Code No. 15028/AICTE/BL

# FACULTY OF ENGINEERING

**B.E. (EE/EIE) III-Semester (AICTE) (Backlog) Examination, November 2021**

**Subject: Electromagnetic Fields**

**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 State stokes theorem.
2 What are the types of charges? Define one of them.
3 Define dipole moment.
4 State point form of ohms law.
5 Write the magnetic boundary condition.
6 Given the function A= ( x + z) $a_x$ + (- 3z)ay + (x – 3y – z)$a_z$, show that it is both irrotational and solenoidal.
7 Give the expression for inductance of solenoid.
8 Write Maxwell second equation in integral form.
9 Mention properties of uniform plane wave.
10 Define pointing vector.

## PART – B

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

11 (a) State and explain coulombs law with super position principle.
(b) Three concentrated charges of 10 C are located at the vertices of an equilateral triangle of 20cm side. Find the magnitude and direction of force on one charge due to other two charges.

12(a) The potential functions is given as V= $2y^4 + 10x^3$ in free space. Determine the volume charge density at a point p(2, 0, 0).,
(b) Derive an expression for energy density in electrostatic fields.

13(a) Give the expression for torque experienced by a current carrying loop situated in a magnetic field.
(b) State and prove boundary conditions for magnetic fields.

14 (a) Derive expression for capacitance of co-axial cable.
(b) List out the properties of dielectric materials.

15 State and explain faradays and Lenz law of induction and derive Maxwell's equation.

16 Derive Maxwell equation in phasor differential and integral form.

17 Derive the one dimensional general wave equation and find the solution for wave equation.

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**Code No. 15270/AICTE/BL**

# FACULTY OF ENGINEERING

**B.E. III - Semester (ECE) (AICTE) (New) (Backlog) Examination, November 2021**

**Subject: Digital Electronics**

**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 Realize an Exclusive OR gate using minimum number of two input NAND gates.
2 Using K-map, simplify the following function f(a,b,c) = $\Sigma$m(1,3,5,7).
3 Implement al full adderusing basic gates.
4 Give the design of a 1 bit magnitude comparator.
5 Outline the structure of PAL.
6 What is a Lookup table? Explain with a simple, how is it used in FPGA.
7 What is race around condition and how can it be eliminated?
8 Draw the structure of SR Flip Flop and give its truth table and excitation table.
9 What is difference between Moore and Mealy FSM?
10 Briefly discuss ASM charts.

## PART – B

**Note: Answer any four questions.** **(4x15 = 60 Marks)**

11 (a) Simplify the following function using Quine-McCluskey method
F(w,x,y,z) = $\Sigma$m(0,1,2,5,6,7,8,9,10,14).
(b) Minimize the given function using K Map Method f(a,b,d,c) = $\Sigma$m(1,2,5,11,15) +d(6,7,8,9).

12 (a) Give the design of 8:1 Mux using two 4:1 Mux's and one 2:1 Mux.
(b) What is the design issue in a conventional four bit adder and how is it resolved using Carry Look ahead adder. Give the design of a Carry Look ahead adder?

13 (a) Give the detailed structure of CPLD. What is difference between CPLD and FPGA?
(b) Implement the design of a half adder using FPGA.

14 (a) Give the design of a 3 bit asynchronous counter using T flip flops.
(b) Draw a 3 bit shift register and show how it can be modified to obtain a Johnson counter and explain its operation with output sequence.

15 Design FSM that detects the input sequence "1010" using Moore FSM.

16 (a) Show the implementation of all basic gates using only NOR gate.
(b) Give the design of 3:8 decoder using basic gates.

17 Write short notes on the following:
(a) Programmable logic Arrays.
(b) Design a 3 bit synchronous up counter.
(c) State minimization with an example.

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**Code No. 15037/AICTE/BL**

# FACULTY OF ENGINEERING

**B.E. III-Semester (AICTE) (ECE-Old) (CSE/IT-Backlog) Examination, November 2021**

**Subject: Digital Electronics**

**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 What is Gray code?
2 What are don't cares?
3 Find the two compliment of $(1010)_2$.
4 Give the application of Multiplexer.
5 Explain about PLA.
6 What is difference between combination circuit and sequential circuit?
7 Give the Excitation table for T Flip-flop.
8 What is a difference between Latch and Flip Flop?
9 Explain about ASM.
10 Difference between state table and state diagram.

