**Code No.2013**

# FACULTY OF ENGINEERING

**B.E 2/4 (Civil) I – Semester (Backlog) Examination, December 2019**

**Subject: Engineering Geology**

**Time: 3 Hours** **Max. Marks: 75**

***Note: Answer all questions from Part– A. Answer any five questions from Part – B.***

**PART – A (10 x 2.5 = 25 Marks)**

1 Define Mineral Specify any three names of rock forming minerals.

2 Define fold in a rock. Draw the sketch of it and label its parts?

3 Explain about Aerial photographs?

4 Explain about seismic refraction method?

5 List out the eight groundwater provinces in India?

6 Explain about a) Intensity and b) Magnitude related with earth quakes.

7 Define the terms un-confined aquifer and confined aquifer with neat sketches?

8 Explain various textures of igneous rocks.

9 What is stand up time in tunnels?

10 Differentiate between earthquakes and landslide?

**PART – B (50 Marks)**

11. (a) Explain a case history of dam failure in India. (5)

(b) Describe in brief the various textures in igneous rocks. (5)

12. (a) Define fold? Describe various parts of fold. Discuss the importance of fold in the field of Civil engineering. (5)

(b) Explain Darcy's law? Add a note on occurrence of ground water in soft rocks. (5)

13. (a) Explain geological maps, aerial photographs and their significance in the site investigation. (5)

(b) Describe the seismic refraction method in sub-surface exploration. (5)

14. (a) What is the difference between hanging wall and foot wall. (5)

(b) Describe various types of faults with neat sketches. (5)

15. Write notes on the following: (10)

(a) Types of Indian soils.

(b) Ground water movement

16. (a) Explain the application of remote sensing and GIS technique in civil engineering Projects. (5)

(b) Explain about stress-strain behavior of rocks. (5)

17. Write notes on the following: (10)

(a) Engineering properties of rocks.

(b) Geological maps, aerial photographs and Bore hole drilling.

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**Code No: 2018**

# FACULTY OF ENGINEERING

## B.E. II/IV (EEE) I Semester (Backlog) Examination, December 2019

## Subject: Electrical Measurements and Instruments

**Time: 3 Hours** **Max. Marks: 75**

**Note: Answer all questions from Part A & answer any Five questions from Part B.**

### Part-A (25 Marks)

1. A milli ammeter of 2.5Ω resistance reads upto 100 mA. Calculate the resistance which is necessary to enable it to be used as: 3
   i. A voltmeter reading upto 10V.
   ii. An ammeter reading upto 10A.
2. The coil of a moving coil ammeter of 100 turns is 40mm long and 30mm wide. The control torque is $240 \times 10^{-6}$ Nm on full scale. If the magnetic flux density in the airgap is 1 $Wb/m^2$ , what will be the range of the ammeter? 2
3. What are the conditions to be satisfied for Synchronization of incoming machine to bus bars? 3
4. What is lag adjustment in energy meter? 2
5. A voltmeter of resistance 500Ω and a milliammeter of 1.0Ω resistance are used to measure a resistance by ammeter – voltmeter method. If the voltmeter reads 20 V and milliammeter 100mA, calculate the value of measured resistance 3
   i) If the voltmeter is put across the unknown resistance and the milliammeter connected in series with the unknown resistance
   ii) If the voltmeter is put across the unknown resistance with ammeter connected on the supply side.
6. Classify the resistances based on their range. List the methods to determine the low value of resistance. 2
7. How is a leakage factor in dynamo-electric machinery determined? 3
8. Give the reason why ballistic galvanometer should have large moment of inertia and small control spring constant. Justify. 2
9. A standard cell of 1.0185 V used with a simple potentiometer balances at 50 cm. Calculate 3
   a) the emf of the cell that balances at 72 cm.
   b) the percentage error in voltmeter which balances at 64.5 cm when reading 1.33 V the percentage error in an ammeter that reads 0.43 A when balanced at 43.2 cm with voltage drop across a 2 Ω resistor in the ammeter circuit.
10. Give the comparison between C.T and P.T. 2

### PART – B (10 X 5 = 50 Marks)

11. Explain the effect of inductance in pressure coil circuit and how the error can be minimized? Derive the expression for correction factor. 10

12. Explain how following adjustments are made in 1-Φ induction type energy meter 10

    1. Lag Adjustment 2.Friction Compensation 3. Creep

    4.Overload Compensation 5.Temperature Compensation ……2

13. Describe Kelvin's double bridge method for measurement of small resistances. Derive the expression for the unknown resistance. 10

14. Describe the method for determination of B-H curve of a magnetic material using: 10
    i) Method of Reversals and
    ii) Step by Step method

15. a) A standard cell of 1.0185 V used with a simple potentiometer balances at 50cm. Calculate a)the emf of the cell that balances at 72 cm b) the percentage error in voltmeter which balances at 64.5 cm when reading 1.33 V c) the percentage error in an ammeter that reads 0.43 A when balanced at 43.2cm with voltage drop across a 2Ω resistor in the ammeter circuit. 4
    b) Draw the equivalent and phasor diagram of a current transformer. Derive the expressions for ratio and phase angle errors. 6

