

FACULTY OF ENGINEERING**BE III - Semester (ECE/M/P/AE) (AICTE) (Backlog) Examination, November 2021****Subject: Mathematics-III (PDE, P&S)****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 Eliminate the arbitrary function f from $z = f(x + y)$ to obtain a partial differential equation.
- 2 Solve $\sqrt{p} + \sqrt{q} = 1$.
- 3 Find the solution of $u_x = 2u_y + u, u(x, 0) = 6e^{-3x}$ using the method of separation of variables.
- 4 Write two dimensional heat and steady state heat equations.
- 5 If a random variable X follows a Poisson distribution such that $P(X=1) = P(X=2)$, find $P(X=0)$.
- 6 Find the mean of uniform distribution.
- 7 Prove that $-1 \leq r \leq 1$, where r is the correction coefficient.
- 8 Define null hypothesis and alternative hypothesis.
- 9 State any two assumptions for applying t-test.
- 10 Write any two uses of χ^2 -test.

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

- 11 (a) Solve $x(y-z)p + y(z-x)q = z(x-y)$.
(b) Reduce the partial differential equation $x^2 p^2 + y^2 q^2 = z^2$ to $F(p, q) = 0$ form and hence solve it.
- 12 Solve the initial boundary value problem $\frac{\partial^2 u}{\partial t^2} = c^2 \frac{\partial^2 u}{\partial x^2}$ subject to the conditions.

$$u(0, t) = u(2, t) = 0, u(x, 0) = \begin{cases} x & , 0 \leq x \leq 1 \\ 2-x & , 1 \leq x \leq 2 \end{cases}, \frac{\partial u}{\partial t}(x, 0) = 0, 0 < x < 2 \text{ and } t > 0.$$

- 13 (a) If X is a normal variate with mean 25 and standard deviation 5, find the probability that
i) $15 \leq X \leq 30$ and ii) $|X - 30| \geq 10$.
(b) Find the moment generating function of the Poisson distribution.
- 14 (a) Using the method of least squares, fit a straight line $y = a + bx$ for the following data:

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..2..

x	1	2	3	4
y	0	1	1	2

- (b) The means of samples of sizes 1000 and 2000 are 67.5 cm and 68.0 cm respectively. Can the samples be regarded as drawn from the same population of standard deviation 2.5 cm? (Test at 5% level of significance)
- 15 The I.Q of the students in an elementary school were tested. A random sample of 7 students had the following I.Q's: 85, 96, 105, 102, 82, 89, 90. Does this data support the claim of a population mean of I.Q 100? Test at 5% level of significance.
- 16 (a) Form a partial differential equation by eliminating the arbitrary constants a and b from $(x-a)^2 + (y-b)^2 + z^2 = 16$.
- (b) The first four central moments of a distribution are 0, 2.5, 0.7 and 18.75. Test the skewness and kurtosis of the distribution.
- 17 (a) Calculate the coefficient of correlation from the following data:

x	64	65	66	67	68	69	70
y	66	67	68	69	70	71	72

- (b) Two samples of sizes 9 and 8 gave the sum of the squares of deviations from their respective means equal to 160 and 91 respectively. Can they be regarded as drawn from the same normal population?

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FACULTY OF ENGINEERING
B.E. III - Semester (Backlog) (AICTE) (CE/EEE/EIE/CSE/CME)
Examination, November 2021

Subject: Biology for Engineers

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 Write about classification of living organisms.
- 2 Outline the importance functions of proteins.
- 3 Briefly describe the process of circulation in animals.
- 4 Write a short note on nitrogen fixation in leguminous plants.
- 5 Write a brief account on evidences of evolution.
- 6 State what are genes and chromosomes.
- 7 Give a brief note on control of type II diabetes.
- 8 Outline the functions of immune system.
- 9 Write short notes on stem cells.
- 10 What are biochips? Write one application of it.

PART – B

Note: Answer any four questions.

