

Time: 3 Hours**Max Marks: 70**

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

UNIT-I

1. a) Write types of admixtures and explain them with their purpose in concrete. 7 M
b) What are accelerators and admixtures? Explain its use with examples. 7 M

(OR)

2. a) Explain the basic chemistry of cement and manufacture of ordinary Portland cement. 7 M
b) Explain the various tests conducted on aggregates used for concreting. 7 M

UNIT-II

3. a) Explain different methods conducted to determine the workability of concrete. 7 M
b) What is workability? What are the factors affecting workability? 7 M

(OR)

4. a) Explain how concreting is done in hot weather and cold weather conditions? 7 M
b) Explain the various means of transporting concrete to work site. 7 M

UNIT-III

5. a) Explain the tensile and compressive strength considerations of concrete. 7 M
b) With a neat sketch explain the Schmidt's Rebound hammer test. What are the limitations of this test? 7 M

(OR)

6. a) What is curing? What are the different methods of curing? Also explain the term 'maturity rule'. 7 M
b) Write short notes on 7 M
(i) Elasticity of concrete ii) Shrinkage iii) Creep iv) Durability of concrete

UNIT-IV

7. a) Explain what is mix design and its practical necessity. 7 M
b) Write the design steps of a mix design by IS code method. 7 M

(OR)

8. Design a concrete mix of M30 grade. Take standard deviation of 5 MPa. The specific gravities of coarse aggregate and fine aggregate are 2.75 and 2.62 respectively. The bulk density of coarse aggregate is 1610 kg/m³ and fineness modulus of aggregate is 2.70. A slump of 60 mm is necessary. The water absorption of coarse aggregate is 1% and free moisture in fine aggregate is 2%. Design the concrete mix using IS code method. Assume any missing data. 14 M

UNIT-V

9. a) What is the need to study fiber reinforced concrete and explain briefly the factors effecting properties of fiber reinforced concrete? 7 M
b) What is polymer concrete? What are the different types of polymers? 7 M

(OR)

10. a) Write about 7 M
(a) Light weight aggregate concrete (b) Self compacting concrete
(c) No-fines concrete
b) Explain salient features of cellular concretes. 7 M

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UNIT-I

1. a) Explain the constructional details of a single phase induction motor? 6M
b) Explain the double field revolving theory and justify why a single phase induction motor is not self-starting along with the torque slip characteristics? 8M

(OR)

2. a) Explain briefly no-load and blocked rotor test of a single induction motor? 6M
b) A 220 V, 6-pole, 50 Hz, single winding single phase induction motor has the following equivalent parameters referred to the stator. $r_{1m}=3.0\Omega$, $x_{1m}=5.0\Omega$, $r_2=1.5\Omega$, $x_2=2.0\Omega$. Neglect the magnetising current. When the motor runs at 97 % of the synchronous speed, compute the ratio of T_f/T_b ? 8M

UNIT-II

3. Explain the different starting methods of a single phase induction motor along with the torque-speed characteristics? 14M

(OR)

4. a) Explain the construction and principle of operation of a shaded pole motor? 7M
b) A universal motor (ac operated) has a 2-pole armature with 960 conductors. At a certain load the motor speed is 5000 rpm and the armature current is 4.6 A; the armature terminal voltage and input are respectively 100 V and 300 W. Compute the following assuming an armature resistance of 3.5Ω . i) Effective armature reactance ii) maximum value of useful flux /pole? 7M

UNIT-III

5. a) Explain the principle of operation of variable reluctance type stepper motor. Also draw torque versus pulses/sec characteristics? 10M
b) List the applications of a stepper motor? 4M

(OR)

6. Explain the principle of operation of a hybrid stepper motor with relevant diagrams? 14M

UNIT-IV

7. a) What are the advantages of a brushless dc motor compared to the conventional dc motor? 4M
b) Explain the construction of a brushless dc motor? 10M

(OR)

8. a) Explain the principle of operation of a brushless dc motor? 10M
b) List out the applications of a brushless dc motor? 4M

UNIT-V

9. a) Explain the construction of a linear induction motor? 10M
b) List out the applications of a linear induction motor? 4M

(OR)

10. a) Explain the principle of operation of a linear induction motor highlighting the terms synchronous velocity of the field as well as slip? 12M
b) How linear induction motor differs from the normal induction motor? 2M

