

**Code: 4G242**

II B.Tech. II Semester Supplementary Examinations Nov/Dec 2016

**Electrical Circuits-II**

( Electrical & Electronics Engineering)

Max. Marks: 70

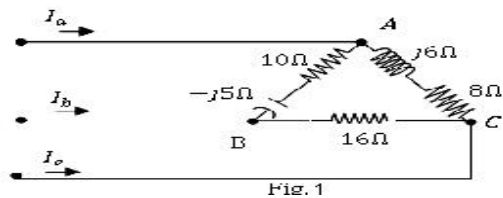
Time: 3 Hours

Answer *all five* units by choosing one question from each unit ( 5 x 14 = 70 Marks )

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**UNIT-I**

1. a) A balanced delta connected load contains  $(4+j2) \Omega/\text{ph}$ , while a balanced star-connected load consists of  $(1-j2) \Omega/\text{ph}$ , both the loads are connected in parallel to a three phase three wire system having a line voltage of 220V. The supply has a resistance of 0.1 ohm/ph. Find the total power delivered to the individual loads and the loss of power in the lines.
- b) The unbalanced U-load in Fig.1 is supplied by balanced voltages of 200V in the positive sequence. Find the line currents. Take  $V_{ab}$  as reference.

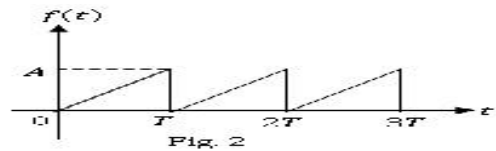


**OR**

2. a) Prove that the 2-watt meter method gives total power for  $\Delta$ -connected unbalanced load under unbalanced 3- $\Phi$  supply even if the supply is non-sinusoidal.
- b) A balanced delta-connected load has a phase current  $I_{AC} = 10\angle -30^\circ \text{ A}$ .
  - i) Determine the three line currents assuming that the circuit operates in the positive phase sequence.
  - ii) Calculate the load impedance if the line voltage is  $V_{AB} = 110\angle 0^\circ \text{ V}$ .

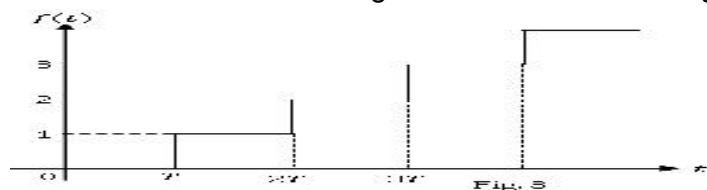
**UNIT-II**

3. a) Verify initial value and final value theorems for  $e^{-t}(t^2 + \cos 3t)$
- b) Find the Laplace transform of the following wave form shown in Fig.2



**OR**

4. a) Find the Laplace transform of the following wave form shown in Fig.3 :



- b) Find the Laplace inverse of the following functions: a)  $\frac{1}{1-e^{-sT}}$  b)  $\frac{1}{s^2(s^2+1)^2}$

## UNIT-III

5. The switch in the circuit shown in Fig.4 is opened at  $t = 0$ . Find  $i(t)$  for  $t > 0$  if,  $L = 0.5$  H and  $C = 1$  F (b)  $L = 5$  H and  $C = 1$  F.

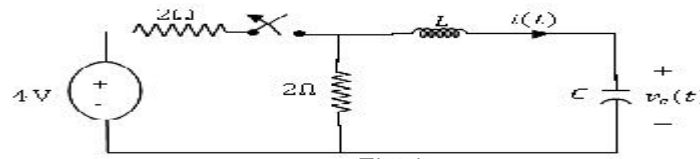


Fig. 4

OR

6. Refer to the circuit shown in Fig.5 below, the switch is closed at  $t = 0$ .
- Determine equations for  $i_L$  and  $v_L$ .
  - At  $t = 300$  ms, open the switch and determine equations for  $i_L$  and  $v_L$  during the decay phase.
  - Determine voltage and current at  $t = 100$  ms and at  $t = 350$  ms.
  - Sketch  $i_L$  and  $v_L$ .