16. a) Explain the term "standardization" of a potentiometer. Describe the procedure of standardization of a d.c potentiometer. 4
    b) An 8/1 current transformer has an accurate current ratio when the secondary is short circuited. The inductance of secondary is 60mH and its resistance, is 0.5 Ω and the frequency is 50 Hz. Estimate the current ratio and phase angle error when the instrument load resistance is 0.4 Ω and inductance is 0.7mH. Assume no iron loss and magnetizing current equal to I percent of primary current. The permeability remains constant. 6

17. Explain any two from the following 10
    a) Synchroscope
    b) Electrical resonance type frequency meter.
    c) Measurement of phase and amplitude using oscilloscope

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**Code No: 2026**

# FACULTY OF ENGINEERING

## BE 2/4 (ECE) I – Semester (Backlog) Examination, December 2019

## Subject: Electronic Devices

**Time: 3 Hours** **Max. Marks: 75**

**Note: Answer all questions from Part-A, & any five questions from Part-B.**

**PART – A (25 Marks)**

1 Calculate the dynamic resistance of a Ge PN junction diode at a forward current of 2mA, assume $V_T = 25mV$ . 2

2 For a Silicon diode calculate the voltage across the diode if the reverse current through it reaches to 75% of its saturation value. 3

3 Why Bleeder resistance is employed in a Filter circuit? 2

4 What is Zener break down phenomenon? 3

5 Define $\alpha, \beta, \gamma$ of a transistor, how they are related to each other. 2

6 What is early effect in BJT? 3

7 What is DIAC, Draw its structure and plot its V-I characteristics? 2

8 What are the characteristics and application of common collector amplifier? 3

9 What is Pinch off in JFET, explain how it occurs. 2

10 Compare depletion MOSFET and enhancement MOSFET. 3

**PART – B (50 Marks)**

11. a) Explain the working of PN junction diode in forward and reverse bias and obtain its V-I characteristics. (5M)
b) Derive the equation for diffusion capacitance of a PN junction diode. (5M)

12. Draw the circuit diagram of a Bridge rectifier and explain its operation, derive its ripple factor, Efficiency, TUF, PIV, % Regulation. (10M)

13. a) Draw the circuit diagram of BJT in common Base configuration and explain its input, output V-I characteristics. (5M)
b) Draw the circuit diagram of a Collector to base bias circuit and obtain an expression for its stability factor. (5M)

14. a) For a common emitter amplifier with $R_S$ = 1kΩ , $R_L$ = 5 kΩ assume the –parameters values as $h_{ie}$ = 1.1k Ω, $h_{re}$ = 250 μ , $h_{fe}$ = 50 , $h_{oe}$ = 25 μ mhos, Determine the following parameters: (6M)
i) Current gain $\mathbf{A_I}$
ii) Input resistance $\mathbf{R_I}$
iii) Voltage gain $\mathbf{A_V}$
iv) Output resistance $R_O$
b) Draw the structure of SCR and briefly explain its principle of operation and plot its V-I characteristics (4M)

15 a) Draw and explain the V-I characteristics of JFET in Common source configuration. (4M)

….2

b) For a JFET amplifier in Common Gate configuration, derive the expressions for
i) Current gain $\mathbf{A_I}$
ii) input resistance $\mathbf{R_I}$
iii) Voltage gain $\mathbf{A_V}$
iv) output resistance $R_O$ (6M)

16 a) Design a SELF bias circuit to establish the Q-point at $I_C$ = 1mA, $V_{CE}$ = 6V. Use a transistor with β = 200 and $V_{BE}$ = 0.65V. Given $V_{CC}$ = 12V, Stability factor is S = 3. Use $R_C$ = 4.7KΩ. (5M)

b) Draw the circuit of full wave rectifier with inductor filter and derive the expression for its ripple factor. (5M)