(4x15 = 60 Marks)

- 11 (a) Describe in detail the classification and important functions of vitamins.
(b) Differentiate the characteristics and structural features of prokaryotes and eukaryotes.
- 12 (a) Give a detailed account on digestion in animals with illustration.
(b) Describe the economic importance of microbes.
- 13 (a) State and explain Mendel's laws of inheritance.
(b) Explain the events of mitotic cell division.
- 14 (a) Give a detailed account on active and passive immunity.
(b) Explain the causes, symptoms and preventive measures for cancer.
- 15 (a) What are transgenic plants and animals? Discuss the potential benefits and harmful effects?
(b) Elucidate the role of biomaterials and their applications in biology.
- 16 (a) Give a detailed account on general classification and important functions of lipids.
(b) Explain the mechanism of enzyme activity. Discuss factors that affect enzyme activity. Give one industrial use of enzymes.
- 17 (a) Describe the diagnosis, treatment and preventive measures of hepatitis.
(b) Explain the process of making medicines from organisms through genetic engineering in biopharming and list its applications.

FACULTY OF ENGINEERING
BE III Semester (CBCS((Backlog) Examination, November 2021

Subject: Engineering Mathematics - III (Except I.T)

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. Show that $f(z) = xy + iy$ is everywhere continuous but is not analytic.
2. State Cauchy's integral formula for derivatives.
3. Show that $f(z) = \frac{\sin z}{z}$ has removable singularity.
4. Expand $f(z) = \frac{1}{z}$ about $z = 2$ in Taylor's series.
5. Express $f(x) = x$ as half- range sine series in $0 < x < 2$.
6. Write Fourier series expansion of even periodic function $f(x)$ in $(-c, c)$.
7. Form the partial differential equation by eliminating the arbitrary function from $z = (x + y)\phi(x^2 - y^2)$.
8. Solve $xp + yq = 3z$.
9. Classify the partial differential equation $\frac{\partial^2 u}{\partial x^2} + 3\frac{\partial^2 u}{\partial x \partial y} + \frac{\partial^2 u}{\partial y^2} = 0$.
10. Solve $\frac{\partial u}{\partial x} = \frac{\partial u}{\partial y}$ using the separation of variables.

PART – B

Note: Answer any four questions.

(4x15=60 Marks)

11. a) Find 'k' such that $f(x, y) = x^3 + 3kxy^2$ is harmonic and find its harmonic conjugate.
 b) Evaluate $\oint \frac{e^{2z}}{(z+i)^4} dz$, $C: |z| = 3$, using Cauchy's integral formula.
12. a) Evaluate $\oint \frac{ze^z}{(z^2+9)} dz$, where c is $|z| = 5$.
 b) Find the bilinear transformation which maps the points $(1, i, -1)$ of z - plane to $(2, i, -2)$ of w - plane.
13. Find the Fourier series expansion of following periodic function $f(x)$ of period 4

$$f(x) = \begin{cases} 2 + x, & -2 \leq x \leq 0 \\ 2 + x, & 0 \leq x \leq 2 \end{cases}$$
 hence deduce that $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \dots = \frac{\pi^2}{8}$
14. a) Find the general solution of the partial differential equation
 $(y + z)p + (z + x)q = x + y$.
 b) Solve $(D^2 + 4DD' - 5D'^2)z = \sin(2x + 3y)$.

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15. An elastic string of length l which is fastened at its end $x = 0$ and $x = l$ is picked up at its center point $x = l/2$ to a height of h and released from rest. Find the lateral displacement of the string at any instant time.

16. a) Expand $f(z) = \frac{1}{(z^2 - 3z + 2)}$ as Laurent's series in the region

(i) $0 < |z - 1| < 1$ (ii) $0 < |z| < 2$.

b) Solve $2\sqrt{p} + 3\sqrt{q} = 6x + 2y$.

17. a) Show that $f(z) = \bar{z}$ is continuous at the point $z = 0$ but not differentiable at $z = 0$.

b) Express $f(x) = \frac{x}{2}$ as a Fourier series in $-\pi < x < \pi$.

