

**FACULTY OF ENGINEERING**

**BE IV-Semester (CBCS) (Civil/ECE/AE) (Backlog) Examination, October 2021**

**Subject: Environmental Sciences**

**Time: 2 Hours**

**Max marks: 70**

**Missing data, if any, may be suitably assumed**

**PART - A**

**Note: Answers any Five questions.**

**(5x2=10 Marks)**

1. List the effects of over utilization of natural resources.
2. Define floods. What are the benefits of floods?
3. Differentiate between natural and artificial ecosystem.
4. What are decomposers? What is their significance?
5. Recall the indirect value of biodiversity.
6. Discuss the term endemic species. Mention few endemic species of India.
7. Define water pollution. Write the reasons for pollution of ground water.
8. What are the merits and demerits of incineration?
9. Name the green house gases and mention their sources of emission.
10. List the consequences of depletion of ozone layer due to human deeds

**PART - B**

**Note: Answers any Four questions.**

**(4x15=60 Marks)**

11. a. Enumerate the ill effects of timber extraction on forests and tribal people.  
b. Discuss the importance of public participation in understanding environmental problems and finding their solutions.
12. a. What are ecological pyramids? Discuss why certain pyramids are upright while others are inverted  
b. Differentiate between food chain and food web with examples.
13. a. Discuss about the direct and indirect value of biodiversity  
b. Describe briefly how human actions have altered ecosystem biodiversity and are responsible for the extinction of species.
14. a. Define air pollution. Discuss advantages and disadvantages of bag house filters used in controlling air pollution  
b. Discuss about the ill effects of e-waste and suggest some good management practices to control them.
15. a. Write about climate change. Explain how you would like to bring awareness among the general public regarding the impacts of global warming.  
b. Write the salient features of Environmental Protection Act 1986.

16. a. List out various water conservation methods and describe any one of them in detail.
- b. Discuss the importance of fresh water ecosystems. What are the impacts of human activities on fresh water ecosystems?
17. a. Justify the following statement "Nature is for man's needs and not for his greed".
- b. Define water pollution. Discuss the various remedial measures to control or minimize the water pollution.

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FACULTY OF ENGINEERING

B.E. (EEE) IV – Semester (CBCS) (Backlog) Examination, October 2021

Subject: Electrical Machines – I

Time: 2 hours

Max. Marks: 70

Note: (Missing data, if any, may be suitably assumed)

PART – A

Answer any five questions.

(5 x 2 = 10 Marks)

- 1 Explain the principle of electromechanical energy conversion.
- 2 Differentiate between lap and wave winding
- 3 Write applications of DC compound motor
- 4 Why DC Series motor is called as variable speed motor?
- 5 Define Voltage regulation
- 6 What are the various losses in DC Machines
- 7 Define critical speed
- 8 Write applications of DC Shunt generator
- 9 Define Armature reaction
- 10 Define Faraday's laws

PART – B

Answer any four questions.

(4 x 15 = 60 Marks)

- 11 (a) What do you mean by energy and co energy in magnetic systems? Also mention its importance.  
(b) In a rectangular electromagnetic relay, the existing coil has 1500 turns of resistance of  $1\Omega$ . The cross-sectional area of the core  $A = 5 \times 5 \text{ cm}^2$ . Neglect the reluctance of the magnetic circuit and fringing effects. If the coil is excited with an AC voltage of 50 Hz frequency, having peak to peak voltage of 100 volts and armature is held at a fixed distance of 1 cm. find the average force on the armature.
- 12 (a) Describe with relevant diagrams the different methods of excitation of DC machines.  
(b) Explain the commutation process in DC machines with diagrams.
- 13 (a) Define torque and power equations of DC motor.  
(b) How speed of a motor is controlled by armature control method?
- 14 Explain in detail about Retardation Test.
- 15 Explain Hopkinson's test in detail with diagram.
- 16 (a) Explain about 3-point starter with neat diagram.  
(b) Write short notes on (i) Compensating winding (ii) Interpoles.
- 17 With a neat diagram explain the construction of DC Machine.

**FACULTY OF ENGINEERING**  
**B.E. (Inst.) IV-Semester (CBCS)(Backlog) Examination, October 2021**  
**Subject: Signals and Systems**

Time: 2 hours

Max. Marks: 70

Note: Missing data, if any, may be suitably assumed.

**PART – A**

Answer any five questions.

(5x2 = 10 Marks)

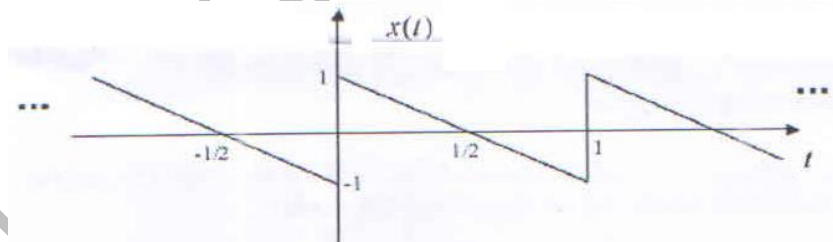
- 1 Define Time variant system with an example.
- 2 Determine the fundamental period of  $x(t) = \sin(\pi/8t^2)$ .
- 3 Using suitable example define a complete set.
- 4 Write the necessary and sufficient condition for existence of Fourier series.
- 5 Prove Time scaling Property of Fourier Transform.
- 6 State and prove the Parseval theorem.
- 7 Define final value and initial value theorem in Laplace Transform.
- 8 Determine the laplace transform of  $\sin(\omega_0 t)u(t)$ .
- 9 Determine Z transform of  $0.3^n u(n)$ .
- 10 Define ROC in Z-transform.