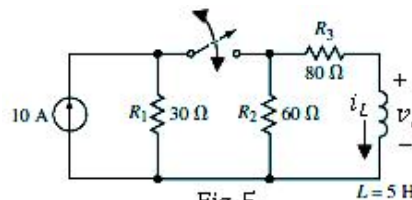


Fig. 5

## UNIT-IV

7. a) A series  $RLC$  circuit has  $R = 10\Omega$ ,  $L = 5$  H, and  $C = 30\mu\text{F}$ . Determine the effective current and average power absorbed when the applied voltage is  $v(t) = 100\cos 1000t + 50\cos 2000t + 25\cos 3000t$  Volts.
- b) Using the Fourier transform method, Find the current  $i_o(t)$  in the circuit shown in Fig.6 when  $i_s(t) = 20\cos 4t$  Amps.

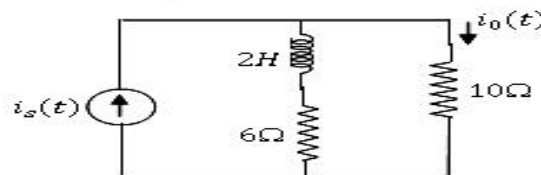


Fig. 6

OR

8. a) Determine the effective value of voltage, current and power if  $v(t) = 10 + 6\cos(t + \frac{1}{4}5^\circ) + 1.8\cos(2t - \frac{1}{1}0^\circ)$  and  $i(t) = 3 + 1.4\cos(t + \frac{2}{2}0^\circ) + 0.5\cos 2t$ .
- b) Find the trigonometric Fourier series of the waveform shown in fig.7

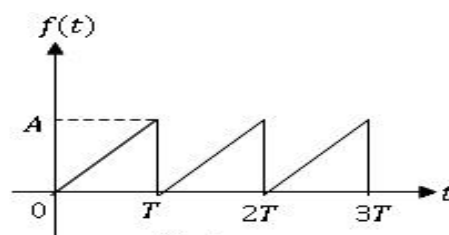


Fig. 7

## UNIT-V

9. a) List the properties of positive real function and test whether the following function is positive real or not?

$$F(s) = \frac{s(s^2 + 6)}{(s^2 + 3)^2}.$$

- b) Obtain the Cauer form realization of  $F(s) = \frac{2(s+1)(s+3)}{s(s+2)}$

**OR**

10. a) Find the first foster form of LC network for the impedance function

$$Z(s) = \frac{s(s^2 + 2)}{(s^2 + 1)(s^2 + 3)}$$

- b) Determine whether the following function is positive real:

$$F(s) = \frac{s^2 + 4}{s^3 + 3s^2 + 3s + 1}$$

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**R-14**

**Code: 4GC43**

*II B.Tech. II Semester Supplementary Examinations Nov/Dec 2016*

**Environmental Science**

( Common to CE, ME and CSE )

Max. Marks: 70

Time: 3 Hours

Answer all five units by choosing one question from each unit ( 5 x 14 = 70 Marks )

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**UNIT-I**

1. a) Explain the components of environment and their major interactions?  
b) Write a brief note on "Global Environmental Crisis"

**OR**

2. a) Explain the multi disciplinary nature of Environmental Studies?  
b) Describe the impact of over-exploitation of natural resources?

**UNIT-II**

3. a) Explain the environmental impacts of deforestation?  
b) Explain the adverse environmental impacts of modern agriculture?

**OR**

4. a) Compare various types of energy with respect to its suitability for Indian conditions?  
b) Discuss various types of land degradation with its causes and remedial measures?