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FACULTY OF ENGINEERING
B.E. 2/4 (Civil) I-Semester (Backlog) Examination, November 2021

Subject: Engineering Geology

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 Write the mineral composition of Gabbro and Marble.
- 2 Write a note on importance of logging in site investigation.
- 3 Define porosity and permeability.
- 4 Discuss over lap and side lap in aerial photograph.
- 5 Give swelling capacity of kaolinite, illite and Montmorillonite.
- 6 Explain three mitigation measures of landslides.
- 7 Differentiate between Anticlinal and Synclinal fold.
- 8 Define crushing strength and tensile strength of a rock.
- 9 Mention any three reasons for failure of a tunnel.
- 10 Discuss the importance of unconformities in identify the various deformations.

PART – B

Answer any three questions.

(3x18 = 54 Marks)

- 11 (a) Compare shale and state for their mineralogy, texture and Engineering uses.
(b) Discuss various physical properties of rock and how they affect the engineering use of the various rocks.
- 12 (a) What is weathering? Explain different types of weathering.
(b) Write a note on various soils of India.
- 13 (a) Explain the causes and effects of Earthquakes.
(b) Discuss geophysical methods used in site investigation.
- 14 (a) Write a detailed note on Aquifer and types of Aquifer.
(b) Write a detailed note on borehole drilling.
- 15 (a) Write short notes on the role of a geologist in Civil Engineering Construction.
(b) Describe various aspects of site investigation for Dam foundation.
- 16 (a) Explain briefly geology of few Indian tunnels.
(b) Define tunnel, overbreak, payline and lining of tunnels.
- 17 (a) Write geological considerations for selection of concrete aggregate.
(b) Write the geology of Bhakra dam.

FACULTY OF ENGINEERING

B.E. 2/4 (EEE/Inst.) I-Semester (Backlog) Examination, November 2021

Subject : Electrical Measurements and Instruments

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 What are the advantages of MI instruments over PMMC instruments
- 2 What is the need of damping torque and controlling torque?
- 3 List out a meter which does not require any controlling force. Explain why?
- 4 What are the possible errors in induction type Energy meter?
- 5 What is the use of Wagner's earthing device?
- 6 What are the differences between Analog and Digital Transducer?
- 7 Explain the principle of Ballistic galvanometer?
- 8 Explain the need of magnetic measurements?
- 9 What are the difference between Current Transformer and Potential Transformer?
- 10 Define actual transformation ratio and nominal ratio?

PART – B

Answer any three questions.

(3x18 = 54 Marks)

- 11 Explain the constructional details and working principle of electrostatic instruments. Also derive an expression for deflecting torque of electrostatic instruments.
- 12 Describe Schering Bridge for the measurement of capacitance and 'loss Angle' of unknown capacitors. Draw the phasor diagram and derive the necessary equations of the bridge under balance conditions.
- 13 a) Explain the construction and operation of single phase Electrodynamic type power factor meter?
b) A 230 v, 50 HZ, 1- ϕ energy meter has a constant of 120 rev/KWh. Determine the speed of the disc in rpm for current of 10A at a power factor of 0.8 lagging?
- 14 a) Explain how to determine the leakage factor of a DC machine by using flux meter
b) Explain how the B-H curve is determined using step by step method?
- 15 a) Discuss the damping techniques used in instruments to suppress the oscillations?
b) Explain the construction and operation of Maximum demand indicator?

- 16 a) Explain with the help of neat diagram, the construction and working of AC Polar type potentiometer.
b) Differentiate AC polar & coordinate type Potentiometer?

17 Answer the following:

- a) Use of oscilloscope in phase and amplitude measurements
b) Kelvin's double bridge for measurement of low resistance

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FACULTY OF ENGINEERING**B.E 2/4 (ECE) I-Semester (Backlog) Examination, November 2021****Subject: ELECTRONIC DEVICES****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. Differentiate between zener breakdown and avalanche breakdown mechanisms.
2. A Silicon diode has a saturation current of $7.5\mu\text{A}$ at room temperature 300°K . Calculate the saturation current at 500°K .
3. What are the advantages and disadvantages of Bridge rectifier
4. Define the terms peak inverse voltage, efficiency and regulation of rectifier
5. What is thermal runaway in transistors? Explain how it can be avoided.
6. A transistor has $\alpha=0.98$. If emitter current of transistor is 1mA , Determine base current and current gain factor β .
7. Draw the V-I Characteristic of UJT? How it is different from JFET
8. Draw the Equivalent h-parameter model of a transistor in CB Configuration.
9. Compare JFET and BJT with various features.
10. Explain how MOSFET acts as a switch.