**PART – B**

Answer any four questions.

(4x15 = 60 Marks)

- 11 (a) Find the response of the system described by difference equation.  
 $y(n) = -0.8 y(n - 1) + x(n)$ . When the input is unit step, with initial condition  
 (i)  $y(-1) = 0$  (ii)  $y(-1) = 2/9$ .  
 (b) Define the standard test signals.
- 12 List out the properties of Fourier Transform. Derive any three properties of Fourier Transform.
- 13 Find the fundamental period T, the fundamental frequency and the Fourier series coefficients of the periodic sawtooth signal  $x(t)$  shown in figure. Express  $x(t)$  as a Fourier series.



- 14 (a) List out the properties of Laplace Transform. Laplace transform is generalized form of Fourier transform. Justify.  
 (b) Find the inverse Laplace transform of  $G(s) = s/(s + 3)(s^2 + 4s + 5)$ .
- 15 (a) Consider a system described by differential equation.  
 $Y(n) - 0.5(n - 1) - 0.25y(n - 2) = x(n)$  determine  $y(n)$  if  $x(n) = u(n)$  using Z-Transform.  
 (b) Mention properties of ROC.
- 16 (a) Write short notes on the classification of Systems.  
 (b) Determine Z-Transform of : (i)  $x(n) = a^n u(n)$  (ii)  $x(n) = nu(n)$
- 17 Write short notes on the following:  
 (a) Sampling theorem (b) Dirichlet condition

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**FACULTY OF ENGINEERING****B.E. IV-Semester (CBCS) (M/P) (Backlog) Examination, October 2021****Subject: DESIGN OF MACHINE ELEMENTS****Time: 2 Hours****Max marks: 70****Missing data, if any, may be suitably assumed****PART - A****Note: Answers any Five questions.****(5x2=10 Marks)**

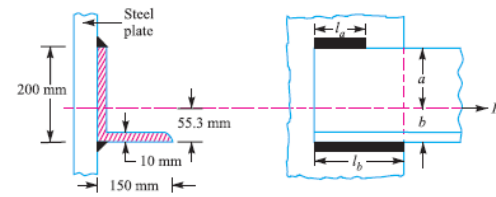
1. Briefly explain about Saint Venant's theory.
2. Explain and draw the Soderberg's method for combination of stresses.
3. Enumerate the type of stresses induced in keys.
4. Briefly discuss about locking devices for nuts.
5. Explain briefly about Axially loaded unsymmetrical welded sections with a neat Sketch.
6. What are the classifications of Machine design?
7. Define the following terms  
i) Bearing (Crushing) stress ii) Repeated stress.
8. Mention the type of shaft couplings.
9. What are the advantages of chain drives over the belt drives?
10. Mention the type of Riveted joints.

**PART - B****Note: Answers any Four questions.****(4x15=60 Marks)**

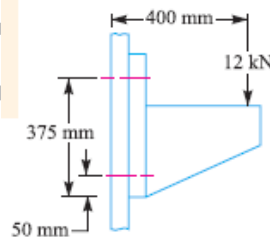
11. A cylindrical shaft made of steel of yield strength 700 MPa is subjected to static loads consisting of bending moment 10 kN-m and a torsional moment 30 kN-m. Determine the diameter of the shaft according to 1. the maximum principal stress; 2. The maximum shear stress; and 3. the maximum distortion strain energy theory of yielding, and assuming a factor of safety of 2. Take  $E = 210 \text{ GPa}$  and poisson's ratio = 0.25.
12. Determine the thickness of a 120 mm wide uniform plate for safe continuous operation if the plate is to be subjected to a tensile load that has a maximum value of 250 kN and a minimum value of 100 kN. The properties of the plate material are as follows: Endurance limit stress = 225 MPa, and Yield point stress = 300 MPa. The factor of safety based on yield point may be taken as 1.5.
13. Design and make a neat sketch of a protective type of cast iron flange coupling for a steel shaft transmitting 15 kW at 200 r.p.m. and having an allowable shear stress of 40 MPa. The working stress in the bolts should not exceed 30 MPa. Assume that the same material is used for shaft and key and that the crushing stress is twice the value of its shear stress. The maximum torque is 25% greater than the full load torque. The shear stress for cast iron is 14 MPa.

14. Design a Sleeve and cotter joint to transmit a Load of 140kN. The design stresses may be taken as 80MPa in tension, 60MPa in shear and 140MPa in compression.

15. A  $200 \times 150 \times 10$  mm angle is to be welded to a steel plate by fillet welds as shown in figure. If the angle is subjected to a static load of 200 kN, find the length of weld at the top and bottom. The allowable shear stress for static loading may be taken as 75 MPa.



16. The brackets are fixed on steel columns as shown in Figure. The maximum load that comes on the bracket is 12 kN acting vertically at a distance of 400 mm from the face of the column. The vertical face of the bracket is secured to a column by four bolts, in two rows (two in each row) at a distance of 50 mm from the lower edge of the bracket. Determine the size of the bolts if the permissible value of the tensile stress for the bolt material is 84 MPa. Also find the cross-section of the arm of the bracket which is rectangular.