17 Write short notes on the following (10M)
a) Thermistor Compensation
b) Charge Coupled device
c) TRIAC

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**Code No: 2030**

# FACULTY OF ENGINEERING

**BE 2/4 (M/P) I-Semester (Backlog) Examination, December 2019**

**Subject : Machine Drawing**

**Time: 3 Hours** **Max. Marks: 75**

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

## PART-A (25 Marks)

1. Draw the profile of unified thread and ACME thread, take pitch = 10 mm

2. Sketch (free hand) two views of knuckle joint for connecting two 40 mm diameter rods.

3. Sketch front and top view of single riveted single strap butt joint to connect two plates of 9 mm thick.

4. Sketch two views of old ham's coupling for 50 mm diameter mild steel shafts.

5. Draw sectional front view and Side view from the left of the component shown in fig1.

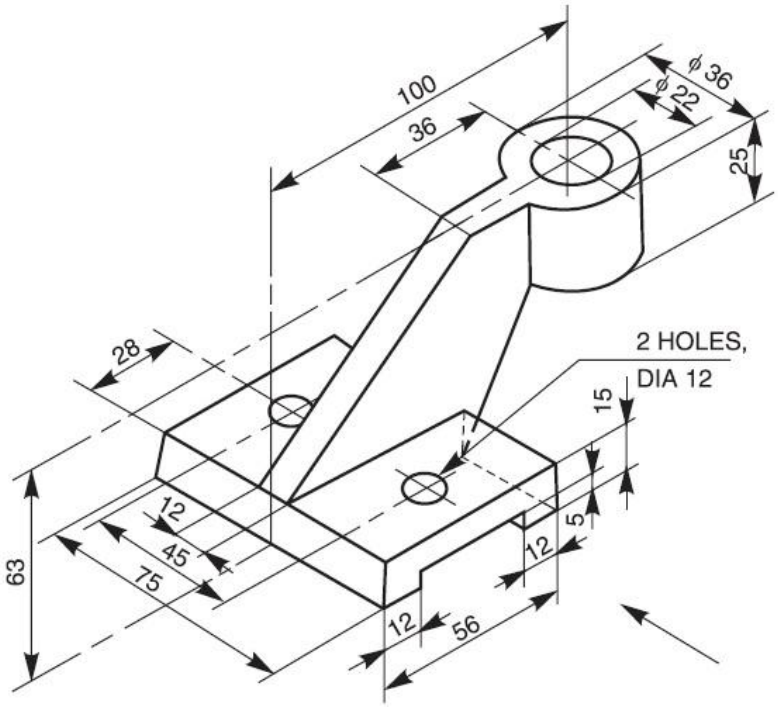



Fig. 1

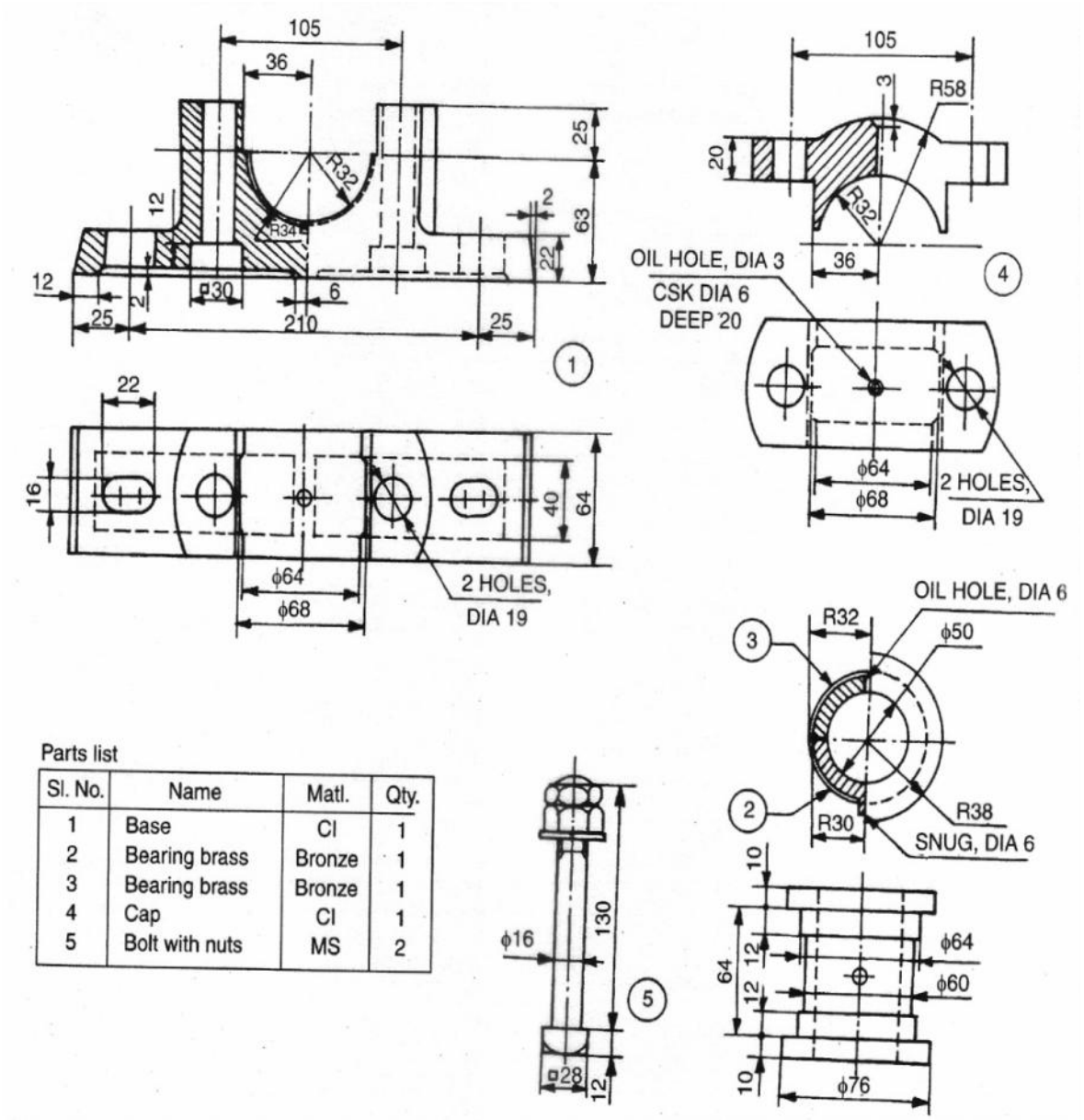
## Part B (50 Marks)