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

11. a) Draw and sketch typical forward and reverse biased characteristics for a germanium diode and for a Si diode. Discuss the characteristics and compare Si and Ge diode.
b) Reverse saturation current of a Si diode is $8\mu\text{A}$. Calculate the current through the diode when the applied forward bias voltages are 0.5V , 0.6V and 0.7V at room temperature.
12. a) Derive all performance parameters of a centre tapped full wave rectifier Circuit.
b) Explain the LC Filter and determine the ripple factor.
13. A CE Amplifier is driven by a voltage source of internal resistance $R_s=800\Omega$, the load impedance of $2\text{K}\Omega$. The h-parameters are $h_{ie}=1.1\text{K}$, $h_{fe}=50$, $h_{oe}=25\mu\text{S}$, $h_{re}=2.5\times 10^{-4}$. Compute the current gain A_i , input resistance R_i , Voltage gain A_v , Output Resistance R_o , and R_o^l . Also calculate power gain A_p using Approximate Analysis.
14. a) Describe an experimental setup to obtain the output characteristics of a CE Transistor configuration. Indicate and explain various regions of operation on the output characteristics.
b) What is early effect?

15. a) Explain the construction and working of a n-channel JFET with drain and transfer characteristics.
b) Show that amplification factor of JFET $\mu = g_m \times r_d$.
16. a) Draw the circuit of self-biased CE-Amplifier using diode compensation for V_{BE} . Describe how bias is achieved.
b) Derive stability of Self Bias Circuit.
17. Write short notes on
a) CCD
b) Full Wave Rectifier
c) SCR

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FACULTY OF ENGINEERING
B.E. 2/4 (M/P) I-Semester (Backlog) Examination, November 2021

Subject : Machine Drawing

Time : 2 Hours

Max. Marks: 75

Note: Answer all questions from Part-A & Part-B.

PART – A (25 Marks)

1 Draw the following view of the component shown in figure 1

(i) Sectional Side view from the left, for the figure sectioned at middle of the part.

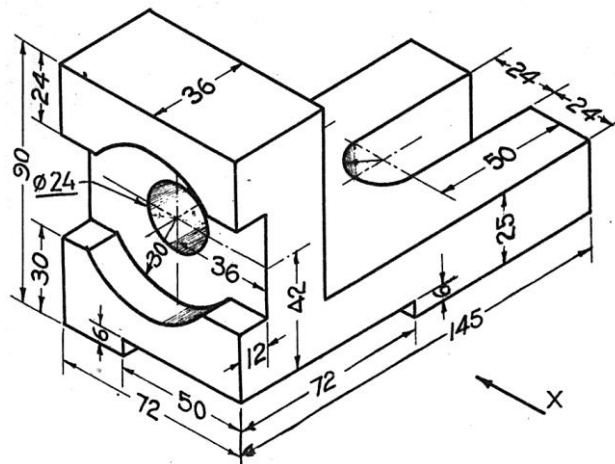


Figure 1

- 2 Sketch sectional view of worth thread and indicate the pitch, major and minor diameter on it.
- 3 Sketch one views of double riveted, double strap, chain butt joint to join plates of 10 mm thick and indicate pitch and margin.
- 4 Draw simple sketch of a ϕ 20mm stud with 100mm long left hand threads on one side and 80mm long right hand thread on other side with a shank portion of 50mm in between the threads.

PART - B (50 Marks)

5 Assemble all parts of the Screw jack shown in figure 2. Draw

- a) Half-sectional front view
- b) Sectional side view of the assembly.