- 17 a. Two plates of 7 mm thick are connected by a triple riveted lap joint of zig-zag pattern. Calculate the rivet diameter, rivet pitch and distance between rows of rivets for the joint. Also state the mode of failure of the joint. The safe working stresses are as follows:  $\sigma_t = 90\text{MPa}$  ;  $\tau = 60\text{MPa}$  ; and  $\sigma_c = 120\text{MPa}$ .
- b. Derive the strength of a sunk Key.

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Subject: Microprocessors and Interfacing

Time: 2 hours

Max. Marks: 70

Note: Missing data, if any, may be suitably assumed.

**PART – A**

Answer any five questions.

(5x2 = 10 Marks)

- 1 Write an assembly language program to find sum of two eight bit numbers.
- 2 Draw and discuss flag registers of 8085 in brief.
- 3 Write examples of use of stacks and subroutines instructions.
- 4 What do you understand by 'opcode'?
- 5 What are the advantages of using segment registers in 8086?
- 6 What is stack and stack pointers? How is it used in Assembly Language Programming?
- 7 Write short note on RS-232.
- 8 List the advantages of memory segmentation of 8086.
- 9 List out the addressing modes of 8086.
- 10 Explain the physical address formation in 8086.

**PART – B**

Answer any four questions.

(4x15 = 60 Marks)

- 11(a) Explain Arithmetic and Logical instructions of 8085 microprocessor with an example.  
(b) Draw and explain the flag register of 8085 microprocessor.
- 12 Explain the block diagram of 8259 Programmable interrupt controller. What are its features? Explain the interrupt operation of 8259 in the simplest format.
- 13 Explain 8254 Programmable Interval Timer with various modes.
- 14 What do you understand by the term 'Addressing mode'? Explain the Addressing modes supported by 8086 by giving suitable examples.
- 15 Draw and explain the 8086 microprocessor architecture.
- 16 With the help of block diagram explain the internal architecture of IC 8257 DMA controller.
- 17 Explain :
  - (a) Analog to Digital Converters
  - (b) Hardware and software interrupts

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## FACULTY OF ENGINEERING

B.E. 2/4 (EEE/EIE) II-Semester (Backlog) Examination, October 2021

Subject: Electronic Engineering – II

Time: 2 hours

Max. Marks: 75

Note: Missing data, if any, may be suitably assumed.

## PART – A

Answer any seven questions.

(7x3 = 21 Marks)

- 1 Calculate the gain of multistage amplifier if 3 stages are cascaded with individual gains of 10, 25 and 30 express the gain in dB.
- 2 Draw the frequency response of transformer coupled amplifier.
- 3 Draw the circuit of basic transresistance amplifier and mention its ideal input and output impedance values.
- 4 The input and output impedances of an amplifier are  $20\text{K}\Omega$  and  $50\text{K}\Omega$  respectively. Gain = 500, feedback ratio = 0.02. Calculate the input and output impedances of a transconductance amplifier.
- 5 Find the operating frequency of a Hartley oscillator if  $L_1 = 10\text{mH}$ ,  $L_2 = 15\text{mH}$  and  $C = 0.1\mu\text{F}$ .
- 6 State the Barkhausen's criterion for sustained oscillations.
- 7 Classify large signal amplifiers and its classes of operations.
- 8 Calculate the efficiency of A directly coupled power amplifier given  $V_{\min} = 0.25\text{V}$  and  $V_{\max} = 2.5\text{V}$ .
- 9 State the Clamping Theorem.
- 10 Define % tilt of differentiator.

## PART – B

Answer any three questions.

(3x18 = 54 Marks)

- 11(a) Derive the low and frequency analysis of a single stage RC coupled amplifier.  
(b) Explain different methods used for cascading multistage amplifier with their frequency response.
- 12 (a) Draw the block diagram of feedback amplifier and explain each block.  
(b) Draw the current series feedback amplifier block diagram and derive voltage gain with feedback. Input impedance  $R_a$  and output impedance  $R_o$ .
- 13 Derive operating frequency and condition for gain of a Colpitts Oscillator.
- 14 (a) Draw a complimentary symmetry class B power amplifier and derive its efficiency.  
(b) For Class B amplifier providing 20V peak signal to  $8\Omega$  load and power supply  $V_{cc} = 25\text{V}$ . Determine (a) Input power (b) Output power and (c) Efficiency.
- 15(a) Evaluate condition for a RC low pass circuit to act as an integrator and explain how it behaves for a square wave input.  
(b) Draw a double biased clipper circuit and explain with input and output waveforms.
- 16 (a) Discuss about distortion in power amplifiers.  
(b) What are the advantages of negative feedback amplifiers?
- 17 Write short notes on the following:
  - (a) Frequency Stability in Oscillators
  - (b) Negative clamper

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## FACULTY OF ENGINEERING

B.E. II/IV II- Semester (Backlog) Examination, October 2021

Subject: Switching Theory &amp; Logic Design

Time: 2 hours

Max. Marks: 75

Note: Missing data, if any, may be suitably assumed.

## PART – A

Answer any seven questions.

