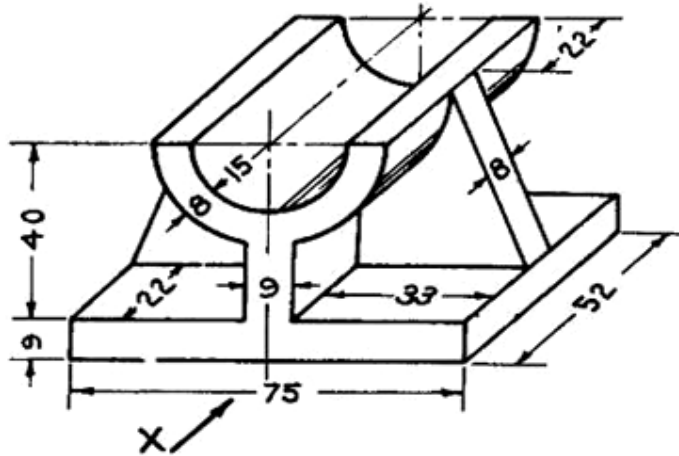
1. a) Divide a Straight line of 150 mm into 9 equal parts. (4M)
- b) Draw the projections of the following points on the same ground line, keeping the Projectors 30 mm apart. (4M)
  - i) Point A, 20 mm below the H.P. and 45 mm behind the V.P.
  - ii) Point B, on the H.P. and 45 mm in front of the V.P.
- c) A cube of 50 mm long edges is resting on the HP with its vertical faces equally inclined to VP. Draw its projections. (6M)

**PART -B**

2. a) Construct a vernier scale to the read metres, decimetres and long enough to measure up to 6 m, when 1 m is represented by 25 mm. Find R.F. and show a distance of 4.36 m on it. (7M)
- b) On a building plan a line 10 cm long represents a distance of 5 m. Construct a diagonal scale for the plan to read upto 6 m, showing meters, decimeters and centimeters. Indicate on your scale the length of 3.24 m. (7M)
3. a) A point A is 20 mm in front of the V.P. and 40 mm above the H.P. Another point B is 40 mm in front of the V.P. and 20 mm above the H.P. The distance measured between the projectors is 50 mm. Draw the projections and find the distance between A and B. (7M)
- b) Draw the projections of a straight line AB, 70 mm long when inclined at  $45^\circ$  to HP with one end 20 mm above HP and parallel to and 30 mm in front of VP. (7M)



4. A straight line AB of 75 mm long has the end A on VP and the end B on HP. The line is inclined at  $30^{\circ}$  to VP and its front view makes an angle of  $45^{\circ}$  with xy. Draw the projections of the line and add the left side view and locate the traces. (14M)
5. A regular hexagon of 30 mm has one of the side in the V.P. and inclined at  $45^{\circ}$  to H.P. Its surface is inclined at  $60^{\circ}$  to the V.P. Draw its projections. (14M)
6. A hexagonal prism side of base 30 mm and axis 60 mm long rests with one of its base corners on HP such that its base makes an angle of  $50^{\circ}$  to HP and its axis is parallel to VP. Draw its projections. (14M)
7. Draw the Front View, Top view & side view of the figure shown below. All dimensions are in mm. (14M)





**I B. Tech II Semester Regular Examinations, April/May - 2017**  
**ENGINEERING PHYSICS**  
 (Com. to CE, ME, CHEM, AE, BIO, AME, MM, PE, PCE, MET)

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) Why two different light sources can't act as coherent sources? (2M)
- b) Why diffraction of light is not evident in daily life? (2M)
- c) Define O-ray and E-ray. (2M)
- d) How is laser different from an ordinary light? (2M)
- e) What is reverberation time? (2M)
- f) Draw (110) & (211) planes in a cubic crystal. (2M)
- g) Why magnetic susceptibility of dia magnetic materials is negative? (2M)

PART -B

2. a) Explain the formation of Newton's rings and derive the expression for diameter of the dark rings in the reflected light. Also show that rings are not equally spaced. (10M)
- b) In a Newton's rings experiment, the diameters of 5th and 15th dark rings are 0.336cm and 0.59cm respectively. If the radius of curvature of plano-convex lens is 100cm, find the wavelength of monochromatic light. What happens to ring diameters if air film is replaced with liquid of refractive index 1.33. (4M)
3. a) What is plane diffraction grating? Obtain an equation to find the wavelength of light using plane diffraction grating. What are the advantages of increasing number of lines in a grating? (10M)
- b) Write the differences between interference and diffraction. (4M)
4. a) Explain the principle, construction and working of Nicol prism. Describe how it can be used as polarizer. (7M)
- b) Write the differences between spontaneous and stimulated emissions? What is the necessity of population inversion in achieving lasing action? (7M)
5. a) What are ultrasonics? Explain a method with a neat diagram to produce ultrasonics. (10M)
- b) Explain the basic requirements of acoustically a good hall. (4M)
6. a) What are Miller indices? How they are obtained? What is their importance? (7M)
- b) What is Nuclear fission? Explain about the chain reactions. (7M)
7. a) What are ferromagnetic materials? Discuss their properties and applications. (6M)
- b) Calculate the expression for internal field of a dielectric material. (8M)

I B. Tech II Semester Regular Examinations, April/May - 2017
ENGINEERING PHYSICS
 (Com. to CE, ME, CHEM, AE, BIO, AME, MM, PE, PCE, MET)

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 any two applications of Newton's rings. (2M)
- b) Write any two differences between interference and diffraction. (2M)
- c) What is the difference between unpolarized and polarized light? (2M)
- d) What is the role of a metastable state in lasers? (2M)
- e) Write any two applications of ultrasonics. (2M)
- f) Silver has FCC structure and iron has BCC structure. Identify which one has primitive unit cell. (2M)
- g) Define dielectric loss and dielectric strength. (2M)