**UNIT-III**

5. a) Explain role of producers, consumers and decomposers in an ecosystem  
b) Explain the components and functions of a Forest ecosystem

**OR**

6. a) Describe the importance and values of biodiversity?  
b) Explain in-situ and ex-situ conservation of biodiversity with examples

**UNIT-IV**

7. a) Enumerate major air pollutants and explain their effects on human beings  
b) Describe various sources of marine pollution. How can you prevent pollution of our oceans?

**OR**

8. a) Discuss major causes and effects of soil pollution  
b) Explain the process of composting as applied for the management of Solid Waste Management

**UNIT-V**

9. a) Explain the acid rain and its impacts. How can we avoid it?  
b) Explain environmental problems posed by population explosion?

**OR**

10. a) Discuss salient features of Air (prevention and control of pollution) Act, 1981  
b) Explain the term "human rights". What is the status of human rights in India?

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Code: 4G543

II B.Tech. II Semester Supplementary Examinations Nov/Dec 2016

**Fluid Mechanics and Hydraulic Machinery**

(Mechanical Engineering)

Max. Marks: 70

Time: 3 Hours

Answer all five units by choosing one question from each unit ( 5 x 14 = 70 Marks )

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**UNIT-I**

1. a) What is capillarity? Derive expression for height of capillarity rise. 06M
- b) The velocity distribution of flow over a plate is parabolic with vertex 30cm from the plate, where the velocity is 180 cm/s. If the viscosity of the fluid is 0.9 Ns/m<sup>2</sup>. Find the velocity gradients and shear stresses at distance of 0, 15 and 30cm from the plate. 08M

**OR**

2. a) Distinguish between path lines, streamlines and streak lines with neat sketches. 08M
- b) How is the continuity equation based on the principle of conservation of mass stated? 06M

**UNIT-II**

3. a) Derive Euler's equation of motion. 06M
- b) A pipe of 300 mm diameter conveying 0.30 m<sup>3</sup>/s of water has a right angled bend in a horizontal plane. Find the resultant force exerted on the bend, if the pressure at inlet and outlet of the bend are 24.525 N/cm<sup>2</sup> and 23.544 N/cm<sup>2</sup>. 08M

**OR**

4. What is a Pitot tube? How will you determine the velocity at any point with the help of Pitot tube? 14M

**UNIT-III**

5. Write advantages and disadvantages of Hydroelectric power plants and mention any four application 14M

**OR**

6. Briefly explain about force exerted on a stationary flat plate held inclined to the jet. 14M

**UNIT-IV**

7. A Kaplan turbine develops 22000 kw at an average head of 35 cm. Assume a speed ratio of 2, flow ratio of 0.6 diameter of the boss equal to 0.35 times. The diameter of the runner and an overall efficiency of 88%, calculate the diameter, speed and specific speed of the turbine 14M

**OR**

8. a) What are the types of draft Tubes and explain with neat sketches? 08M
- b) State the advantages of Kaplan turbine over Francis turbine 06M

**UNIT-V**

9. Which points should be considered while selecting right type of hydraulic turbines for hydroelectric power plant? 14M

**OR**

10. a) What is negative slip in reciprocating pump? Explain with neat sketches the function of air vessels in reciprocating pumps? 08M
- b) A single acting reciprocating pump operating at 120 rpm has a piston diameter of 200 mm and stroke of 300 mm. The suction and delivery heads are 4 m and 20 m, respectively. If the efficiency of both suction and delivery strokes is 75%, determine the power required by the pump. 06M

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**Kinematics of Machinery**

( Mechanical Engineering )

Max. Marks: 70

Time: 3 Hours

Answer all five units by choosing one question from each unit ( 5 x 14 = 70 Marks )