6. Draw the following views of a plummer block, suitable for supporting a shaft of diameter 50mm:
   (a) half sectional view from the front, with left half in section,

   (b) sectional view from the side, and

   (c) view from above.

…2




Parts list

| Sl. No. | Name | Matl. | Qty. |
|---|---|---|---|
| 1 | Base | CI | 1 |
| 2 | Bearing brass | Bronze | 1 |
| 3 | Bearing brass | Bronze | 1 |
| 4 | Cap | CI | 1 |
| 5 | Bolt with nuts | MS | 2 |

Fig. 2

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**Code No: 2033**

# FACULTY OF ENGINEERING

## BE 2/4(AE) I-Semester (Backlog) Examination, December 2019

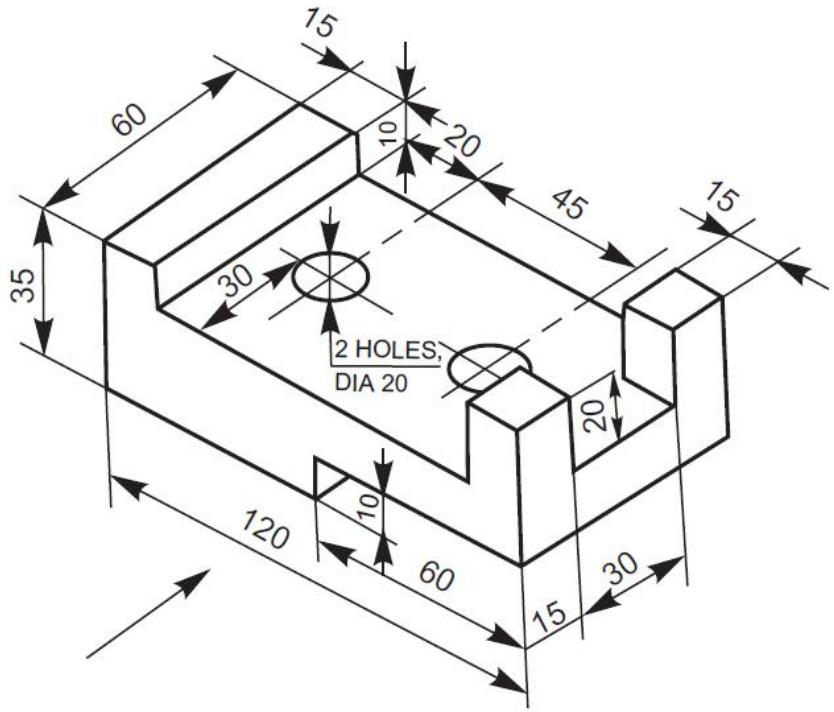
## Subject: Automotive Engg. Drawing

**TIME :3 HOURS** **MAX.MARKS:75**

**Note: Answer All Questions from Part –A, &Part-B**

### Part –A (5x5 = 25 Marks)

1. Sektch the conventional representation of the following materials: (*a*) concrete, (*b*) wood and (*c*) Cast iron.
2. Draw the top view and sectional front view of a single strap double riveted butt joint for 8 mm thick plate.
3. Sketch a socket and spigot joint to connect two rods of 25mm diameters.
4. Sketch a universal coupling.
5. Sketch sectional front view, side view and top view of the component given in figure1.