**PART -B**

2. a) Why circular fringes are observed in Newton's rings? Explain the procedure for determination of wavelength of a monochromatic light using Newton's rings experiment. Which method (Newton's rings or Interferometer) is better to find the wavelength of monochromatic light? Why? (10M)
- b) Describe the method to determine refractive index of a material using Newton's rings. (4M)
3. a) Explain the Fraunhofer diffraction due to single slit. Obtain the conditions for maxima and minima. (10M)
- b) In the diffraction grating, what is effect of total number of lines and width of grating on the spectrum. (4M)
4. a) With a neat diagram, explain the construction and working of He-Ne laser. (10M)
- b) Explain any two methods to produce plane polarized light. (4M)
5. a) Explain in detail the Non destructive testing (NDT) using ultrasonics. (4M)
- b) Derive Sabine's formula for reverberation time. (10M)
6. a) Derive the relation between interplanar distance and Miller indices of the planes of a cubic crystal. (10M)
- b) Silver has FCC structure and its atomic radius is  $1.441\text{\AA}$ . Find the spacing of (220) planes. (4M)
7. a) Classify the magnetic materials in atomic point of view. (4M)
- b) What is dielectric breakdown? Explain different kinds of dielectric breakdown mechanisms. (10M)

**I B. Tech II Semester Regular Examinations, April/May - 2017**  
**ENGINEERING PHYSICS**  
 (Com. to CE, ME, CHEM, AE, BIO, AME, MM, PE, PCE, MET)

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) Write the principle of Superposition. (2M)
- b) In a Newton's rings experiment, why we choose a plano convex lens of larger radius of curvature? (2M)
- c) Define Mass defect and binding energy. (2M)
- d) What is a quarter wave plate? (2M)
- e) What is meant by non-destructive testing? (2M)
- f) Define the terms primitive and non-primitive unit cells. (2M)
- g) What are ferroelectrics? (2M)

**PART -B**

2. a) Why the Newton's rings are circular and central fringe is dark? Show that fringes are unequally spaced. Explain the determination of wavelength of monochromatic light using Newton's rings experiment. (10M)
- b) In Michelson's interferometer 200 fringes crossed the field of view when the movable mirror is displaced through a distance of 0.0589mm. Find the wavelength of light used. (4M)
3. a) Explain the Fraunhofer's diffraction due to a double slit. Explain the intensity distribution curve. (10M)
- b) Write the differences between Fresnel's and Fraunhofer's diffractions. (4M)
4. a) Explain the construction and working of a polarimeter. (7M)
- b) Describe the construction and working of Ruby laser with a neat energy level diagram. (7M)
5. a) Write notes on absorption coefficient of a material and its measurement. (7M)
- b) Explain the production of ultrasonics by any one method. (7M)
6. a) What are Miller indices? Explain their role in the crystal structures. Draw the crystal planes having Miller indices (100), (111), (211). (10M)
- b) Write about controlled and uncontrolled chain reactions. (4M)
7. a) Explain the hysteresis of ferromagnetic materials. How it can be used to select materials for construction of permanent magnets? (9M)
- b) What are ferroelectric materials? How they are different from dielectric materials? (5M)



**I B. Tech II Semester Regular Examinations, April/May - 2017**  
**ENGINEERING PHYSICS**  
 (Com. to CE, ME, CHEM, AE, BIO, AME, MM, PE, PCE, MET)

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) Why the central fringe is dark in Newton's rings experiment? (2M)
- b) What is diffraction grating? (2M)
- c) What is difference between Polarimeter and Saccharimeter? (2M)
- d) Write any two industrial applications of ultrasonics. (2M)
- e) Lead is face centered cubic with atomic radius of  $1.746\text{\AA}$ . Calculate the interplanar spacing of (200) plane. (2M)
- f) Explain the Hysteresis of Ferro magnetic materials. (2M)
- g) Define dielectric constant and dielectric loss. (2M)

**PART -B**

2. a) What is thin film? Derive the expressions for maxima and minima for reflected light in case of transparent film of uniform thickness. (10M)
- b) What will happen if the plano convex lens in the Newton's rings experiment is lifted up by  $\lambda/2$ , where  $\lambda$  is wavelength of monochromatic light used? (4M)
3. a) What is resolving power of a grating? Obtain an expression for resolving power of a diffraction grating and prove that it is independent of grating element. (10M)
- b) Calculate the maximum order of diffraction possible with a plane transmission grating having 15000 lines/inch and light of wavelength  $6000\text{\AA}$ . (4M)
4. a) Explain the principle, construction and working of Nicol prism. (6M)
- b) Explain construction and working of He-Ne laser with a neat energy level diagram. (8M)
5. a) State and explain the acoustic requirements of a concert hall. (4M)
- b) Explain the production of ultrasonics by Magnetostriction method. Write its merits and demerits. (10M)
6. a) State and derive Bragg's law. Calculate the longest wavelength that can be analyzed by rock salt crystal of spacing  $2.82\text{\AA}$  in the first order. (10M)
- b) Distinguish between fission and fusion reactions. Explain. (4M)
7. a) Discuss temperature dependence of susceptibility of para and ferro magnetic materials. (4M)
- b) Derive Clasius-Mossoti relation. Calculate the ratio between electronic and ionic polarizability of a dielectric having  $\epsilon = 4.94$  and  $n^2 = 2.69$ . Where ' $\epsilon$ ' is dielectric constant and 'n' is refractive index. (10M)



**I B. Tech II Semester Regular Examinations, April/May - 2017****ENGLISH-II**

(Com. to All Branches)

Time: 3 hours

Max. Marks: 70

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- 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 layman's view of atomic bomb? How right is he in thinking so? (2M)
- b) Define culture shock with various symptoms of it. (2M)
- c) What is public health surveillance and why is it important? (2M)
- d) What was the program Gates developed along with his friend and how did he market it? (2M)
- e) What were Kalam's contributions to DRDO? (2M)
- f) Name any two European scientists Bhabha was associated with and their contributions to the scientific world. (2M)
- g) What was Branley's experiment and what is its importance? (2M)

**PART -B**

2. a) How is the knowledge given by science different from what is acquired through education? Give examples from your learning experiences to support your answer. (5M)
- b) Mention any four great qualities of Dr. Kalam that made the world recognize him as a great scientist and leader. (4M)
- c) Write a letter to the Regional Manager of South Central Railways, Vijayawada complaining about the luggage/parcel you have not received which your friend has sent from IIT Mumbai. (5M)
3. a) Who do you think is to be held responsible for the destruction created by technology? Support your opinion with suitable examples. (5M)
- b) Write an email to your principal with a copy to your head of the department, asking him/her to permit your class to go on an industrial & educational tour for a week. (4M)
- c) List out the awards and achievements of Sir C.V. Raman. (5M)