(7x3 = 21 Marks)

- 1 Convert  $(63,875)_{10}$  into Binary and octal.
- 2 With an example explain self-complementing code?
- 3 What is an essential prime implicant?
- 4 What is an advantage of K-Map?
- 5 Design a function  $F = \sum m(2,4,5,6)$  using 74151.
- 6 Name the types of Hazards?
- 7 Define race around condition.
- 8 Define setup time and hold time.
- 9 Explain lock-out condition.
- 10 Draw the design circuit of 4 bit serial in serial out shift register.

## PART – B

Answer any three questions.

(3x18 = 54 Marks)

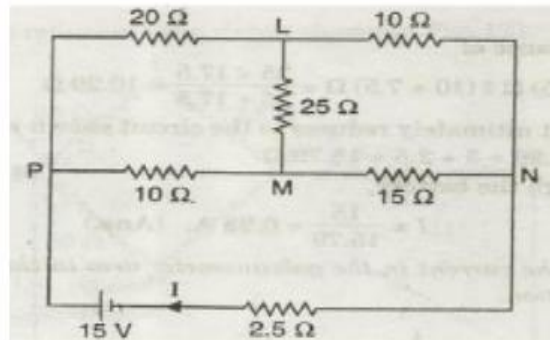
- 11 a) Expand the function  $(A+B)(A+B+C)$  into maxterms.  
b) Prove that NAND, NOR gates are universal gates.
- 12 Obtain the minimal expression for  $F = \sum m(1,2,3,5,6,7,8,12,13,15)$  using tabular method.
- 13 a) Explain BCD adder operation with example and design its circuit.  
b) Design 2-bit comparator circuit.
- 14 a) Give state table, state diagram, characteristic equation and excitation table of SR Flip Flop.  
b) Convert D Flip Flop into JK Flip Flop.
- 15 Design mod-6 synchronous up counter using JK Flip Flop.
- 16 a) Simplify  $F = (\overline{A}BC + B + B\overline{D} + AB\overline{D} + \overline{A}C)$  using Boolean theorems.  
b) Reduce the expression  $F = \prod M(1,2,4,5,6,9,10,12,13,14) + d(11,15)$  using K-Map method.
- 17 Write any two of the following:
  - a) Priority encoder
  - b) Master slave JK Flip Flop
  - c) Mod-10 asynchronous counter

**FACULTY OF ENGINEERING****B.E. 2/4 II - Semester (Mech/Prod) (Backlog) Examination, October 2021****Subject: Electrical Circuits and Machines****Time: 2 Hours****Max. Marks: 75****(Missing data, if any, may be suitably assumed)****PART – A****Note: Answer any seven questions.****(7x3 = 21 Marks)**

- 1 State Thevenin's theorem.
- 2 Explain the Dot convention.
- 3 Draw the characteristic of DC shunt Generator.
- 4 The reading of two wattmeter of 3 phase power measurement are 50 W and 100 W respective. Calculate power factor.
- 5 What are different type of excitation in DC machine?
- 6 A 250V DC shunt motor draws 51A and has field and armature resistance of 250 ohm and 0.2 ohms respectively. Find the Back Emf.
- 7 Why transformer rating is KVA?
- 8 If Iron and copper losses at half load are 100W and 200W respectively, the full load iron and copper losses are \_\_\_\_\_.
- 9 Difference between 3 phase and 1 phase induction motor.
- 10 Why is single phase induction motor not self starting?

**PART – B****Note: Answer any three questions.****(3x18 = 54 Marks)**

- 11 (a) Derive the expression for energy store in inductance.
- (b) Determine the total current  $I$  in the given circuit.



- 12 (a) Derive and with phasor relationship between line and phase quantity of voltage and current in star and delta connected system.
- (b) Explain the construction and principle of a DC machine.
- 13 (a) What is efficiency and different types of losses in DC machines and derive the derivation of Maximum efficiency condition.
- (b) Speed control of DC shunt motor.

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- 14 (a) Explain how efficiency of transformer may be estimated from open circuit and short circuit test.  
(b) Explain about autotransformer with necessary diagram.
- 15 (a) Explain the principle of rotating magnetic field and hence prove it is of constant magnitude and rotating at synchronous speed.  
(b) Explain about Brushless DC motor.
- 16 (a) Dc shunt machine when run as a motor on No load takes 440W and runs at 1000 rpm. The field current and armature resistance are 1A and .5 ohm respectively. Calculate the efficiency of the machine  
(i) Running as a generator delivering 40A at 220V  
(ii) as a motor taking 40A from 220V supply.  
(b) Derive emf equation of DC generator.
- 17 Three similar coils, each of resistance  $20\Omega$  and inductance of 0.5H are connected with (a) star (b) delta to a 3-phase, 50 Hz, 400 V supply. Calculate for the both cases phase and line currents, phase and line voltages, total power absorbed and p.f. Comment on power absorbed by circuit in star and delta connection.