**INSTRUMENTATION AND CONTROL SYSTEMS
(Mechanical Engineering)****Time: 3 Hours****Max Marks: 70**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

UNIT-I

1. a) What are Static performance characteristics? Explain briefly. 7M
b) Explain the construction and working of an angular displacement measurement device. 7M

(OR)

2. a) Discuss briefly different types of error, its sources and their elimination methods 7M
b) How vibrometer is used for measuring acceleration? 7M

UNIT-II

3. a) Explain the working principle of a stroboscope for speed measurement. 7M
b) Derive an expression for gauge factor of a resistance strain gauge. 7M

(OR)

4. a) Explain the working principle of a load cell for force measurement. 7M
b) Derive an expression for Gauge factor for measurement of tensile strains 7M

UNIT-III

5. a) With the help of a neat sketch, discuss the working of a total radiation pyrometer. 7M
b) Discuss the working principle of Ionization type pressure gauges. 7M

(OR)

6. a) What is the principle of operation of capacitive level measurement? 7M
b) Enumerate different laws of thermocouple. 7M

UNIT-IV

7. a) Describe the working of a turbine flow meter. 7M
b) How a dew point meter works. Explain. 7M

(OR)

8. a) Explain the working of a Rota meter with a sketch. 7M
b) With a sketch, explain the working of a Absorption Hygrometer. 7M

UNIT-V

9. a) Mention the applications of automatic control devices in industries. 7M
b) Explain PID control algorithm And write their advantages and disadvantages? 7M

(OR)

10. a) Difference between open loop and closed loop control system. 7M
b) Explain PI control algorithm and write their advantages and disadvantages? 7M

Time: 3 Hours**Max Marks: 70**

Answer ONE Question from each Unit

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All parts of the Question must be answered at one place

UNIT-I

1. a) Explain briefly about Static characteristics and dynamic characteristics of instruments. 7M
b) The following values are obtained from the measurements of the value of a resistor: 7M
147.2 , 147.4 , 147.9 , 147.1 , 147.5 , 147.6 , 147.4 , 147.6 , 147.5 .
Calculate a) Arithmetic mean b) Average deviation c) Standard Deviation

(OR)

2. a) A voltmeter having a sensitivity of $1\text{K}\Omega/\text{V}$ is connected across an unknown resistance 7M
in series with a milli ammeter reading 80V on 150V scale. When the milli ammeter
reads 10mA, Calculate the (i) apparent resistance of the unknown resistor (ii) Actual
resistance of the unknown resistor, and (iii) Error due to the loading effect of the
voltmeter?
b) Discuss about the principle and operation of a thermocouple type RF ammeter. 7M

UNIT-II

3. a) Explain the working principle of a harmonic distortion analyzer. 7M
b) Discuss square wave and pulse generator with neat block diagrams. 7M
(OR)
4. a) What is AF oscillators and explain its operation along with circuit diagram 7M
b) Draw the circuit diagram of Digital Fourier Analyzers and explain its operation. 7M

UNIT-III

5. a) Explain the operation of a Dual trace oscilloscope with neat sketches. 7M
b) Draw the circuit diagram of Sampling oscilloscope and explain its operation in detail. 7M
(OR)
6. a) Explain the principle and working of a digital storage oscilloscope with neat figures. 7M
b) Differentiate various digital oscilloscope. 7M

UNIT-IV

7. a) Explain the working principle of Kelvins bridge. 7M
b) Draw the Wien Bridge and derive the expression for the frequency of excitation Signal 7M
at balance.
(OR)
8. a) Draw the circuit diagram of Maxwell's bridge and derive conditions of balance 7M
b) In case of a Schering bridge, arm AC has $R=4.7\text{K}\Omega$. Arm CD has unknown elements. 7M
Arm BD has $C=0.1\mu\text{f}$, Arm AB= $4.7\text{K}\Omega$ is in shunt with 1MF. Determine values of
components in the Arm CD.