4. a) How should one avoid culture shock before experiencing it when one goes to a new place? What precautions would help in living peacefully in a new place of new culture? (5M)
- b) **Fill in the blanks with suitable forms of the verbs given in the parenthesis.** (4M)  
She \_\_\_\_\_ (look) for a house for the past one month. Finally, she \_\_\_\_\_ (find) one that suits her requirements. She \_\_\_\_\_ (want) a house that has a small garden and space to \_\_\_\_\_ (park) her car. She \_\_\_\_\_ (say) she \_\_\_\_\_ (love) to live in a house that \_\_\_\_\_ (have) cross ventilation. She \_\_\_\_\_ (move) into it tomorrow.
- c) Name the discoveries and inventions that Bhabha was associated with. How did they help him contribute better to our country? (5M)
5. a) How did lottery in the village change the lives of the people? What could be done to make the villagers' lives better? (5M)
- b) Why and how do you think J.C.Bose remained an ideal scientist in principle and practice? State instances from his life that support your opinion. (4M)
- c) Write an essay on "Importance of Technical Education" in about 300 to 350 words. (5M)
6. a) What kind of health problems are common in India in relation to climate changes? What steps are to be taken by the public and government to prevent health hazards caused due to climate changes? (5M)
- b) Give a note on P.C. Ray's discoveries and their properties. (5M)
- c) **Give one word substitutes for the following and use the word in your own sentence:** (4M)  
i) Hard to please  
ii) A great lover of books  
iii) Having a ready disposition to fight  
iv) Someone who is the first to think/make something
7. a) What do you think are the qualities of Bill Gates that made him a successful professional? Give examples from the text to support your answer. (5M)
- b) How did Hardy help Ramanujan personally and professionally? (5M)
- c) **Rewrite the following sentences correcting the errors:** (4M)  
i) I started late at my house. Thought I can take a cab to reach my office in time.  
ii) He plays football when he was free.  
iii) He drunk coffee everyday when he was young.  
iv) Had your breakfast in the morning?

**I B. Tech II Semester Regular Examinations, April/May – 2017****ENGLISH-II**

(Com. to All Branches)

Time: 3 hours

Max. Marks: 70

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- 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 the foremost task of education according to the text “The Greatest Source- Education”? (2M)
- b) How is the attitude of the local people towards a person who is under culture shock? (2M)
- c) Who is Paul Allen and how did he contribute to Microsoft? (2M)
- d) Explain the process of lottery in the village and state whether it is democratic. (2M)
- e) What is Kalam’s role in SLV-3 project that made it successful? (2M)
- f) Explain Raman Effect. (2M)
- g) What were the unique achievements of Ramanujan? (2M)

**PART -B**

2. a) Does our education system help us find the difference between science and education? Give reasons to support your point of view. (4M)
- b) What qualities of Abdul Kalam made him the world’s admirable scientist? How do you think he has developed them? (5M)
- c) Write a dialogue between you and your friend who has come from a school where he is not very much exposed to English. He feels he is not fit for the course and needs to quit. However, his previous ranks and marks show that he is brilliant. Convince him instilling some courage using your soft skills. (Your dialogue cannot be less than 10 exchanges-A+B) (5M)
3. a) Who is to be held responsible for the destructive use of scientific inventions- science or people? Give reasons/examples to support your opinion. (5M)
- b) What were Raman’s contributions to Indian Institute of Sciences? (5M)
- c) Write an email to the regional manager of Samsung, complaining about the malfunctioning of the refrigerator you bought last month. The service center manager refused to take up the issue as the product is in the guarantee period. Give details of your gadget and request for immediate action. (4M)

4. a) Why and when do variations in cultures lead to a shock to new comers? How do you think one can avoid any kind of culture shock? (5M)
- b) Why did Bhabha initiate Indian Nuclear programme? Do you think it is realistic and necessary for a country like India? Give reasons. (5M)
- c) **Fill in the blanks with suitable forms of the verbs given in the parenthesis.** (4M)  
I \_\_\_\_\_ (wait) for this news for the past one week. Finally, it \_\_\_\_\_ (come) but none \_\_\_\_\_ (be) ready to accept it. Our teacher \_\_\_\_\_ (leave) us to \_\_\_\_\_ (join) her family in Chennai. She \_\_\_\_\_ (tell) me this a week ago but did not officially announce. She \_\_\_\_\_ (vacate) her house tomorrow. So we \_\_\_\_\_ (think) of giving her a farewell today evening.
5. a) Is lottery morally justified? Give reasons with examples from the story “The Lottery”. (5M)
- b) Why did J.C.Bose remain against patenting his inventions? (5M)
- c) Write an essay on “Importance of Digital Literacy in Rural India”. (4M)
6. a) What are the different measures the author talks about to manage health problems caused due to climate changes? (5M)
- b) What were the achievements and awards won by P.C. Ray? How did they contribute to the scientific world? (5M)
- c) **Give one word substitutes for the following and use the word in your own sentence:** (4M)  
i) A remedy for all diseases  
ii) One who can speak two languages  
iii) A word opposite in meaning  
iv) A person who never drinks alcohol
7. a) What do you think is the role of Gates parents in his success? Can similar kind of home environment lead to anyone’s success? Give reasons. (5M)
- b) What were the circumstances that helped Ramanujan go to England and why did he return to India? (5M)
- c) **Rewrite the following sentences correcting the errors:** (4M)  
i) I waved at my friend’s car. Thought he will stop to pick me up.  
ii) They gathered under the tree and discusses the agenda of the meeting.  
iii) She sung a very melodious song yesterday in the competition.  
iv) You saw the doctor yesterday?