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**FACULTY OF ENGINEERING**  
**B.E. 2/4 II - Semester (AE) (Backlog) Examination, October 2021**

**Subject: Automotive Petrol Engines**

**Time: 2 Hours**

**Max. Marks: 75**

**(Missing data, if any, may be suitably assumed)**

**PART – A**

**Note: Answer any seven questions.**

**(7x3 = 21 Marks)**

- 1 What is the need of a cooling system?
- 2 What are the properties of a good lubricant?
- 3 What is the significance of firing order in four stroke engines?
- 4 What are the different parts of a mechanical fuel injection system?
- 5 What are the advantages of a battery ignition system w.r.t. magneto ignition system?
- 6 What do you understand by idling in automobiles?
- 7 Name the different parts of a battery ignition system.
- 8 What are the different factors that affect the knock in automobiles?
- 9 What is the function of a pump in cooling systems?
- 10 What is pressure lubrication system?

**PART – B**

**Note: Answer any three questions.**

**(3x18 = 54 Marks)**

- 11 Explain in detail the working of the air standard cycle with the help of a neat diagram.
- 12 Write about the mechanical and electrical fuel injection systems.
- 13 (a) Explain the working of carburetor and its functions.  
(b) How does the spark plug work? Explain its construction and working.
- 14 Write about the electronic ignition system.
- 15 (a) What are the factors that influence the design of a combustion chamber?  
(b) Explain the combustion process in detail for S.I. engines.
- 16 Explain the dry sump lubrication system with a neat diagram.
- 17 What are the different types of cooling systems used in automobiles? Explain each briefly.

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**FACULTY OF ENGINEERING**  
**B.E. 2/4 II - Semester (I.T.) (Backlog) Examination, October 2021**

**Subject: Signals and Systems**

**Time: 2 Hours**

**Max. Marks: 75**

**(Missing data, if any, may be suitably assumed)**

**PART – A**

**Note: Answer any seven questions.**

**(7x3 = 21 Marks)**

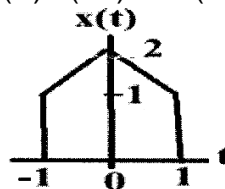
- 1 What are the basic operations on signals?
- 2 Define unit impulse,  $\int_0^2 \cos(\pi t) \delta(t-1) dt$  & compute.
- 3 How do you obtain Exponential Fourier series coefficients from Trigonometric Fourier series coefficients?
- 4 Examine whether the signal  $x(t) = 2\cos(4\pi t) - 3\sin(3\pi t)$  is periodic or not. If periodic, find the fundamental time period.
- 5 Draw the characteristics of ideal filters.
- 6 Find the Laplace Transform of  $u(t)$ .
- 7 When does aliasing occur? How can it be avoided?
- 8 Define a band limited signal.
- 9 What is Region of convergence with respect to Z-Transform?
- 10 Determine the initial & final values of the signal  $x(n)$  if  $X(z) = \frac{1}{(z-1)}$ .

**PART – B**

**Note: Answer any three questions.**

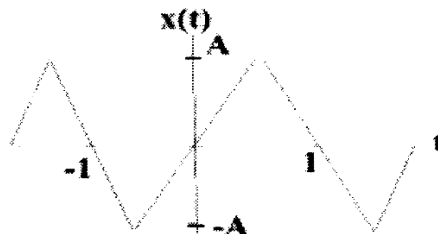
**(3x18 = 54 Marks)**

- 11 (a) For the signal  $x(t)$  shown in the figure. Sketch the following  
 (i)  $x(t-3)$     (ii)  $x(t/2-1)$     (iii)  $x(1-t)$     (iv)  $x(-2t)$

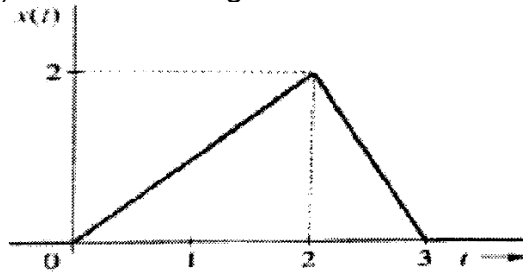


- (b) Check whether  $2\sin(10\pi t)$  is an energy signal or power signal.

- 12 Find the Cosine and Trigonometric Fourier series for the signal  $x(t)$  shown in figure and sketch magnitude, phase spectra.



13 (a) For the signal  $x(t)$  shown in the figure. Find the Fourier Transform.



(b) Explain any three properties of Laplace Transform with suitable examples.

14 (a) Solve the second order linear differential equation

$$\frac{d^2}{dt^2} y(t) + 5 \frac{d}{dt} y(t) + 6y(t) = \frac{d}{dt} x(t) + x(t).$$

(b) For the initial conditions  $y(0)=2$   $\dot{y}(0)=1$  and the input  $x(t) = e^{-4t} \cdot u(t)$ .

15 (a) Determine whether the following discrete time signals are energy signals or power

Signals (i)  $x(n) = n \cdot u(n)$

(ii)  $x(n) = 3^{-n} \cdot u(n)$ .

(b) Find the discrete time Fourier transform of  $x(n) = \sin\left(\frac{\pi}{4} n\right)$ .

16 (a) Find Z-Transform of the following  $2^{-n} u(n) + 3^n u(-n-1)$ .

(b) Find Inverse Z-Transform by power series method  $X(Z) = \frac{Z}{2Z^2 - 3Z + 1} |Z| > 1$ .

17 Write short notes on:

(a) BIBO stability criteria

(b) Exponential Fourier series

(c) Nyquist rate of sampling.