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**UNIT-I**

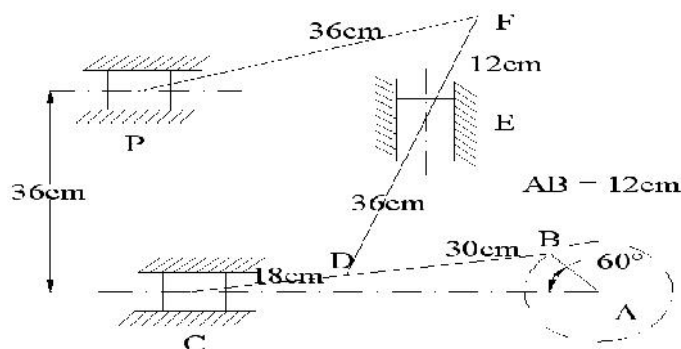
1. a) Define 'Degree of Freedom' 2M  
 b) Sketch and Explain inversions of Single slider crank chain. 12M

**OR**

2. a) Define spatial mechanism. 2M  
 b) Sketch and Explain inversions of Double slider crank chain. 12M

**UNIT-II**

3. In a steam engine mechanism shown in figure, crank AB rotates at 200 rpm. The dimensions of various links are AB=12cm, BC=48cm, CD=18cm and DE=36cm, EF=12cm and FP=36cm. Find the velocities of C, E, and P.



14M

**OR**

4. a) The length of crank and connecting rod of a vertical reciprocating engine are 150mm and 750mm respectively. The crank rotates at 400 rpm clockwise. Find analytically the acceleration of the piston when the crank has turned through 30° from the top dead center, and the piston is moving downwards. 7M  
 b) A rigid link AB is rotating anti-clockwise about the point A with angular velocity '  $\omega$  ' and angular acceleration '  $\alpha$  '. Describe the method of drawing the acceleration diagram and find the total acceleration of B with respect to A. 7M

**UNIT-III**

5. a) Define Pantograph. 4M  
 b) Sketch peaucellier straight line motion mechanism and prove that the tracing point 'P' describe a straight line path. 10M

**OR**

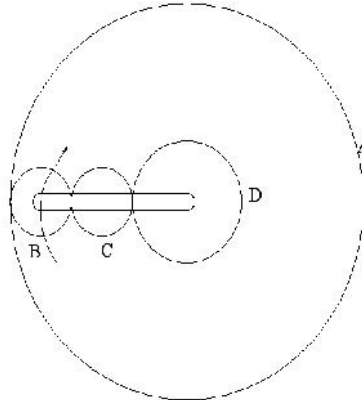
6. a) What is the function of a Hook's joint? 2M  
 b) The angle between the two axes of two shafts joined by Hook's joint is 25°. The driving shaft rotates at uniform speed of 150 rpm. The driven shaft carries a steady load of 7.5 kW. Calculate the mass of the flywheel of the driven shaft, if its radius of gyration is 150 mm and the output torque of the driven shaft does not vary by more than 15% of the input shaft. 12M

<b>UNIT-IV</b>
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7. a) Define interference in gears. 2M
- b) Two  $20^\circ$  gears have a module of 4mm. The number of teeth on gear 1 is 40 and on gear 2 is 24. If the gear 2 rotates at 600 rpm, determine the velocity of sliding when the contact is at the tip of the teeth of gear 2. Take the addendum equal to one module. Also find the maximum velocity of sliding. 12M

**OR**

8. An epi-cyclic gear train as shown in figure is composed of affixed annular wheel A having 150 teeth. The wheel A is meshing with wheel B which drives wheel D through an idle wheel C, D being concentric with A. The wheels B and C are carried on an arm which revolves clockwise at 100 rpm about the axis of A and D. If the wheel B and D have 25 and 40 teeth respectively, determine the number of teeth on C and speed sense of rotation of wheel C.



14M

<b>UNIT-V</b>
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9. Draw the profile of a cam operating a roller reciprocating follower and with the following data.