Show one Bill of materials, ballooning and important dimensions on the drawing

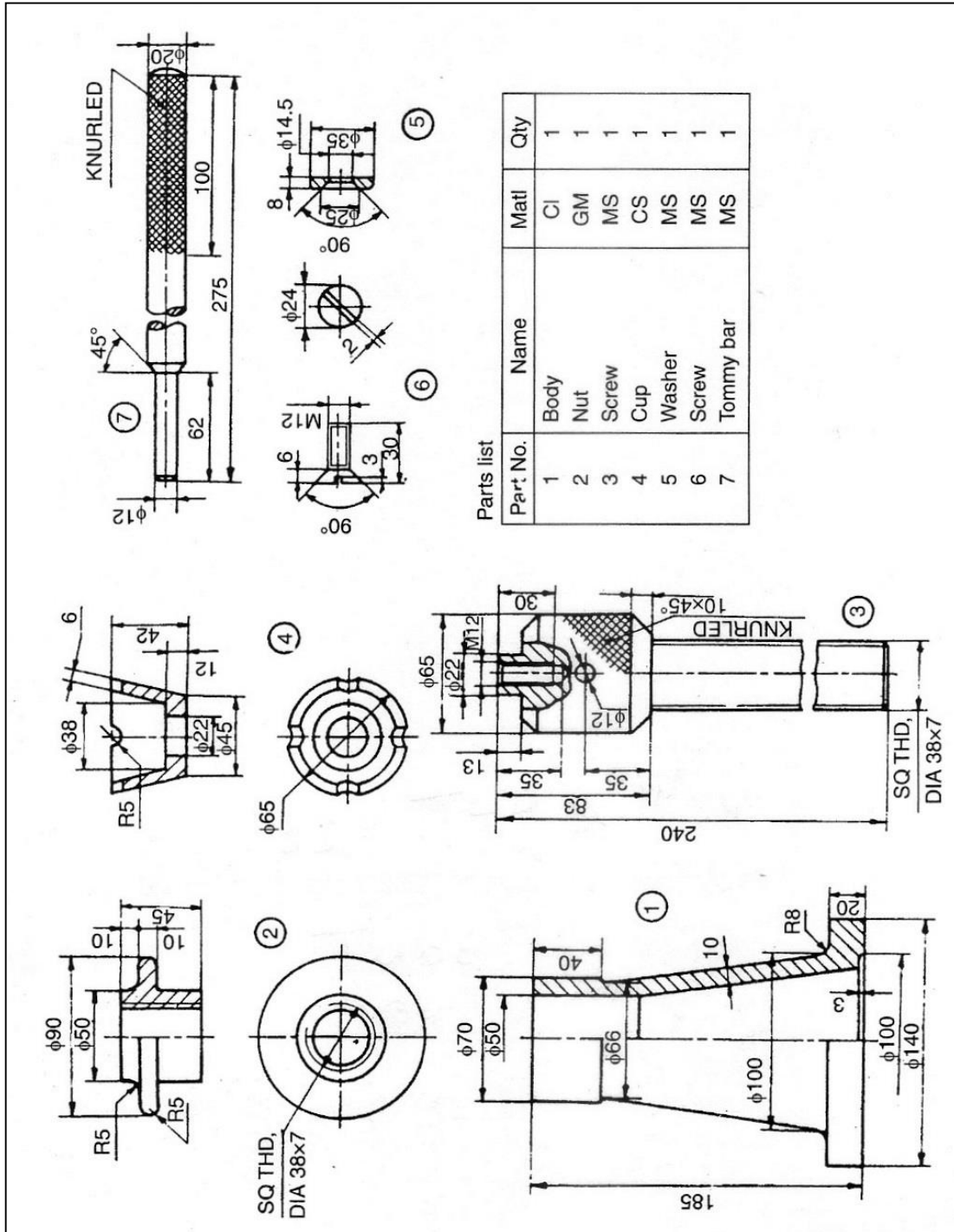


Figure 2

FACULTY OF ENGINEERING
B.E. 2/4 (CSE) I-Semester (Backlog) Examination, November 2021
Subject: Computer Architecture

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 Explain about logic micro operations?
- 2 Discuss about computer Instructions?
- 3 Explain how the following expression is evaluated using Stack.
 $(3*4) + (5*6)$
- 4 Discuss about data transfer instructions?
- 5 Explain about Flynn's Classification of computers?
- 6 What is Normalization of Floating point numbers?
- 7 Discuss about Input-Output Interface?
- 8 Define Handshaking?
- 9 Discuss about the BC Dadder.
- 10 What is meant by pipeline? How it improve the system Performance?