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## FACULTY OF ENGINEERING

B.E. IV Semester (AICTE) (CE) (Main&amp;Backlog) Examination, October 2021

Subject: Fluid Mechanics

Time: 2 hours

Max. Marks: 70

Note: Missing data, if any, may be suitably assumed.

## PART – A

Answer any five questions.

(5x2 = 10 Marks)

- 1 Differentiate between fluids and solids.
- 2 Define vapor pressure and cavitation.
- 3 Write the relation between absolute pressure, gauge pressure and atmospheric pressure.
- 4 Define metacenter and buoyancy.
- 5 Differentiate between uniform and non-uniform flow with examples.
- 6 Differentiate between free vortex flow and forced vortex flow with formulas.
- 7 What are the main forces acting in laminar flow equation?
- 8 Define energy correction factor and write its equation.
- 9 Why venturimeter is most efficient when compared to orifice meter.
- 10 Define coefficient of contraction and coefficient of resistance with formulas.

## PART – B

Answer any four questions.

(4x15 = 60 Marks)

- 11 a) Explain the phenomenon of surface tension and capillarity. Derive the expression for capillarity rise and fall.  
b) A 90 N rectangular solid block slides down a 30° inclined plane. The plane is lubricated by a 3mm thick film of oil of relative density 0.90 and viscosity 8.0 poise. If the contact area is 0.3 m<sup>2</sup>, estimate the terminal velocity of the block.
- 12 a) Distinguish between manometers and mechanical gauges. Explain briefly the working principle of a Bourdon pressure gauge with neat sketch.  
b) A rectangular plane surface 3.0 m wide and 4.0 m deep lies in water in such a way that its plane makes an angle of 30° with the free surface of water. Determine the total pressure force and position of Centre of pressure, when the upper edge is 2 m below the free surface.
- 13 a) Derive 3D continuity equation in Cartesian coordinates.  
b) A fluid flow field is given by  $V = x^2yi + y^2zj - (2xyz + yz^2)k$ . Prove that it is a case of possible steady incompressible flow.  
Calculate the velocity and acceleration at the point (2,1,3).
- 14 a) Derive Bernoulli's equation with assumptions from force potential concept with fundamentals.  
b) A 300 mm diameter pipe carries water under a head of 20 m with a velocity of 3.5 m/s. If the axis of the pipe turns through 45°, find the magnitude and direction of the resultant force.

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- 15 a) Derive an expression for the discharge through orifice meter and why mercury is preferred for measurement of pressure. A hemispherical tank of diameter 4 m contains water up to a height of 1.5m. An orifice of diameter 50 mm is provided at the bottom. Find the time required by water to fall from 1.5m to 1.0m and for completely emptying the tank. Take  $c_d=0.6$ .
- 16 a) An oil of relative density 0.8 is flowing through a pipe of length 400m laid on a downward grade of 1 in 100. The rate of flow of oil in the pipe is  $1.75 \text{ m}^3/\text{s}$ . The diameter at upper end of the pipe is 1.2m and it is 0.6m at the lower end.(1) If the pressure at the higher end is 80K Pa. Assume loss of energy between two ends of the pipe is 0.5 m of oil.(2) draw a schematic diagram of pipeline setup showing clearly the HGL and TEL.
- b) Define flow net. Write its uses and limitations of flow net.
- 17 Briefly explain the following:
- Pitot tube with neat sketch.
  - Rota meter.
  - Cipoletti notch.



## FACULTY OF ENGINEERING

B. E. IV – Semester (AICTE) (EE/Inst.) (Main &amp; Backlog) Examination, October 2021

Subject: Digital Electronics &amp; Logic Design

Time: 2 hours

Max. Marks: 75

Note: Missing data, if any, may be suitably assumed.

## PART – A

Answer any five questions.

(5x3 = 15 Marks)

1. What are the important features of CMOS gates? Draw a 3-input CMOS-NOR gate and its truth table?
2. What is a number system? Explain different types of number systems?
3. Distinguish between MUX and DEMUX.
4. Explain single bit digital comparator.
5. Explain a basic latch circuit.
6. Convert J-K flip-flop to D flip-flop.
7. Explain parallel comparator of A/D converter.
8. How is a state diagram useful for designing counter?
9. Write a short note on PLA.
10. Is magnitude comparator a combinational circuit or sequential circuit? Explain.

## PART – B

Answer any four questions.

(4x15 = 60 Marks)

11. (a) Explain full adder using truth table implement the logic circuit for carry and sum using a universal gate.  
(b) Explain about decimal to excess three code converter.
12. (a) Explain about decimal to binary code converter.  
(b) Design a 4 to 16 decodes using 3 to 8 decodes.
13. (a) Find the complement of the function.  
 $F = x'yz' + x'y'z$  by finding the dual of the function.  
(b) Implement NOT, AND, OR, NOR, XOR and XNOR using NAND gates.
14. Explain the following: -  
(a) TTL Family.  
(b) RTL Family.
15. (a) Write the truth table of JK flip-flop and explain the principle of operation of clocked JK flip-flop with output waveform. (b) Convert a D flip-flop and explain its operation.
16. (a) Distinguish between PLA and PAL.  
(b) Implement the following function using a PROM  
 $F(W,X,Y,Z) = \Sigma(0,1,2,3,4,6,7,8,9,12,13,14,15)$

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- 17.(a) Draw the block diagram of a 4-bit shift register to have serial input serial output and explain its operation.
- (b) Draw and explain with a block diagram of a 4-bit parallel input serial output configuration shift register.
- (c) Draw the circuit of a serial adder. Obtain its state diagram and state table.