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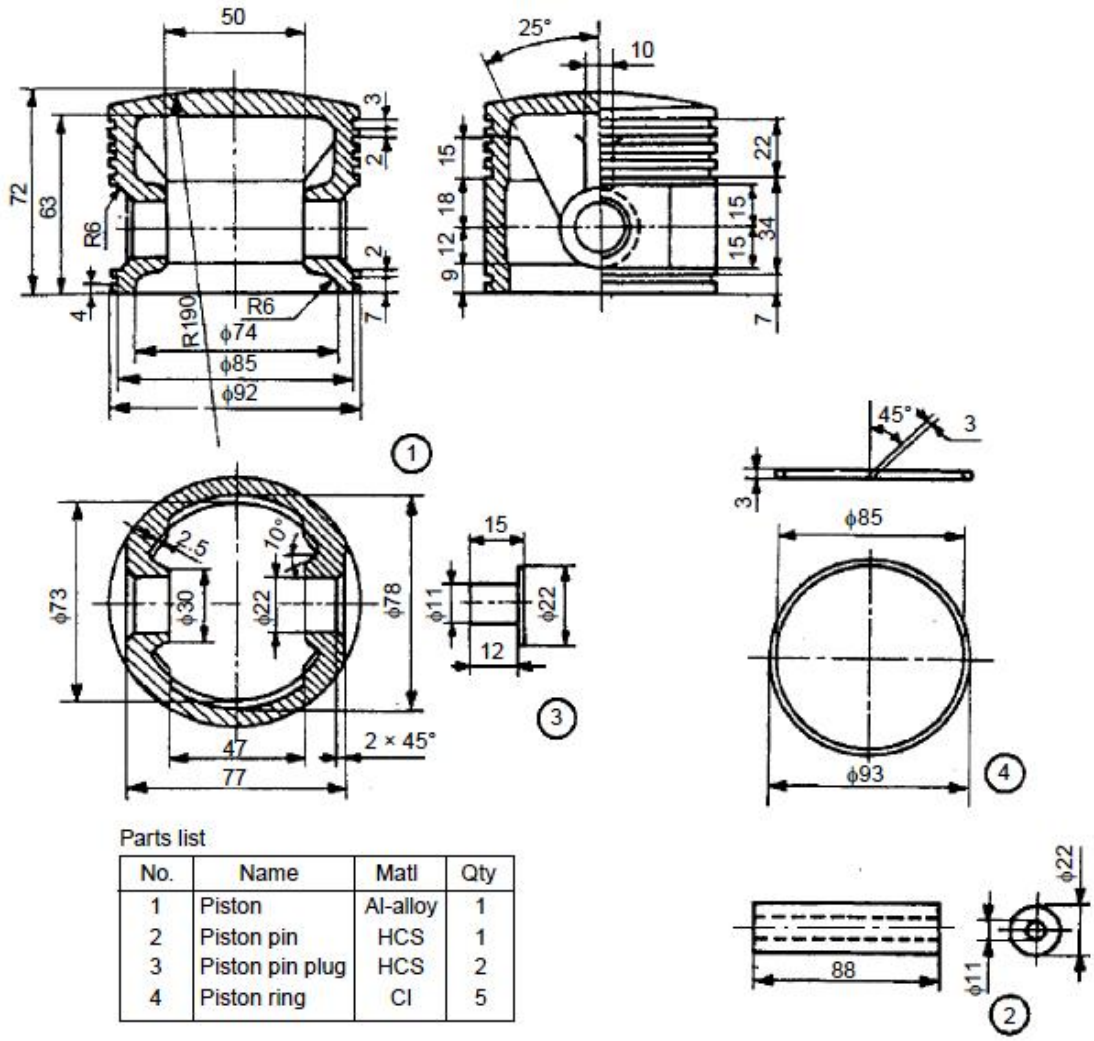
## Part – B(50 Marks)

6. Assemble all the components shown in figure 2 to form piston assembly and draw

(a) Full section front view (20)

(b) Top view (10)

(c) Side view (20)




Parts list

| No. | Name | Matl | Qty |
|---|---|---|---|
| 1 | Piston | Al-alloy | 1 |
| 2 | Piston pin | HCS | 1 |
| 3 | Piston pin plug | HCS | 2 |
| 4 | Piston ring | CI | 5 |

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**Code No. 2037**

# FACULTY OF ENGINEERING

## B.E. 2/4 CSE I – Semester (Backlog) Examination, December 2019

## Subject: Computer Architecture

**Time: 3 Hours** **Max. Marks: 75**

**Note: Answer all questions from Part – A, & Any five questions from Part – B.**

### PART – A (25 Marks)

1. What does the term ”register transfer language” imply? (2)
2. What is the difference between a direct and an indirect address instruction? (2)
3. Define stack and give any two examples of stack instruction. (3)
4. Illustrate one-address and zero-address instruction formats with an example. (2)
5. What is pipelining? Why do we use it? (2)
6. List the advantages of memory interleaving. (3)
7. What are the needs for input-output interface? (3)
8. Write short notes on Memory connection to CPU. (3)
9. What do you mean by virtual memory? (3)
10. What is the significance of memory hierarchy? (2)

### PART – B (50 Marks)

11. a) What is instruction cycle? Draw and explain about the instruction cycle with flowchart. (5)
    b) Design a 4-bit combinational circuit dcrementer using four full-adder circuits. (5)

12. a) Describe, with a suitable diagram, the working of Micro-programme sequencer. (6)
    b) Distinguish between RISC and CISC. (4)

13. a) Determine the number of clock cycles that it takes to process 200 tasks in a six- segment pipeline. (4)
    b) Describe Booth’s algorithm for division of two 2’s complement numbers. (6)

14. What is the purpose of DNA? Draw the block diagram for DMA controller and explain about DMA transfer in a computer. (10)

15. a) What additional logic is required to give a no-match result for a word in an associative memory when all key bits are zeros? (4)
    b) Discuss Address mapping using pages in virtual memory. (6)