**I B. Tech II Semester Regular Examinations, April/May – 2017****ENGLISH-II**

(Com. to All Branches)

Time: 3 hours

Max. Marks: 70

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 Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answering the question in **Part-A** is Compulsory3. Answer any **FOUR** Questions from **Part-B**

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PART -A

1. a) What is the scientific dilemma a layman is linked with and why? (2M)
- b) What is the role of language in helping us recover from culture shock? (2M)
- c) How is temperature directly related to the death rate of a place? (2M)
- d) What did Gates feel about the free distribution of his software and what did he write in his open letter? (2M)
- e) How was Kalam involved with Pokhran-II project? (2M)
- f) How was TIFR founded and what were its research areas? (2M)
- g) Name the top most award in the field of science that Bose received. What was it given for? (2M)

PART -B

2. a) Describe how education can be the greatest source for civilization. Give suitable examples to support your answer. (5M)
- b) Why do you think Dr. Kalam was nominated as President of India unanimously? Give reasons highlighting his qualities/characteristics. (4M)
- c) You are the president of the students' union of your college. Write a letter to the officer-in-charge of the hostels of your college explaining the problems faced by the students. Suggest some solutions and request for immediate action. (5M)
3. a) Is it possible to have a scientific invention without any evil effects? Support your answer with suitable examples from our day to day use of scientific inventions. (5M)
- b) Was Raman's career as a scientist a smooth one? Give reasons to support your answer. (5M)
- c) Write an email to your district collector asking him to provide more beds and a proper qualified doctor at all the health centers in the rural places of your district which would improve the living conditions in the villages. (4M)

4. a) How is culture shock caused and what are the various strategies a person can adopt to overcome culture shock? (5M)
- b) How did Bhabha contribute to Atomic Energy Commission in India? (5M)
- c) **Fill in the blanks with suitable forms of the verbs given in the parenthesis.** (4M)
She _____ (look) for a house for the past one month. Finally, she _____ (find) one that suits her requirements. She _____ (want) a house that has a small garden and space to _____ (park) her car. She _____ (say) she _____ (love) to live in a house that _____ (have) cross ventilation. She _____ (move) into it tomorrow.
5. a) Explain the practice of lottery in the village. Do you think it is the right one? Give reasons to support your opinion. (5M)
- b) Mention the famous devices designed by J.C.Bose. Describe their functioning and importance. (5M)
- c) Write an essay on "Importance of Protecting One's Culture". (4M)
6. a) What kind of health problems do Indians face due to climate changes? How can they be prevented? (5M)
- b) Give details of contributions of P.C Ray as a scientist, entrepreneur and socialist to India. (5M)
- c) **Give one word substitutes for the following and use the word in your own sentence:** (4M)
i) Detailed plan of a journey
ii) Person who works in the same department/office
iii) One who travels in space
iv) A small shop that sells fashionable clothes, cosmetics etc.
7. a) Explain the social services rendered by Bill Gates as Philanthropist. (5M)
- b) What were the strengths and weaknesses of Ramanujan as a mathematician according to Hardy? (5M)
- c) **Rewrite the following sentences correcting the errors:** (4M)
i) I keep smiling at the blind man at the bus stop. Although I knew he cannot see my smile.
ii) She looked at the cake and immediately orders for it.
iii) She written the report yesterday.
iv) Had your lunch in the afternoon?

I B. Tech II Semester Regular Examinations, April/May – 2017**ENGLISH-II**

(Com. to All Branches)

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 Compulsory3. Answer any **FOUR** Questions from **Part-B**

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**PART –A**

1. a) Why does the author say that the ‘know-how’ produced by science and technology is an ‘unfinished sentence’? (2M)
- b) How can one control air pollution and manage it? (2M)
- c) How do people express their culture shock? (2M)
- d) What is public health surveillance and why is it important? (2M)
- e) What was Kalam’s role in building indigenous rockets in India? (2M)
- f) Describe the work of Raman that made him to achieve the Noble Prize. (2M)
- g) Name some awards P. C. Ray won. What were they given for? (2M)

**PART –B**

2. a) What is the prime source for civilizations to come into existence and disappear? Do you agree with the author’s argument? Justify. (5M)
- b) Why do you think Dr. Kalam is called “The Missile Man of India”? How did his scientific contributions help our country? (5M)
- c) Write a letter to the Editor of the Hindu newspaper stating the present hot summer days and the bad status of bus shelters that cannot give shade resulting in deaths due to sunstroke at many places. (4M)
3. a) Describe any modern invention that the present generation is obsessed with. Write the positive and negative effects it has on the society. Who should be praised or held responsible for these effects? (5M)
- b) What were the challenges Raman faced in his life and career? How did he overcome them? (5M)
- c) Write an email to the regional manager of Whirlpool, complaining about the malfunctioning of the washing machine you bought last month. The service center manager refused to take up the issue as the product is in the guarantee period. Give details of your gadget and request for immediate action. (4M)

4. a) Elaborate with examples on how language variations contribute to culture shock. (5M)
- b) How did Bhabha's education help him contribute better to our country's scientific and academic progress? (5M)
- c) **Fill in the blanks with suitable forms of the verbs given in the parenthesis.** (4M)  
I \_\_\_\_\_ (wait) for this news for the past one week. Finally, it \_\_\_\_\_ (come) but none \_\_\_\_\_ (be) ready to accept it. Our teacher \_\_\_\_\_ (leave) us to \_\_\_\_\_ (join) her family in Chennai. She \_\_\_\_\_ (tell) me this a week ago but did not officially announce. She \_\_\_\_\_ (vacate) her house tomorrow. So we \_\_\_\_\_ (think) of giving her a farewell today evening.
5. a) What is black box in the story "The Lottery"? Who made it? When and why is it significant? (5M)
- b) How could J.C. Bose establish the harmony between the living and non-living worlds? (5M)
- c) Write an essay on "Making India a Developed Country" (4M)
6. a) Suggest some traditional measures to manage health problems caused due to climate changes? (5M)
- b) How and when could P.C. Ray help his village people? (5M)
- c) **Give one word substitutes for the following and use the word in your own sentence:** (4M)
- Incapable of being seen through
  - One who talks to people to help solve their problems
  - One who talks in sleep
  - That which can be easily broken
7. a) When and how did Bill Gates start building his own empire of business? Give the details of each stage. (5M)
- b) How do you justify Srinivasa Ramanujan's birthday being celebrated as Mathematics day in India? (5M)
- c) **Rewrite the following sentences correcting the errors:** (4M)
- I gave a good gift to my friend. Which I bought in Dubai.
  - They ride through the tunnel and stopped at the other end.
  - The peon rung the bell when the clock showed 12.
  - You came to see me now?