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**FACULTY OF ENGINEERING**

**B. E. IV – Semester (AICTE) (ECE) (Main&Backlog) Examination,**

**October 2021**

**Subject: Analog Electronic Circuits**

**Time: 2 hours**

**Max. Marks: 70**

*Note: (Missing data, if any, may be suitably assumed)*

**PART – A**

**Answer any five questions.**

**(5 x 2 = 10 Marks)**

- 1 What are the various distortions in amplifiers?
- 2 What are the advantages and disadvantages of transformer coupled amplifier?
- 3 What is the effect of negative current series feedback on input and output impedances of amplifier?
- 4 An Amplifier has a gain of 100 and bandwidth of 600Hz. If negative feedback is applied with  $\beta = 0.1$ , find gain and bandwidth with feedback
- 5 Compare LC and RC oscillators?
- 6 If  $L_1 = 3\text{mH}$ ,  $L_2 = 10\text{mH}$  and  $C = 10\mu\text{F}$ . Calculate frequency of oscillations for a Hartley oscillator?
- 7 What is cross-over distortion in power amplifiers?
- 8 Find efficiency of class A power amplifier?
- 9 What is unilateralisation in RF voltage amplifier?
- 10 What is a stagger tuned amplifier. What are its advantages?

**PART – B**

**Answer any four questions.**

**(4 x 15 = 60 Marks)**

- 11 Derive expressions for mid band gain, high frequency gain and upper cutoff frequency of a single stage RC coupled BJT amplifier?
- 12 (a) Write about stability consideration of negative feedback amplifier?  
(b) Draw voltage shunt negative feedback amplifier with  $R_c = 3\text{k}\Omega$ ,  $R_f = 400\text{k}\Omega$ ,  $R_s = 2\text{k}\Omega$ ,  $R_e = 500\Omega$  and find  $R_{msf}$  and  $R_{if}$ . If  $h_{ie} = 1\text{k}\Omega$ ,  $h_{fe} = 100$ ,  $h_{re} = h_{oe} = 0$ ?
- 13 Derive expressions for frequency of oscillation and condition of oscillation for Hartley oscillator?
- 14 Explain operation of class-B push pull power amplifier. Prove the efficiency of class B power amplifier is 78.6%?
- 15 For a single tuned RF voltage amplifier obtain expression for gain at resonance and bandwidth?

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- 16 a. show the frequency response is poor at high frequencies for transformer coupled amplifier. Derive necessary expression.  
(b) Compare local and global feedback?

17 Write short note on any two

- (a) Transistorized shunt voltage regulator  
(b) Class- Doperation  
(c) Double tuned RF voltage amplifier.

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**FACULTY OF ENGINEERING**  
**B.E. IV - Semester (AICTE) (M/P/AE) (Main & Backlog) Examination,**  
**October 2021**

**Subject: Energy Sciences and Engineering**

**Time: 2 Hours**

**Max. Marks: 70**

**(Missing data, if any, may be suitably assumed)**

**PART – A**

**Note: Answer any five questions.**

**(5x2 = 10 Marks)**

- 1 What are the various sources of energy?
- 2 Why Renewable resources are preferable over Nonrenewable energy resources?
- 3 What is a reactor core?
- 4 Define spillway.
- 5 Define solar photo voltaic cell.
- 6 What are the units of solar power and solar energy?
- 7 Explain different types of systems used for energy storage.
- 8 What do you mean by WHR?
- 9 What is fixed cost and operating cost?
- 10 List any five energy efficiency standards.

**PART – B**

**Answer any four questions.**

**(4x15 = 60 Marks)**

- 11 Explain about the statistics and prospects of conventional energy sources.
- 12 Discuss in detail of the following with neat sketch.
  - (a) Steam turbine power plant.
  - (b) Gas turbine power plant.
- 13 Draw the schematic layout of hydroelectric power plant and explain its parts and working in detail.
- 14 Explain different types of solar collectors with a neat sketch.
- 15 Explain the following:
  - (a) Wave energy devices
  - (b) Wave profile devices
  - (c) Oscillating wave columns.
- 16 Explain shell and tube heat exchangers with a neat sketch and mention its types.
- 17 Explain the following:
  - (a) Gravitational settling chamber
  - (b) Cyclone separator's
  - (c) Fabric filters.

**FACULTY OF ENGINEERING**

**B.E. IV Semester (AICTE) (Main & Backlog) Examination, October 2021**

**Subject: Computer Organization**

**Time: 2 hours**

**Max. Marks: 75**

**Note: Missing data, if any, may be suitably assumed.**

**PART – A**

**Answer any five questions.**

**(5x3 = 15 Marks)**

1. What is the use of CALL and RETURN instructions?
2. What is meant by program status word (psw).
3. Draw block diagram of CPU.
4. Differentiate Isolated and Memory mapped I/O.
5. How to write back method differ from write through in cache memory.
6. Differentiate SRAM and DRAM
7. Explain flag register of 8086
8. How is effective address calculated in "Indirect addressing Mode"?
9. An eight bit register contains the binary value 11010010. What is value in the registrar after Arithmetic right Shift? Is there any overflow?
10. Write an assembly language program to perform 8 bit subtraction.