16. (a) Derive the control gates associated with the program counter PC in the basic computer. (5)
    (b) What are the basic differences between a branch instruction, a call subroutine instruction, and program interrupt? (5)

17. Write short notes on:
    (a) SIMD Array Processor (3)
    (b) Isolated Vs. memory mapped I/O (3)
    (c) RAM and ROM chips (4)

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Code No.2042

# FACULTY OF ENGINEERING

## B. E. 2/4 (IT) I – Semester (Backlog) Examination, December 2019

## Subject: Electrical Circuits and Machines

**Time: 3 hours** **Max. Marks: 75**

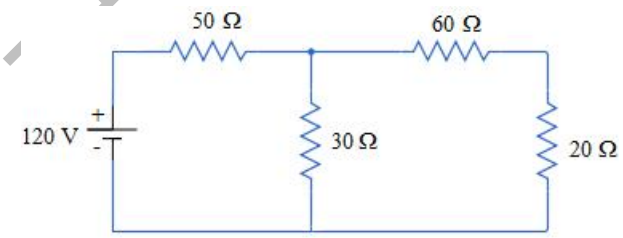
***Note: Answer all questions from Part-A. Answer any FIVE questions from Part-B.***

**PART – A** (25 Marks)

1. State and explain Kirchhoff's voltage law. 2
2. Derive the expression for energy stored in a magnetic field. 3
3. The readings wattmeter's in 3 – phase power measurement are $W_1$ = 10 KW, $W_2$ = 11KW. Calculate power factor. 2
4. Derive the condition for maximum efficiency in a single phase transformer. 3
5. Mention various types of excitation for a DC machines. 3
6. What is the signification of back EMF in a DC motor? Under what conditions it would be zero? 3
7. Write the applications of 3 phase induction motor. 3
8. A 50Hz, 4-pole 3 phase induction motor has a rotor current of frequency 2Hz. Determine the speed of motor. 2
9. Why single phase induction motors are not self starting? Explain. 2
10. What are the advantages of BLDC motors over conventional DC motor? 2

**PART – B** (50 Marks)

11. (a) Calculate current in 20Ω resistor by using Thevenin's theorem for the circuit shown below. 7




(b) Find the RMS value of v(t) = 10 Sin(t). 3

12. (a) Explain two – watt meter method of 3 phase power measurement. 5

(b) In a 100 KVA transformer the iron loss is 1.1 KW & full load copper loss is 2.1KW. If the load power factor is 0.8 lagging, find the efficiency at (i) Full load, (ii) half full load. 5

13. (a) Explain the characteristics of DC series, DC shunt motors. 5

(b) A wave wound DC shunt generator having 8-poles develops an EMF of 500V at 400 rpm. The armature has 144 slots & each slot contains 6 conductors. Calculate the flux per pole. 5

14. (a) Explain torque – slip characteristics of a three phase induction motor. 5

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(b) Explain, how rotating magnetic field is produced in three phase induction motor. 5

15. (a) Explain capacitor star motor with the help of neat circuit diagram and mention its applications. 5

(b) Discuss constructional details and working principle of BLDC motor. 5

16. (a) Explain various speed control method of dc shunt motor. 5

(b) Derive the torque equation of a DC motor. 5

17. Write short notes on the following:

(a) Coupled circuits. 3

(b) Auto transformer. 3

(c) Mutual inductance. 4

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Code No. 2522/CBCS

# FACULTY OF ENGINEERING

## B.E. III Semester (CBCS) (Except I.T) (Backlog) Examination, December 2019

### Subject: Engineering Mathematics- III

**Time: 3 Hours** **Max. Marks:75**

**Note: Answer all questions from Part-A & any five questions from Part-B**

### PART – A (25 Marks)

1. If $f(z)=u(x,y)+iv(x,y)$ is analytic function, then prove that $u(x,v)$ and $v(x,y)$ are harmonic functions. (3)
2. Evaluate $\oint_C \frac{\sin^2 z}{\left(z-\frac{®}{6}\right)}dz$, where C is the circle $|z|=1$. (2)
3. Determine the pole of the function $f(z)=\frac{z^2}{(z-1)^2(z+2)}$ and find the residue at each point. (2)
4. Expand $f(z)=\frac{1}{(z-1)(z-2)}$ is the region $|z|<1$. (3)
5. Define Dirichlet's conditions for the existence of Fourier series of a function $f(x)$. (2)
6. Find the half range sine series of $f(x)=x, x\in(o,®)$. (3)
7. Form the partial differential equation by eliminating arbitrary functions from $Z=f(x+at)+g(x-at)$. (3)
8. Obtain complete solution of $pq+p+q=0$. (2)
9. Solve $3\frac{\partial u}{\partial x}+2\frac{\partial u}{\partial y}=0,\ u(x,0)=4e^{-x}$. (3)
10. Classify the partial differential equation $\frac{\partial^2 z}{\partial x^2}+2\frac{\partial^2 u}{\partial x\partial y}+4\frac{\partial^2 z}{\partial y^2}=0$. (2)