UNIT-V

9. a) Draw the construction diagram and explain the working of LVDT 7M
b) Briefly explain about resistance thermometers 7M
(OR)
10. a) What is Thermistor and explain its importance along with advantages of it 7M
b) What is Piezo-electric effect? Explain the operation of Piezo-electric transducer. 7M

**JAVA PROGRAMMING
(Common to CSE & IT)****Time: 3 Hours****Max Marks: 70**

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

UNIT-I

1. a) Write the structure of a typical Java program. 6 M
b) Explain the process involved in execution of a java program. 8 M
- (OR)**
2. a) How arrays are declared in java. Write the suitable example program. 7 M
b) What are the various loop statements available in Java? Discuss any one with suitable example. 7 M

UNIT-II

3. a) What are classes and objects? How are classes and objects created in Java? Explain with example. 8 M
b) Define Constructor. How to overload a constructor. Justify your answer using example. 6 M
- (OR)**
4. a) Explain the use of **static** keyword when apply for variable and method. 8 M
b) Give a suitable example program for method overloading. 6 M

UNIT-III

5. a) Explain the various types of inheritance with suitable examples. 8 M
b) Write a example program for method overriding. 6 M
- (OR)**
6. a) What is an interface? Explain the implementation of multiple inheritance using interfaces with the help of program. 10 M
b) How to define a final method in java. 4 M

UNIT-IV

7. What are packages? State the steps involved in creating and importing a package. 14 M
- (OR)**
8. a) What is an exception? Is it possible to include your own exception in a program? Explain with suitable code. 10 M
b) What is the use of throw keyword? 4 M

UNIT-V

9. a) What do you know about multithreading? How it is implemented in Java? 6 M
b) Explain the Thread life cycles with neat sketch. 8 M
- (OR)**
10. a) What are applets? How do they differ from application programs? 6 M
b) Discuss the steps involved in creating and running applet. 8 M

PART-A**ANSWER ALL QUESTIONS****[1 x 10 = 10 M]**

- 1 (a) What are the advantages of rotating field and stationary armature in 3 phase alternator?
- (b) What is the effect of chording in the armature winding?
- (c) Define synchronous speed.
- (d) Define winding factor.
- (e) Why is synchronous motor starting torque zero?
- (f) Define synchronization
- (g) Why is mmf method called as an optimistic method?
- (h) What are the necessary conditions for parallel operation?
- (i) What is a synchronous condenser?
- (j) Why is a 1 phase induction motor not a self starting motor?

PART-B**Answer one question from each unit****[5x12=60M]****UNIT-I**

2. a) Explain constructional details of both cylindrical and salient pole synchronous machine. 6M
- b) A 3- Φ , 8 pole, 750 rpm star connected alternator has 72 slots on the armature. Each slot has 12 conductors and winding is short chorde by 2 slots. Find the induced emf between line, given flux per pole is 0.06 webers 6M

(OR)

3. a) What is meant by armature reaction? What are its effects at different power factor of an alternator? 6M
- b) Derive EMF equation of an alternator and explain pitch factor and distribution factor. 6M

UNIT-II

4. a) Compare synchronous impedance method and ampere turn method of predetermining voltage regulation of alternators. 6M

- b) a) The following test results are obtained on a 6600 volts alternator 6M

Open circuit voltage (V)	3100	4900	6600	7500	8300
Field Current (A)	16	25	37.5	50	70

A field current of 20 A is found necessary to circulate full load current on short circuit of the armature. Calculate the full load regulation at 0.8 pf lag by mmf method.

(OR)

5. a) Describe the slip test method for determining X_d , X_q parameters. 6M
- b) Explain synchronization of an alternator with an infinite bus bar. 6M

UNIT-III

6. a) What are the advantages of connecting alternators in parallel? 6M
b) The speed regulation of two 1000 KW alternators running in parallel are 100% to 104% and 100% to 105% from full load to no load respectively. How will the two alternators share a load of 1200 KW? 6M

(OR)

7. a) Explain the effect of varying excitation of a synchronous generator connected to an infinite bus on the pf, armature current and load angle 6M
b) Two 1- Φ alternators operate in parallel and supply a load impedance of $(3+j4)\Omega$. Impedance of the machine is $(0.2+j2)\Omega$ and emfs are $(220+j0)$ V and $(220+j0)$ V respectively. Determine each machine 1) terminal voltage 2) power factor 3) output 6M

UNIT-IV

8. a) Explain about starting methods of synchronous motor. 6M
b) Explain how synchronous motor can be operated as synchronous condenser. 6M

(OR)

9. a) Explain about excitation circles of synchronous motor 6M
b) A 2KV 3- Φ star connected synchronous motor has an effective resistance and synchronous reactance of 0.2Ω and 2.2Ω per phase respectively. The input is 800 KW at normal voltage and induced line emf is 2.5 KV. Calculate the line current and power factor. 6M