## PART – B

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

11 (a) Reduce the function using Quine-McCluskey tabular method.

$$f(A, B, C, D) = \Sigma m(0, 2, 3, 4, 5, 10, 11, 3)$$

(b) State De Morgan's laws.

12 (a) Design a circuit to convert BCD to Seven segment decoder Logic.
(b) Explain about 2 bit Arithmetic comparator circuits.

13 (a) Give the brief explanation of 2 input and 3 input lookup tables.
(b) Give in detail the structure of FPGAs.

14 (a) What are register and explain different types of register?
(b) Write a Verilog code of D flip flop.

15 Design of FSM for Sequence Generation and Detection.

16 (a) Convert the following numbers into decimal numbers
(i) $(1011011101101110)_2$ (ii) $(A0CB.EE)_{16}$
(b) For the given Boolean function F = x y′ z + x′ y′ z + w′ x y + w x y + w x y
Simplify the function to minimal literals using Boolean algebra.

17 Deign a Mod-10 counter using RS flip-flops.

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**Code No. 15040/AICTE/BL**

# FACULTY OF ENGINEERING

**B.E. III - Semester (Mech/Prod) (AICTE) (Backlog) Examination, November 2021**

**Subject: Metallurgy and Material Science**

**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 Enlist different type of Mechanical properties of materials.
2 Define polymers and composites.
3 With the help of a sketch, explain the term Endurance Limit.
4 Explain significance of S-N curve.
5 What are the conditions for obtaining substitutional and interstitial solid solutions?
6 State the properties and application of Low Carbon Steel.
7 What is Martempering?
8 State the principles of precipitation hardening.
9 Explain concept of composite.
10 Enlist properties and applications of Cu and its alloy.

## PART – B

**Note: Answer any four questions.** **(4x15 = 60 Marks)**

11 (a) Explain effects of Slip and twinning on plastic deformation with neat sketch.
(b) Explain effect of dislocation on strength of materials particularly during deformation.

12 (a) Discuss various protective methods of enhancing fatigue life of a component.
(b) Discuss low temperature creep and its utility in engineering design.

13 Explain the procedure of constructing a binary alloy phase diagram in which two metals are completely soluble in both liquid and solid states. Also interpret each area of that phase diagram.

14 (a) Discuss various types of annealing procedures.
(b) Discuss the various surface hardening techniques mentioning their principle, limitation and specific application.

15 (a) What are thermoplastics and thermosetting plastics? Explain with examples.
(b) What are the properties and application of polymers? How can properties of polymers be improved?

16 (a) Explain with neat sketches the two modes of fracture failure of metal.
(b) Discuss concepts of cumulative fatigue and fatigue damage.

17 Write short notes on any two of the following:
(a) Properties of S.G. Cast Iron
(b) Various types of surface hardening process for steels
(c) Matrix and Reinforcement.

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**Code No.15042/AICTE/BL**

# FACULTY OF ENGINEERING

**B. E. (AE) III – Semester (AICTE) (Backlog) Examination, November 2021**

**Subject: Fluid Mechanics & Machinery**

**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 various types of fluids using Newton's law of viscosity.
2. If a certain liquid has a dynamic viscosity of 0.073 poise and specific gravity of 0.87. Compute the kinematic viscosity of the liquid in stokes.
3. Define stream lines, stream tube, path lines and streak lines.
4. Write the Bernoulli's equation and write its applications.
5. Explain how to determine the loss of head due to friction in pipes by using Darcy Formula and Chezy's formula.
6. Differentiate between Laminar flow and Turbulent flow.
7. Explain some methods to avoid Cavitation in hydraulic turbines.
8. Explain the criteria of selection of Turbines.
9. Differentiate between positive displacement pump and roto dynamic pump.
10. What is the significance of priming in centrifugal pump?

## PART – B

**Note: Answer any four questions.** **(4x15 = 60 Marks)**

11. (a) What is the principle of manometer while measuring the pressure and write the various types of manometers?

    (b) An oil of viscosity of 5 poise is used for lubrication between a shaft and a sleeve. The diameter of shaft is 0.5m and it rotates at 200rpm. Calculate the power lost in oil for sleeve length of 100mm and thickness of oil film is 1.0mm.

12. (a) Derive the expression for discharge through a Venturi meter and state the assumptions made.

    (b) A venture meter with 150 mm diameter at inlet and 100 mm at throat is laid with its axis horizontal and is used of measuring the flow of oil of specific gravity 0.9. The oil mercury differential manometer shows a gauge difference of 200 mm. Calculate the discharge. Assume the coefficient of discharge for the venture meter as 0.98.