### PART – B (5 x 10 = 50 Marks)

11. a) Find the analytic function $f(z)=u+iv, if\ u\text{-}v=(x-y)(x^2+4xy+y^2)$. (6)

    b) Evaluate $\oint_C \frac{\sin ®z^2+\cos ®z^2}{(z-1)(z-2)}dz$ where C is the circle $|z|=3$. (4)

12. a) Find Laurent's expansion of

    $f(z)=\frac{7z-2}{z(z+1)(z-2)}$ in the region $1<|z+1|<3$. (4)

    b) Evaluate $\int_{-\infty}^{\infty}\frac{x^2}{(x^2+1)(x^2+4)}dx$. (6)

13. If $f(x)=|\cos x|$, expand $f(x)$ as a Fourier series in the interval $(-®,®)$. (10)

14. a) Solve $(x^2-y^2-z^2)p+2xyq=2xz$. (5)

    b) Solve $2z+p^2+qy+2y^2=0$ by using Charpit's method. (5)

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15. A homogeneous rod of conducting material of length 100 cm has its ends kept at zero temperature and the temperature initially is $u(x,0)=\begin{cases} x, & 0 \le x \le 50 \\ 100-x & 50 \le x \le 100 \end{cases}$ Find the temperature $u(x,t)$ at any time. (10)

16. a) Find the bilinear transformation which maps the points $z=1,i,-1$ onto the points $w=i,0,-i$. (4)

b) Evaluate $\oint_C \frac{z}{(z-1)(z-2)^2}\,dz$ where C is the circle $|z-2|=\frac{1}{2}$. (6)

17. a) Solve $\frac{\partial^3 z}{\partial x^3}-2\frac{\partial^3 z}{\partial x^2 \partial y}=2e^{2x}+3x^2y.$ (5)

b) Find the complete solution of $z^2\left(p^2+q^2\right)=x^2+y^2$. (5)

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**Code No : 2553/CBCS**

# FACULTY OF ENGINEERING

**BE III Semester (CBCS)(I.T)(Backlog)Examination, December 2019**

**Subject : Micro Electronics**

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

**Note: Answer all questions from Part-A , & Any five questions from Part-B**

## PART – A (20 Marks)

1. State the properties of a semiconductor. (2)
2. What is Zener diaode? (2)
3. What is meant by Early effect? (2)
4. Compare FET & BJT. (2)
5. State the Barkhausen condition for oscillation. (2)
6. Derive the loop gain of a negative feedback amplifier. (3)
7. What are the characteristics of an ideal Op-amp? (2)
8. Define PUN and PDN. (3)
9. Design structure of CMOS logic families. (2)

## PART – B (50 Marks)

10. a) Explain the operation of a PN junction diode under No bias, Forward Bias and Reverse bias conditions. (6)
    b) Interpret the operation of Positive and Negative clippers. (4)

11. a) Discuss the different modes of operation of BJT. (5)
    b) Discuss the Drain characteristics of a JFET. (5)

12. a) Write properties of negative feedback amplifier. (6)
    b) Analyze the operation of a Colipitts oscillator. (4)

13. a) Derive the gain of a Non-inverting operational amplifier. (5)
    b) Implement Op-amp as a Differentiator (5)

14. a) Design the following gates using CMOS: (6)
    i) Ex-OR gate -2 input ii) NAND gate- 2 input
    b) Discuss the voltage transfer characteristics of an Inverter. (4)

15. a) Explain how Zener diode can be used as a voltage regulator. (7)
    b) Sketch the input & output characteristics of a CB transistor. (3)

16. Explain the operation of a Mono-stable multi-vibrator. (10)

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**Code No.2887/AICTE**

# FACULTY OF ENGINEERING

**B.E. (AICTE)(CE/EE/Inst./CSE) III-Semester (Main) Examination, December 2019**

**Subject: Biology for Engineers**

**Time: 3 hours** **Max. Marks: 70**

***Note: Answer all questions from Part-A. Answer any FIVE questions from Part-B.***

**PART – A** (10 x 2 = 20 Marks)

1. Write about cell theory of living organisms.
2. Explain the important functions of enzymes.
3. How are microbes economically important?
4. Write a note on photosynthesis in plants.
5. What is meiotic cell division?
6. What are chromosomes? Write their importance.
7. Give a brief note on hepatitis.
8. What is AIDS? Explain its cause and prevention.
9. Write a note on tissue engineering.
10. What are biofertilizers? What is their application?