## I B. Tech II Semester Regular Examinations, April/May – 2017

## MATHEMATICS-III

(Com. to CE, EEE, ME, ECE, CSE, CHEM, EIE, IT, ECC, AE, AME, MM, PE, PCE, MET, AGE)

Time: 3 hours

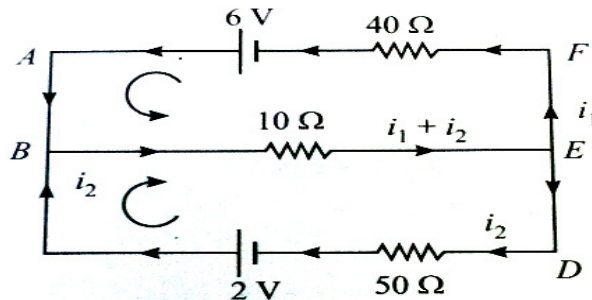
Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)2. Answering the question in **Part-A** is Compulsory3. Answer any **FOUR** Questions from **Part-B****PART -A**

1. a) Find the rank of a matrix  $A = \begin{bmatrix} -1 & 2 & 1 & 8 \\ 2 & 1 & -1 & 0 \\ 3 & 2 & 1 & 7 \end{bmatrix}$  (2M)
- b) Prove that if  $\lambda$  is an eigen value of a matrix A then  $\lambda^{-1}$  is an eigen value of the matrix  $A^{-1}$  if it exists. (2M)
- c) Evaluate  $\int_0^1 \int_0^1 \int_{\sqrt{x^2+y^2}}^y xyz \, dz dy dx$ . (2M)
- d) Find the value of  $\Gamma\left(\frac{5}{2}\right)$ . (2M)
- e) Find the angle between the surface  $x^2 + y^2 + z^2 = 9$  and  $z = x^2 + y^2 - 3$  at  $(2, -1, 2)$ . (2M)
- f) If  $\vec{F} = (5xy - 6x^2)\vec{i} + (2y - 4x)\vec{j}$  then evaluate  $\int \vec{F} \cdot d\vec{R}$  along the curve  $y = x^3$  from the point  $(1, 1)$  to  $(2, 8)$ . (2M)
- g) Write the quadratic form corresponding to the symmetric matrix  $\begin{bmatrix} 1 & 0 & 4 \\ 0 & -2 & -1 \\ 4 & -1 & 3 \end{bmatrix}$ . (2M)

**PART -B**

2. a) Solve the system of equations  $20x + y - 2z = 17, 3x + 20y - z = -18, 2x - 3y + 20z = 25$  by Gauss Jacobi method. (7M)
- b) Find the currents in the following circuit (7M)



3. a) Verify Cayley-Hamilton theorem and find the inverse of the matrix (7M)
- $$A = \begin{bmatrix} 1 & 0 & 3 \\ 2 & 1 & -1 \\ 1 & -1 & 1 \end{bmatrix}$$
- b) Reduce the quadratic form  $2x^2 + 2y^2 + 2z^2 - 2xy - 2yz - 2zx$  to canonical form by orthogonal transformation and hence find rank, index, signature and nature of the quadratic form. (7M)
4. a) Trace the curve  $r^2 = a^2 \cos 2\theta$ . (7M)
- b) Evaluate  $\int_0^a \int_{\frac{x^2}{a}}^{2a-x} x y^2 dy dx$  by changing the order of integration. (7M)
5. a) Express  $\int_0^1 x^m (1 - x^n)^p dx$  in terms of  $\Gamma$  functions and hence evaluate  $\int_0^1 x^5 (1 - x^3)^{10} dx$ . (6M)
- b) Evaluate  $\int_0^{\frac{\pi}{2}} \sin^5 \theta \cos^7 \theta d\theta$  by using  $\beta, \Gamma$  functions. (4M)
- c) Express  $\int_0^4 \sqrt{x}(4-x)^{3/2} dx$  in terms of  $\beta$  function. (4M)
6. a) Show that the vector field  $\vec{F} = (x^2 - yz)\vec{i} + (y^2 - zx)\vec{j} + (z^2 - xy)\vec{k}$  is conservative and find the scalar potential function corresponding to it. (7M)
- b) Show that  $\nabla \cdot (\vec{F} \times \vec{G}) = \vec{G} \cdot (\nabla \times \vec{F}) - \vec{F} \cdot (\nabla \times \vec{G})$  (7M)
7. State Stoke's theorem and verify the theorem for  $\vec{F} = (x + y)\vec{i} + (y + z)\vec{j} - x\vec{k}$  (14M) and S is the surface of the plane  $2x + y + z = 2$ , which is in the first octant.

## I B. Tech II Semester Regular Examinations, April/May – 2017

## MATHEMATICS-III

(Com. to CE, EEE, ME, ECE, CSE, CHEM, EIE, IT, ECC, AE, AME, MM, PE, PCE, MET, AGE)

Time: 3 hours

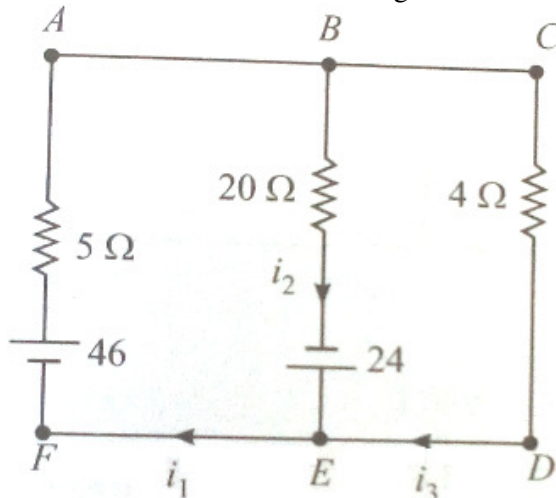
Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)2. Answering the question in **Part-A** is Compulsory3. Answer any **FOUR** Questions from **Part-B****PART -A**

1. a) Determine the rank of a matrix  $A = \begin{bmatrix} 2 & -1 & 3 & 4 \\ 0 & 3 & 4 & 1 \\ 2 & 3 & 7 & 5 \\ 2 & 5 & 11 & 6 \end{bmatrix}$ . (2M)
- b) Use Cayley-Hamilton theorem to find  $A^8$  if  $A = \begin{bmatrix} 1 & 2 \\ 2 & -1 \end{bmatrix}$ . (2M)
- c) Evaluate  $\int_0^1 \int_0^1 \int_0^y xyz \, dx dy dz$ . (2M)
- d) Find the value of  $\Gamma\left(-\frac{5}{2}\right)$ . (2M)
- e) Find unit normal vector to the surface  $x^2y + 2xz^2 = 8$  at the point  $(1, 0, 2)$ . (2M)
- f) If  $\vec{F} = (3x^2 + 6y)\vec{i} - 14yz\vec{j} + 20xz\vec{k}$  then evaluate  $\int \vec{F} \cdot d\vec{R}$  from  $(0, 0, 0)$  to  $(1, 1, 1)$  along the path  $x = t, y = t^2, z = t^3$ . (2M)
- g) Write the quadratic form corresponding to the symmetric matrix  $\begin{bmatrix} 0 & 5/2 & 3 \\ 5/2 & 7 & 1 \\ 3 & 1 & 2 \end{bmatrix}$  (2M)