UNIT-V

10. a) Explain the constructional features of a 1- Φ induction machine 6M
b) List different types of 1- Φ induction motors also mention their applications 6M

(OR)

11. a) Using double revolving field theory explain torque slip characteristics of 1- Φ induction motor 6M
b) Explain the operation of shaded pole motor 6M

Time: 3 Hours**Max Marks: 70****PART-A****ANSWER ALL QUESTIONS****[1 x 10 = 10 M]**

1. a) What are the four basic components of a steam power plant?
- b) What is reheating? What are the advantages of reheat Rankine cycle?
- c) Write the function of Economiser
- d) What are the effects of Air leakage in a condenser ?
- e) Write the effect of friction on flow through steam nozzle?
- f) Why are steam turbines compounded?
- g) Define reheat factor?
- h) Name the elements of Condensing Plant.
- i) Write some applications of gas turbines
- j) Write a short note on fuels used for gas turbines.

PART-B**Answer one question from each unit****[5x12=60M]****UNIT-I**

2. a) Write the formation of P-V diagram for water at different pressures and sketch it ? 5M
- b) One kg of steam at 20 bar exists in the following conditions. i) 0.9 dry 7M
ii) Dry and saturated iii) at 500 °C Find its enthalpy, specific volume and internal energy in each case

(OR)

3. a) A cyclic steam power plant is to be designed for a steam temperature at turbine inlet of 360 °C and an exhaust pressure of 0.08 bar. After isentropic expansion of steam in the turbine, the moisture content at the turbine exhaust is not to exceed 15 %. Determine the greatest allowable steam pressure at the turbine inlet, and calculate the Rankine cycle efficiency for these steam conditions 6M
- b) Explain the Orsat apparatus with neat sketch for the analysis of flue gases. 6M

UNIT-II

4. a) Derive an expression for condition for maximum discharge through a chimney 6M
- b) Summarize the functioning of Lamont boiler with the help of a neat sketch? 6M

(OR)

5. a) Explain the working of Super heater and Steam separator with neat sketch? 5M
- b) Write the construction and working of a Cochran Boiler with a neat sketch? 7M

UNIT-III

6. a) Classify the nozzles? evaluate the critical pressure ratio for dry saturated steam and super heated steam? 5M
- b) Dry saturated steam at 10 bar is expanded isentropically in a nozzle to 0.1 bar. 7M
Find the dryness fraction of the steam at exit. Also find the velocity of steam leaving the nozzle when (i) initial velocity is negligible
(ii) Initial velocity of the steam is 135 m/s.

(OR)

7. a) Explain the working of a low level Counter flow jet condenser with a neat diagram? 6M
 b) State the function of an air pump? Describe the various sources of air into the condenser. 6M

UNIT-IV

8. a) Give detail classification of steam turbines 5M
 b) In single stage impulse turbine, the nozzle angle is 30° and the blade speed is 215 m/s. The steam speed is 550 m/s. The blade velocity coefficient is 0.85. Assuming axial exit and a flow rate of 700 kg/hr, determine:
 i) Blade angles ii) Absolute velocity of steam at exit
 iii) The power output of the turbine

(OR)

9. a) Explain the phenomenon of governing of steam turbines ? 5M
 b) In a reaction stage of a steam turbine, the nozzle angle is 20° and the absolute velocity of steam at inlet to the moving blades is 240 m/s. The blade velocity is 210 m/s. If the blades are designed for 50% reaction, determine:
 i) The blade angle at inlet and exit ii) The enthalpy drop per unit mass of steam in the moving blades and in the complete stage
 iii) The diagram power for a steam flow of 1kg/s iv) The diagram efficiency 7M

UNIT-V

10. a) Give detail classification of gas turbine 4M
 b) The air enters the compressor of an open cycle constant pressure gas turbine at a pressure of 1 bar and temperature of 293K. The pressure of the air after compression is 4 bar. The isentropic efficiencies of compressor and turbine are 80% and 85% respectively. The air fuel ratio used is 90:1. If flow rate of air is 3 kg/s. find 1) Power developed 2) thermal efficiency of the cycle. 8M

(OR)

11. a) Explain about Construction and working of pulse jet engine ? 6M
 b) What are different types of liquid propellants used and their desirable properties? 6M