Minimum radius of the cam = 25mm, lift = 30mm, Roller diameter = 15mm

The cam lifts the follower for  $120^\circ$  with SHM followed by dwell period of  $30^\circ$ . Then the follower lowers down during  $150^\circ$  of the cam rotation with uniform acceleration and deceleration followed by dwell period. If the cam rotates at a uniform speed of 150 rpm, calculate the maximum velocity and acceleration of the follower during the descent period. 14M

**OR**

10. It is required to set out the profile of a cam to give the following motion to the reciprocating follower with a flat mushroom contact surface: (i) follower to have a stroke of 20mm during  $120^\circ$  of cam rotation, (ii) Follower to dwell for  $50^\circ$  of cam rotation, (iii) Follower to return to its initial position during  $90^\circ$  of cam rotation (iv) Follower to dwell for remaining period of cam rotation. The minimum radius of the cam is 25mm. the outer stroke of the follower is performed with SHM and return stroke with equal uniform acceleration and retardation. 14M

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**R-14**

**Code: 4G544**

II B.Tech. II Semester Supplementary Examinations Nov/Dec 2016

**Manufacturing Technology**

( Mechanical Engineering )

Max. Marks: 70

Time: 3 Hours

Answer *all five* units by choosing one question from each unit ( 5 x 14 = 70 Marks )

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**UNIT-I**

1. a) Explain the importance of permeability of molding sands? 7M  
b) What are the essential conditions that are to be kept in mind while designing risers? 7M

**OR**

2. a) Outline the precision investment casting process? Give some typical applications of the process? 7M  
b) How will you compare a cold – chamber die casting process with that of a hot-chamber process? 7M

**UNIT-II**

3. a) What are the differences between TIG and MIG welding processes? 7M  
b) What is a flux? Why is it essential to use it in some welding situations? 7M

**OR**

4. a) What are the specific advantages and disadvantages of Oxy – acetylene gas cutting process? 7M  
b) What measures do you consider while cutting non-ferrous metal? 7M

**UNIT-III**

5. a) What is meant by 'grain flow' in the case of forged or rolled components? 7M  
b) What is the significance of recrystallization temperature in metal working? 7M

**OR**

6. a) List various operations generally perform in a sheet – metal shop? 7M  
b) Define metal spinning? What types of components are generally manufactured by this process? 7M

**UNIT-IV**

7. a) Show the process of forward and backward extrusions by schematic sketches. Give two examples of components produced by extrusion process? 10M  
b) How does extrusion different from rolling? Comment. 4M

**OR**

8. a) Distinguish between open and closed die forging process? 7M  
b) What are the allowances that are normally provided in forging? 7M

**UNIT-V**

9. a) Explain the process of injection molding in detail? 7M  
b) How do you classify polymeric materials? Explain the properties of thermoplastic materials? 7M

**OR**

10. a) Give a brief account of some salient points to be considered for designing parts for plastic processing? 7M  
b) Identify various methods available for processing of plastics? 7M

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**Code: 4GC42**

II B.Tech. II Semester Supplementary Examinations Nov/Dec 2016

**Probability and Statistics**

( Common to CE, ME &amp; IT )

Max. Marks: 70

Time: 3 Hours

Answer all five units by choosing one question from each unit ( 5 x 14 = 70 Marks )

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**UNIT-I**

- 1 a) In a group there are 3 men and 2 women. Three persons are selected at random from this group. Find the probability that one man and two women or two men and one woman are selected. 7M

- b) A random variable X has the following probability function:

X	1	2	3	4	5	6
P(X)	K	3K	5K	7K	9K	11K

- Determine i) K. ii) Expectation. iii) Variance. 7M

**OR**

2. a) Two cards are selected at random from 10 each numbered 1 to 10. Find the probability that the sum is even if
- i) The two cards are drawn together 7M
- ii) The two cards are drawn one after other with replacement.
- b) For the continuous random variable X whose probability density function is given by  $f(x) = \begin{cases} cx(2-x), & \text{if } 0 \leq x \leq 2 \\ 0, & \text{otherwise} \end{cases}$  where c is a constant. Find c, mean and variance of X. 7M