**PART -B**

2. a) Show that the system of equations is consistent (7M)  
 $2x - y - z = 2, x + 2y + z = 2, 4x - 7y - 5z = 2$  and solve.
- b) Find the currents in the following circuit (7M)



3. a) Reduce the quadratic form  $6x_1^2 + 3x_2^2 + 3x_3^2 - 4x_1x_2 - 2x_2x_3 + 4x_1x_3$  to canonical form and hence state nature, rank, index and signature of the quadratic form. (7M)
- b) Determine the natural frequencies and normal modes of a vibrating system for which mass  $m = \begin{bmatrix} 1 & 0 \\ 0 & 2 \end{bmatrix}$  and stiffness  $k = \begin{bmatrix} 2 & 1 \\ 1 & 3 \end{bmatrix}$ . (7M)
4. a) Trace the curve  $y^2(2a - x) = x^3$ . (7M)
- b) Evaluate  $\int_0^\infty \int_0^\infty e^{-(x^2+y^2)} dx dy$  by changing in to polar coordinates and hence deduce  $\int_0^\infty e^{-x^2} dx = \frac{\sqrt{\pi}}{2}$ . (7M)
5. a) Show that  $\beta(m, n) = \frac{\Gamma(m)\Gamma(n)}{\Gamma(m+n)}$ . (6M)
- b) Evaluate  $\int_0^\pi \sin^4 \theta \cos^2 \theta d\theta$  by using  $\beta, \Gamma$  functions. (4M)
- c) Express  $\int_0^1 \frac{1}{(1-x^3)^{1/3}} dx$  in terms of  $\beta$  function. (4M)
6. a) Show that the vector field  $\vec{F} = (x^2 + xy^2)\vec{i} + (y^2 + x^2y)\vec{j}$  is conservative and find the scalar potential function. (7M)
- b) Show that  $\nabla(\nabla \cdot \vec{F}) = \nabla \times (\nabla \times \vec{F}) + \nabla^2 \vec{F}$ . (7M)
7. State Greens theorem in plane and verify the theorem for  $\oint_C [(y - \sin x)dx + \cos x dy]$ , where C is the plane triangle formed by the lines  $y = 0, x = \frac{\pi}{2}, y = \frac{2}{\pi}x$ . (14M)



## I B. Tech II Semester Regular Examinations, April/May – 2017

## MATHEMATICS-III

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Time: 3 hours

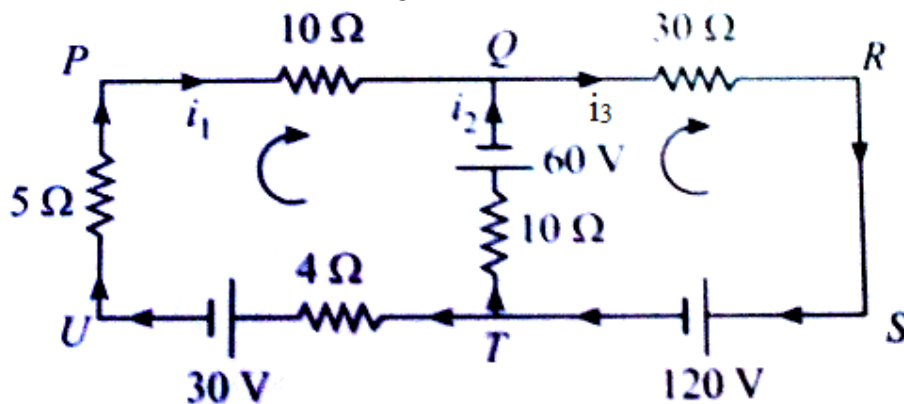
Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)2. Answering the question in **Part-A** is Compulsory3. Answer any **FOUR** Questions from **Part-B**PART -A

1. a) Determine the rank of a matrix  $A = \begin{bmatrix} 1 & 2 & 3 & 0 \\ 2 & 4 & 3 & 2 \\ 3 & 2 & 1 & 3 \\ 6 & 8 & 7 & 5 \end{bmatrix}$ . (2M)
- b) Use Cayley-Hamilton theorem and find  $A^{-1}$  if  $A = \begin{bmatrix} 1 & 4 \\ 2 & 3 \end{bmatrix}$ . (2M)
- c) Evaluate  $\int_0^{\frac{\pi}{2}} \int_0^{a \sin \theta} \int_0^{\frac{(a^2-r^2)}{a}} r \, dz \, dr \, d\theta$ . (2M)
- d) Show that  $\beta\left(\frac{1}{2}, \frac{1}{2}\right) = \pi$ . (2M)
- e) Find directional derivative of  $\phi = xy^2 + yz^2$  at the point (2,-1,1) in the direction of the vector  $\bar{i} + 2\bar{j} + 2\bar{k}$ . (2M)
- f) If  $\bar{F} = (x^2 - y)\bar{i} + (2xz - y)\bar{j} + z^2\bar{k}$  then evaluate  $\int_C \bar{F} \cdot d\bar{R}$  where C is the straight line joining the points (0, 0, 0) to (1, 2, 4). (2M)
- g) Write the quadratic form corresponding to the symmetric matrix  $\begin{bmatrix} 3 & 5 & 0 \\ 5 & 5 & 4 \\ 0 & 4 & 7 \end{bmatrix}$ . (2M)

PART -B

2. a) Solve the system of equations  $10x + y + z = 12$ ,  $2x + 10y + z = 13$ ,  $2x + 2y + 10z = 14$  by Gauss Seidel method. (7M)
- b) Find the currents in the following circuit (7M)