**PART – B**

**Answer any four questions.**

**(4x15 = 60 Marks)**

- 11(a) what do you understand by the term "Addressing Modes"? Explain any six addressing modes with examples.  
(b) Write an Assembly language program to evaluate  $(w+x+y)-(u/v)$  using three,two,one,and zero address instructions.
- 12(a) Explain with block diagram how CPU and IOP communicate with each other.  
(b) Explain the three different modes of data transfer.
- 13(a) Explain two-way set associative mapping in cache memory with an example.  
(b) Explain the functioning of magnetic disk.
- 14 Explain the architecture of 8086 microprocessor in detail with diagram.
- 15 Explain Data transfer and Arithmetic instructions of 8086 in detail with examples.
- 16(a) Explain Asynchronous data transfer with neat block and timing diagrams.  
(b) Explain types of interrupts in detail. Draw interrupts cycle.
- 17 Write short notes on :  
(a)Push and Pop Instructions (b) Auxiliary memory (c)Pipelining

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**FACULTY OF ENGINEERING**

**B.E. IV - Semester (AICTE) (CME) (Main & Backlog) Examination, October 2021**

**Subject: Computer Organization & Microprocessor**

**Time: 2 Hours**

**Max. Marks: 70**

**(Missing data, if any, may be suitably assumed)**

**PART – A**

**Note: Answer any five questions.**

**(5x2 = 10 Marks)**

- 1 Explain about status bit conditions.
- 2 Define Pipelining.
- 3 Differentiate between Isolated I/O and Memory mapped I/O.
- 4 Explain about memory hierarchy.
- 5 Calculate the effective address for the Following Register SS: 3860, SP: 1735H, BP: 4826H.
- 6 Distinguish between direct addressing mode and indirect addressing mode with example.
- 7 Explain about JUMP and RETURN instructions with an example.
- 8 Differentiate between write back and write through mechanism of writing data into cache memory.
- 9 What is Auxiliary memory?
- 10 List few branch and call instructions.

**PART – B**

**Note: Answer any four questions.**

**(4x15 = 60 Marks)**

- 11 (a) Explain about the addressing modes of 8086 microprocessor.  
(b) Evaluate the arithmetic expression using memory stack  $X=L*M+L*(M+O+N*P)$ .
- 12 (a) Explain three address, two address, one address and zero address instructions with examples.  
(b) What is associative mapping? How is it implemented to improve performance?
- 13 Explain about the pin diagram of 8086.
- 14 (a) What are the different modes of I/O transfer?  
(b) Draw the Block Diagram of RAM chip and explain with the help of the function table.
- 15 (a) Explain how communication takes place between CPU and IOP.  
(b) What is Program control? Explain in detail.
- 16 (a) What is cache memory, explain a mechanism of data transfer between cache and main Memory?  
(b) Write an Assembly language program to demonstrate the numbers in Descending Order.
- 17 Explain in detail different kinds of asynchronous data transfer methods with the help of block diagram.

## FACULTY OF ENGINEERING

B.E. (IT) IV-Semester (AICTE)(Main&amp;Backlog)Examination, October 2021

Subject: Computer Organization and Microprocessor

Time: 2 hours

Max. Marks: 70

**Note: Missing data, if any, may be suitably assumed.****PART – A****Answer any five questions.****(5x2 = 10 Marks)**

- 1 Draw the timing diagram for fetch phase in instruction cycle.
- 2 Write about types of interrupts.
- 3 Compute the average access time with cache access time of 100ns and main memory access times is 1000ns. The hit ratio is 0.8.
- 4 Write the difference between logical address space and physical address space.
- 5 List the various 8085 instructions to perform arithmetic and logical operations and write the function of each instruction.
- 6 How many number of the times the instruction sequence in the loop will execute? Justify?  

```
MOV AL, 00h
A1: INC AL
    JNZ A1
```
- 7 State the function of following pins of DMA controller 8257.  
i) HLDA ii) HRQ
- 8 Write a 20ms time delay subroutine using register pair BC, clear the Z flag without affecting any other flags in the flag register.
- 9 Write the any two mode operations of 8253/8254 Programmable Interval Timer.
- 10 Define slew rate and line impedance? What is slew rate and line impedance values of RS232?

**PART – B****Answer any four questions.****(4x15 = 60 Marks)**

- 11 a) Explain the process of instruction cycle with interrupts with the help of state diagram.  
b) Write the various data transfer modes using Direct memory access.
- 12 a) Write and explain the types of memory-reference instructions with example for each.  
b) Explain the organization of Associative memory.
- 13 a) Write an assembly language to find the 3-bit binary numbers.  
b) Draw the 8085 timing diagram for execution of IN instruction.
- 14 a) What are the major components of the 8259A interrupt controller and functions of each component. Explain each component in detail.  
b) What are the various modes and its function in 8257. Explain with the help of 8257 block diagram.



- 15 a) Describe the function of 8253 with the help of block diagram.  
b) Explain various programming modes of 8251 with the help of functional block diagram.
- 16 a) Write a short note on RS-232-C. Give its applications.  
b) Explain the internal architecture of 8085 with a neat block diagram and explain its working.
- 17 a) Describe how the virtual memory is organized by means of block diagram.  
b) Write short notes on subroutines in 8085.

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