**UNIT-II**

3. a) If the masses of 300 students are normally distributed with mean 68 kgs and deviation 3 kgs, how many students have masses
- (i) Greater than 72 kg.
- (ii) Less than or equal to 64 kg.
- (iii) Between 65 and 71 kg inclusive. 7M
- b) 10 % of screws produced by a company are defective. Find the probability that out of 10 screws chosen at random
- (i) 1 will be defective
- (ii) at most 2 will be defective
- (iii) none will be defective. 7M

**OR**

4. a) In a normal distribution 31% of the items are under 45 and 8% of the items are over 64. Find the mean and variance of the distribution. 7M
- b) A hostel switch board receives an average of 4 emergency calls in a 10 minute interval. What is the probability that
- (i) There are at most two emergency calls.
- (ii) Exactly 3 emergency calls, in a 10 minutes interval. 7M

**UNIT-III**

5. a) Write the short note on Test of hypothesis. 7M
- b) A manufacturer claimed that at least 95% of the equipment which he supplied to a factory conformed to specifications. An examination of a sample 200 pieces of equipment revealed that 18 were faulty. Test his claim at 5% level of significance. 7M

**OR**

6. a) Random samples of 400 men and 600 women were asked whether they would like to have a flyover near their residence. 200 men and 325 women were in favor of the proposal. Test the hypothesis that proportions of men and women in favour of the proposal are same, at 5%. 7M
- b) The mean yield of wheat from a district A was 210 pounds with S.D 10 pounds per acre from a sample of 100 plots. In another district the mean yield was 220 pounds with S.D 12 pounds from a sample of 150 plots. Assuming that the S.D of yield in the entire state was 11 pounds, test whether there is any significant difference between the mean yields of crops in the two districts. 7M

<b>UNIT-IV</b>
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7. a) The mean life time of a sample of 25 fluorescent light bulbs produced by a company is computed to be 157 hours with S.D of 120 hours. The company claims that the average life of the bulbs is 1600 hours using the level of significance of 0.05. Is the claim acceptable? 7M
- b) From the following data, find whether there is any significant liking in the habit of taking soft drinks among the categories of employees.

		Employees			
		Clerks	Teachers	Officers	Total
Soft drinks	Pepsi	10	25	65	100
	Thumps up	15	30	65	110
	Fanta	50	60	30	140
	Total	75	115	160	350

7M

**OR**

8. a) A mechanist is making engine parts with axle diameters of 0.7000 inches. A random sample of 10 parts shows a mean diameter of 0.742 inch, with S.D of 0.04 inch. Compute the statistic you would use to test whether the work is meeting the specifications at 0.05 level of significance. 7M
- b) Two random samples have the following results.

Sample	Size	Sample mean	Sum of square of deviations from the mean
1	10	15	90
2	12	14	108

Test whether the samples came from the same normal population. 7M

<b>UNIT-V</b>
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9. a) Give the comparison of  $\bar{x}$  and R charts with P-chart. 7M
- b) A self-service store employs one cashier at its counter. Nine customers arrive on an average every 5 minutes while the cashier can serve 10 customers in 5 minutes. Assuming Poisson distribution for arrival rate and exponential distribution for service time, find
- i) Average number of customers in the system.
  - ii) Average number of customers in the queue or average queue length.
  - iii) Average time a customer spends in the system.
  - iv) Average time a customer waits before being served. 7M

**OR**

10. a) In a manufacturing process the number of defectives found in the inspection of 15 lots of 400 items each are given below:  
2,5,0,14,3,0,1,0,18,8,6,0,3,0 and 6.
- i) Determine the trial control limits and state whether the process is in control.
  - ii) What will be the corresponding control limits of some obvious points outside the control limits are eliminated? Examine whether the process is still in control or not. 7M
- b) Derive average number of customers and average length of queuing system. 7M

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