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

- 11 a) Draw and explain the flow chart for instruction cycle.
b) Explain the functions of basic registers for basic computer.
- 12 a) What is control memory organization and micro program sequence? Explain in detail.
b) Evaluate $(A+B)*(C+D)$ using 3, 2, 1,0 address instruction.
- 13 a) Explain in detail about three segment instruction pipeline.
b) Show various steps involved in Multiplication of (-9) and (-13) using Booth's algorithm.
- 14 a) Explain the Synchronous and Asynchronous data transfer?
b) Write the IEEE 754 standard representation scheme for single and double precision floating point numbers.
- 15 a) Compare the relative merits of the three cache memory organization.
(i) Direct mapping cache
(ii) Set associative cache
b) Explain briefly about virtual Memory.
- 16 a) Show how multiplication and division operations would be performed by hardware with a narrative flow chart.
b) Explain about parallel priority Interrupt.
- 17 Write short notes on:
 - a) Auxiliary Memory.
 - b) Array Processors.

FACULTY OF ENGINEERING
B.E. 2/4 (I.T) I – Semester (Backlog) Examination, November 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.

(7 x 3 = 21 Marks)

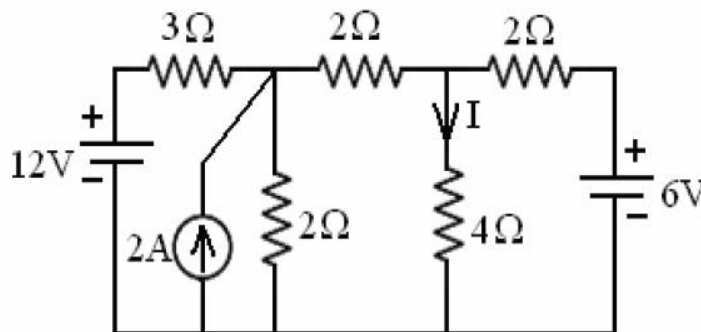
- 1 Write the formulae for Average and RMS values of sinusoidal current?
- 2 Derive the energy stored in a capacitor with a DC excitation.
- 3 What are the applications of a DC motor?
- 4 Write the principle of operation of a DC motor?
- 5 Define regulation and write the formulae for transformer regulation?
- 6 Write any two applications of squirrel cage induction motor.
- 7 Write the formulae for torque equation of 3- Φ Induction motor.
- 8 Differentiate between Auto transformer and single phase transformer.
- 9 Why single phase induction motor is not self starting?
- 10 Draw the circuit diagram of capacitor start and capacitor run single phase induction motor.

PART – B

Note: Answer any three questions.

(3 x 18 = 54 Marks)

- 11 Find current 'I' in the below circuit by using loop current method.



- 12 Explain the construction and working operation of a 3-Point starter with a neat sketch?
13. In a 50kVA transformer, the iron loss is 500W and full-load copper loss is 800W. Find the efficiency at full-load and half load at 0.8p.f lagging.
14. Derive the torque equation of a 3-phase induction motor and explain the slip torque characteristics of 3-phase induction motor.
15. Explain the operation of Stepper motor and Brushless DC motor with neat circuit diagrams.

16. A 6-pole lap wound d.c generator has 600 conductors on its armature. The flux per pole is 0.02wb. Calculate (i) the speed at which the generator must be run to generate 300V
(ii) What would be the speed if the generator were wave-wound?

17. Write short notes on:

- a) Norton's theorem
- b) Production of rotating magnetic field
- c) 3-phase balanced voltages.