13. (a) Draw and explain laminar boundary layer, turbulent boundary layer, laminar sub-layer.

    (b) Derive Hagen Poiseuille's equation for steady laminar flow through a circular pipe. Prove that the velocity distribution across the section is parabolic and the average velocity is half of the maximum velocity.

14. (a) Design a Pelton wheel to develop 103 kW of power at 300 rpm under a head of 80m with an overall efficiency of 80%. Take $C_v$ = 0.98 and speed ratio 0.45.

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(b) Draw a schematic diagram of a Francis turbine and explain briefly its construction and working.

15. (a) With help of a neat sketch explain the working of centrifugal pump.

(b) Centrifugal pump runs at 800 rpm and delivers 5 $m^3/s$ against a head of 7m, the impeller has an outer diameter of 25 cm and width of 5 cm at out let if the vane angle at the out let is 50 degrees determine (i) manometric efficiency (ii) specific speed.

16. (a) Derive an expression for minimum starting sped of a centrifugal pump.

(b) Show that the area of the indicator diagram is proportional to the work done by the reciprocating pump.

(c) Effect of Acceleration of piston on the water inside suction and delivery pipe of reciprocating pump.

17. Write short notes on the following:

(a) Air vessels in Reciprocating pumps.

(b) Types of impellors and casings of centrifugal pumps.

(c) Functions of Draft tubes and types of Draft tubes.

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**Code No: 15025/AICTE/BL**

# FACULTY OF ENGINEERING

**BE III-Semester (AICTE) (Civil) (Backlog) Examination, November 2021**

**Subject : Solid Mechanics**

**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. Differentiate between Brittle and Ductile materials
2. Differentiate between thin and thick cylindrical shells
3. A point in a strained material is subjected to a direct stress of 80MPa. Calculate the resultant stress on a plane making $30^o$ with the axis of given stress
4. Define 'Resilience' and 'Proof Resilience'.
5. Draw SFD and BMD for a simply supported beam of span 3m subjected to 20 kN at the center of the beam.
6. Determine the section modulus of a hollow circular section whose internal and external diameters are 80mm and 100mm respectively.
7. What is the relation between average shear stress and maximum shear stress in rectangular and circular sections
8. Sketch the core of a circular section of diameter 25mm.
9. Differentiate between 'Flexural rigidity' and 'Torsional rigidity'
10. If the thickness of plates in a Semi-elliptical laminated spring is reduced to half, what happens to the maximum bending stress induced in the spring.

## PART - B

**Note: Answer any Four questions**. **(4x15=60 Marks)**

11. A steel rod 20mm diameter passes centrally through a steel tube 30mm internal diameter and 40mm external diameter. The tube is 800mm long and is closed by rigid washers which are fastened by nuts threaded on the rod. the nuts are tightened until the compressive load on the tube is 10kN. Calculate the stresses in the tube and the rod. Take E=200GPa.

12. Find the thickness of metal necessary for steel cylindrical shell of internal diameter 150mm to withstand an internal pressure of $50N/mm^2$. The maximum hoop stress in the section is not to exceed $150N/mm^2$.

13. At a certain point in a strained material the intensities of normal stresses on two planes at right angles to each other are $20N/mm^2$ and $10N/mm^2$ both tensile. They are accompanied by shear stress of $10N/mm^2$. Find the principal planes and the principal stresses. Find also the maximum shear stress.

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14. A beam AB, 20 meters long supported on two intermediate props 12 meters apart carries as uniformly distributed load 6kN/m together with concentrated loads of 30kN at the left end A and 50kN at the right end B. The props are so located that the reaction is the same at each support. Determine the position of the props and draw SFD and BMD.

15. A Cast Iron beam section is of I-section with a top flange 80mm X 20mm thick bottom flange 160mm X 40mm thick and web 200mm deep and 20mm thick. The beam is freely supported on a span of 5 meters. If the tensile stress is not to exceed 20N/mm$^2$ find the safe uniformly distributed load which the beam can carry. Find also the maximum compressive stress.

16. A beam of square section is used as a beam with one diagonal horizontal. Find the magnitude and location of maximum shear in the beam. Also sketch the shear stress distribution across the section.

17. A hollow shaft having an inside diameter 60% of its outer diameter is to replace a solid shaft transmitting the same power at the same speed. Calculate the % saving in material, if the material to be used is also the same.

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