3. a) Reduce the quadratic form  $3x^2 + 5y^2 + 3z^2 - 2xy - 2yz + 2zx$  to canonical form by orthogonal transformation and hence find the rank, index signature and nature of the quadratic form. (7M)
- b) Find the natural frequencies and normal modes of a vibrating system  $mx'' + kx = 0$  for mass  $m = \begin{bmatrix} 2 & 0 \\ 0 & 1 \end{bmatrix}$  and stiffness  $k = \begin{bmatrix} 9 & -3 \\ -3 & 3 \end{bmatrix}$ . (7M)
4. a) Trace the curve  $a^2y^2 = x^2(a^2 - x^2)$ . (7M)
- b) Evaluate  $\int_0^1 \int_{\sqrt{y}}^{2-y} xy \, dx \, dy$  by changing the order of integration. (7M)
5. a) Show that  $\Gamma\left(\frac{1}{2}\right) = \sqrt{\pi}$ . (6M)
- b) Evaluate  $\int_0^{\pi} \sin^5 \theta \, d\theta$  by using  $\beta, \Gamma$  functions. (4M)
- c) Express  $\int_0^1 \frac{x \, dx}{\sqrt{1+x^4}}$  in terms of  $\beta$  function. (4M)
6. a) Find the constants a, b such that the surfaces  $5x^2 - 2yz - 9x = 0$  and  $ax^2y + bz^3 = 4$  cut orthogonally at (1,-1,2). (7M)
- b) Show that  $\nabla \times (\nabla \times \vec{F}) = \nabla(\nabla \cdot \vec{F}) - \nabla^2 \vec{F}$ . (7M)
7. State Gauss divergence theorem in plane and verify the theorem for  $\vec{F} = 4xz\vec{i} - y^2\vec{j} + zy\vec{k}$  over the cube  $x = 0, x = 1, y = 0, y = 1, z = 0, z = 1$ . (14M)

## I B. Tech II Semester Regular Examinations, April/May – 2017

## MATHEMATICS-III

(Com. to CE, EEE, ME, ECE, CSE, CHEM, EIE, IT, ECC, AE, AME, MM, PE, PCE, MET, AGE)

Time: 3 hours

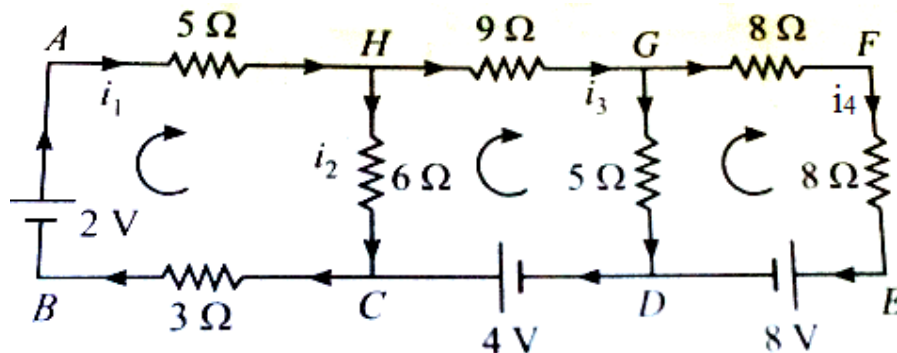
Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)2. Answering the question in **Part-A** is Compulsory3. Answer any **FOUR** Questions from **Part-B**PART -A

1. a) Find inverse of the matrix  $A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 3 & -3 \\ -2 & -4 & -4 \end{bmatrix}$  by elementary operations. (2M)
- b) Prove that if  $\lambda$  is an eigen value of a matrix A then  $\frac{|A|}{\lambda}$  is an eigen value of  $\text{adj}A$ . (2M)
- c) Evaluate  $\int_0^1 \int_{y^2}^1 \int_0^{1-x} x \, dz \, dx \, dy$ . (2M)
- d) Determine the value of  $\beta(2, 3)$ . (2M)
- e) Show that  $\nabla f g = f \nabla g + g \nabla f$ . (2M)
- f) If  $\vec{F} = x^2 y^2 \vec{i} + y \vec{j}$  then evaluate  $\int_C \vec{F} \cdot d\vec{R}$  where C is the curve  $y^2 = 4x$  in the XY plane from (0, 0) to (4, 4). (2M)
- g) Write the quadratic form corresponding to the symmetric matrix (2M)
- $$\begin{bmatrix} 2 & -3 & 5 \\ -3 & 2 & -2 \\ 5 & -2 & 2 \end{bmatrix}$$

PART -B

2. a) Solve the system of equations (7M)
- $$x + 10y + z = 6, \quad 10x + y + z = 6, \quad x + y + 10z = 6$$
- by Gauss Seidel method.
- b) Find the currents in the following circuit (7M)



3. a) Verify Cayley-Hamilton theorem for the matrix  $A = \begin{bmatrix} 1 & 2 & -1 \\ 2 & 1 & -2 \\ 2 & -2 & 1 \end{bmatrix}$  and hence (7M)  
find  $A^4$ .
- b) Reduce the quadratic form  $3x_1^2 + 5x_2^2 + 3x_3^2 - 2x_1x_2 - 2x_1x_3 + 2x_2x_3$  to (7M)  
canonical form and hence state nature, rank, index and signature of the quadratic  
form.
4. a) Trace the curve  $r = a \sin 3\theta$ . (7M)
- b) Evaluate  $\int_0^a \int_0^{\sqrt{a^2-x^2}} y \sqrt{x^2 + y^2} dy dx$  by transforming to polar coordinates. (7M)
5. a) Establish a relation between  $\beta$  and  $\Gamma$  functions. (6M)
- b) Evaluate  $\int_0^{\frac{\pi}{2}} \cos^7 \theta d\theta$  by using  $\beta, \Gamma$  functions. (4M)
- c) Express  $\int_0^1 \frac{x dx}{\sqrt{1-x^5}}$  in terms of  $\beta$  function. (4M)
6. a) Find the angle between the surfaces  $ax^2 + y^2 + z^2 - xy = 1$  and conservative (7M)  
 $bx^2y + y^2z + z = 1$  at  $(1, 1, 0)$ .
- b) Show that  $\vec{F} = (y^2 - z^2 + 3yz - 2x)\vec{i} + (3xz + 2xy)\vec{j} + (3xy - 2xz + 2z)\vec{k}$  (7M)  
is both solenoidal and irrotational.
7. a) State Greens theorem in plane and apply the theorem to evaluate  $\oint_C x^2y dx + y^3 dy$ , where C is the closed path formed by  $y = x$ ,  $y = x^3$  from  $(0, 0)$  to  $(1, 1)$ . (7M)
- b) Evaluate  $\int_S \vec{F} \cdot \vec{ds}$  using Gauss divergence theorem, where  $\vec{F} = 2xy\vec{i} + yz^2\vec{j}$  (7M)  
 $+ z\vec{k}$  and S is the surface of the region bounded by  $x = 0$ ,  $y = 0$ ,  $z = 0$ ,  
 $x + 2z = 6$ .