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FACULTY OF ENGINEERING

B.E. 2/4 (AE) I-Semester (Backlog) Examination, November 2021

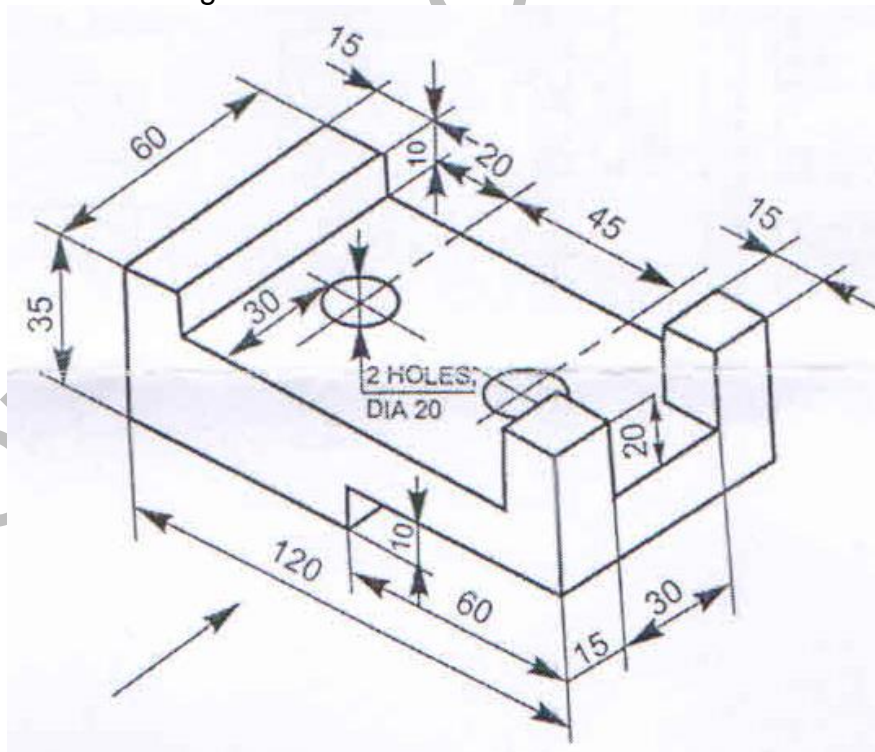
Subject: Automotive Engg. Drawing

Time: 2 Hours

Max. Marks: 75

Note: Answer all questions from Part-A & Part-B.**PART – A (5x5=25 Marks)**

- 1 Sketch the conventional representation of the following materials:
(a) Glass (b) Wood and (c) Concrete
- 2 Draw two views of the double riveted butt joint by taking $T = 8\text{mm}$, $D=20\text{mm}$. Where T = Thickness of the plate ; D = dia. Of the rivet hole
- 3 Sketch a Hexagonal bolt and nut with by taking $D = 20\text{ mm}$ and $L = 80\text{ mm}$. where D = Normal Dia. of the bolt ; L = Length of the cost
- 4 Sketch a universal coupling.
- 5 Sketch front view, side view and top view of the component given in figure 1. All dimension shown in figure in mm.



FACULTY OF ENGINEERING

B. E. (I.T.) (CBCS) III – Semester (Backlog) Examination, November 2021

Subject: Micro Electronics

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. Differentiate N-type and P-type semiconductors.
2. Obtain the ripple factor of a Half-wave rectifier.
3. Draw the symbols of NPN & PNP transistors.
4. List the advantages of FET.
5. State the condition for Oscillation.
6. Discuss the properties of negative feedback.
7. Implement Op-amp as an Integrator.
8. What are the characteristics of an Ideal Op-amp?
9. Define a) Noise Margin & b) Propagation delay
10. Sketch the VTC of an Inverter.

PART – B

Answer any four questions.

(4 x 15 = 60 Marks)

11. a) Explain the operation of a center-tapped full-wave rectifier with a neat sketch.
b) Discuss about Limiting & Clamping Circuits.
12. a) Discuss the operation of a transistor as an amplifier.
b) Describe the structure & operation of a JFET.
13. a) Explain the operation of RC phase shift oscillator with the help of a neat circuit diagram.
b) Sketch the Series-Shunt & Shunt-Shunt feedback topologies.
14. a) Explain how an Op-amp can be implemented as a **V** and **I** and **I** to **V** converter.
b) Derive the gain of an Op-amp Inverting amplifier.
15. a) Classify various logic circuit families and discuss about their characteristics.
b) Describe the operation of a CMOS Inverter.
16. Explain the operation of a Monostable multi-vibrator.
17. Write short notes on the following
 - a) Transistor as a switch
 - b) Varactor diode
 - c) Op-amp as adder