**I B. Tech II Semester Regular Examinations, April/May - 2017**  
**OBJECT ORIENTED PROGRAMMING THROUGH C++**  
(Com. to CSE, IT)

Time: 3 hours

Max. Marks: 70

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

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PART -A

1. a) What is a class? Give an example. (2M)
- b) Define scope and lifetime of a variable. (2M)
- c) What is a virtual base class? (2M)
- d) What is a dereferencing Operator? (2M)
- e) What features of C++ enable polymorphism? (2M)
- f) What is an iterator in STL? (2M)
- g) What is a copy constructor? (2M)

PART -B

2. a) List the drawbacks of conventional programming. Explain how object oriented programming overcome them. (7M)
- b) Explain about polymorphism and encapsulation. (7M)
3. a) What are recursive constructors? Explain with an example. (7M)
- b) Define inline function. Write a C++ program for finding the area of a triangle using inline functions. (7M)
4. a) What is inheritance? Present the advantages and disadvantages of inheritance. (7M)
- b) Write C++ Program to overload + operator to add two matrices. (7M)
5. a) What is a virtual destructor? Explain with an example. (7M)
- b) Explain the role of this pointer in C++ with a programming example. (7M)
6. a) Write a C++ program to add two integers, two floating point numbers and two complex numbers using class templates. (7M)
- b) Explain how to catch multiple exceptions in C++. (7M)
7. a) Write a function template for finding the minimum value in an array. (7M)
- b) Discuss about STL programming model. (7M)

I B. Tech II Semester Regular Examinations, April/May - 2017
OBJECT ORIENTED PROGRAMMING THROUGH C++
(Com. to CSE, IT)

Time: 3 hours

Max. Marks: 70

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

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**PART -A**

1. a) Define a class and an object. (2M)
- b) With an example, explain the purpose of scope access operator. (2M)
- c) List some C++ operators that cannot be overloaded. (2M)
- d) How to declare a pointer in C++? (2M)
- e) What is the primary difference between early binding and late binding? (2M)
- f) What is an algorithm in STL? (2M)
- g) Write the purpose of a destructor. (2M)

**PART -B**

2. a) List the similarities and differences between C and C++. (7M)
- b) Write about inheritance and abstraction. (7M)
3. a) What is function overloading? What are the principles of function overloading? (7M)
- b) Write C++ Program that demonstrates the usage of static data member and static member function. (7M)
4. a) Explain hybrid inheritance with a C++ example. (7M)
- b) Explain the concept of Data hiding in C++, with suitable examples. (7M)
5. a) What is a virtual base class? Why it is important to make a class virtual? (7M)
- b) Write a C++ program that declare and use pointer to a class. (7M)
6. a) Explain the concept of Class Template with overloaded operators. (7M)
- b) Write a C++ program that implements Bubble Sort using function templates. (7M)
7. a) Write a C++ program to insert elements into a map. (7M)
- b) Explain different ways of initializing a vector with programming examples. (7M)

**I B. Tech II Semester Regular Examinations, April/May - 2017**  
**OBJECT ORIENTED PROGRAMMING THROUGH C++**  
(Com. to CSE, IT)

Time: 3 hours

Max. Marks: 70

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

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PART -A

1. a) List some operators in C++, which are not present in C. (2M)
- b) What is a constructor? (2M)
- c) What is a friend function? (2M)
- d) Define namespace. (2M)
- e) How is polymorphism achieved at runtime? (2M)
- f) What is a list in C++ STL? (2M)
- g) What happens if we declare all member functions as private in a class? (2M)

PART -B

2. a) Explain the key concepts of Object Oriented Programming. (7M)
- b) Briefly write about the evolution of C++. (7M)
3. a) Write C++ program to find the area of a circle, rectangle and triangle using function overloading. (7M)
- b) What is a constructor? Write different rules associated with declaring constructors. (7M)
4. a) What is code reusability? Explain different C++ features that enable reusability. (7M)
- b) Write about operator overloading in C++ with an example. (7M)
5. a) What is dynamic binding? How it is different from static binding? List some advantages of dynamic binding over static binding. (7M)
- b) List and explain the rules associated with virtual functions. (7M)
6. a) Define template. What is the need for templates in programming? Write C++ code that declares a Template class. (7M)
- b) Write a C++ program that catches any math exception. (7M)
7. a) Explain the components of Standard Template Library (STL). (7M)
- b) Write a C++ program that fills a vector with random numbers. (7M)

I B. Tech II Semester Regular Examinations, April/May - 2017
OBJECT ORIENTED PROGRAMMING THROUGH C++
(Com. to CSE, IT)

Time: 3 hours

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

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**PART -A**

1. a) Write C++ code that reads two numbers from user and prints their sum. (2M)
- b) List different access specifiers in C++. (2M)
- c) Define an abstract class. (2M)
- d) What is a pure virtual function? (2M)
- e) List the keywords used in exception handling along with their purpose. (2M)
- f) What is a map in STL? (2M)
- g) What are anonymous objects in C++? (2M)

**PART -B**

2. a) Present the structure of C++ program. Explain different elements in it. (7M)
- b) Write C++ code that defines a class and declares an array of objects to that class. (7M)
3. a) Explain about default and parameterized constructors with suitable examples. (7M)
- b) Write C++ program to add two complex numbers using friend functions. (7M)
4. a) What are different types of inheritance supported by C++? Give an example for each. (7M)
- b) Write a C++ program to overload increment operator. (7M)
5. a) Write a C++ program to demonstrate pointers to base and derived classes. (7M)
- b) Discuss about virtual functions with a C++ example. (7M)
6. a) What is a template function? How to overload template functions in C++? (7M)
- b) How to handle exceptions that arise in constructors? Explain with an example. (7M)
7. a) Explain about different types of containers. (7M)
- b) Write a C++ program that erases all elements in a list using iterators. (7M)