**PART – B** (5 x 10 = 50 Marks)

11. (a) Explain the general classification of proteins. 5
    (b) Describe the structure of eukaryotic cell. 5
12. (a) How does plants absorb nutrients? 5
    (b) Explain the control measures of microorganisms. 5
13. (a) State and explain Mendel's laws. 5
    (b) What are nucleic acids? Write the importance of nucleic acids as genetic material. 5
14. (a) What is an antibody? Explain briefly the structure and types of antibodies. 5
    (b) Explain the causes, symptoms and preventive measures for diabetes. 5
15. (a) What is cloning? Explain the process of cloning and its applications. 5
    (b) Elucidate the role of biopolymers and their applications in biology. 5
16. (a) Give a detailed account on classification of vitamins. 5
    (b) Elucidate the importance of nitrogen fixation in plants. 5
17. (a) What is cancer? Explain the causes and prevention of cancer. 5
    (b) Explain the process of drug discovery and its applications. 5

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**Code No: 2900/AICTE**

# FACULTY OF ENGINEERING

## B.E. (AICTE/ECE/M/P/AE) III – Semester Examinations, December 2019

**Subject: Mathematics - III**

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

**Note: Answer all questions from Part-A, and any five questions from Part-B.**

### PART – A (20 Marks)

1. Form the partial differential equation by eliminating the arbitrary constant $a$ and $c$ from $(x-a)^2+(y-b)^2+z^2=c^2$. 2
2. Solve $\frac{y^2z}{x}p+xzq=y^2$. 2
3. Solve $\frac{\partial u}{\partial z}=4\frac{\partial u}{\partial y}$, given that $u(0,y)=8e^{-3y}$. 2
4. Classify the second order linear partial differential equation.
$A\frac{\partial^2 z}{\partial x^2}+2B\frac{\partial^2 z}{\partial xy}+C\frac{\partial^2 z}{\partial z^2}+D\frac{\partial u}{\partial x}+E\frac{\partial u}{\partial y}+Fu(x,y)=f(x,y)$. 2
5. Define uniform distribution. Find its variance. 2
6. Define moments, skewness and Kurtosis. 2
7. Derive the normal equations for the curve $y=ax+\frac{b}{x^2}$ using principle of Least squares. 2
8. Show that the correlation coefficient is the geometric mean between the two regression coefficients. 2
9. Write the properties of t-distribution. 2
10. Define Chi-square $(\chi^2)$– test. 2

### PART – B (50 Marks)

11. (a) Solve $q^2=z^2p^2(1-p^2)$. 5

    (b) Solve $2xz-px^2-2qxy+pq=0$. 5

12. Solve the differential equation $\frac{\partial u}{\partial t}=\sim^2\frac{\partial^2 u}{\partial x^2}$ subject to the following conditions:

    i) $u$ is not infinite for $t\to\infty$..

    ii) $\frac{\partial u}{\partial x}=0$ for $x=0$ and $x=l$.

    iii) $u=lx-x^2$ for $t=0$ between $x=0$ and $x=l$. 10

13. (a) Fit a Poisson distribution to the set of observations. 5

| x | 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| f | 122 | 60 | 15 | 2 | 1 |

(b) In a test of 2000 electrical bulbs, it was formal that the life of a particular make was normally distributed with an average life of 2040 hrs and S.D of 60 hrs. Estimate the

....2

number of bulbs likely to burn for
a) more than 2150 hrs
b) less than 1950 hrs
c) more than 1920 hrs but less than 2160 hrs. 5

14. (a) Fit the curve $y = ae^{bx}$ to the following data 5

| $x$ | 77 | 100 | 185 | 239 | 285 |
|---|---|---|---|---|---|
| $y$ | 2.4 | 3.4 | 7 | 11.1 | 19.6 |

(b) Find the correlation coefficient and the regression lines $y$ on $x$ and $x$ on $y$ for the data 5

| $x$ | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| $y$ | 2 | 5 | 3 | 8 | 7 |

15. (a) Fit a Poisson distribution to the following data and test for its goodness of fit at level of significance 0.05 5

| $x$ | 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| $y$ | 419 | 352 | 154 | 56 | 19 |

(b) The lifetime of electric bulbs for a random sample of 10 from a large consignment gave the following data 5

| Item | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| Life in hrs | 4.2 | 4.6 | 3.9 | 4.1 | 5.2 | 3.8 | 3.9 | 4.3 | 4.4 | 5.6 |

Can we accept the hypothesis that the average lifetime of bulb is 4000hrs.

16. (a) An unbiased coin is thrown $n$ times. It is desired that the relative frequency of the appearance of heads should be between 0.49 and 0.51. Find the smallest value of $n$ that will ensure this result with 90% confidence. 5

(b) A lightly stretched string with fixed end points $x = 0$ and $x = 1$ is initially in a position given by $y = y_0 \sin^3\left(\frac{®x}{l}\right)$. If it is released from rest from this position, find the displacement $y(x,t)$. 5

17. (a) Solve $p^2 + q^2 = x + y$. 5

(b) Obtain the rank correlation coefficient for the following data 5

| $x$ | 68 | 64 | 75 | 50 | 64 | 80 | 75 | 40 | 55 | 64 |
|---|---|---|---|---|---|---|---|---|---|---|
| $y$ | 62 | 58 | 68 | 45 | 81 | 60 | 68 | 48 | 50 | 70 |

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**Code No. 2961/AICTE**

# FACULTY OF ENGINEERING

## B.E. III Semester (AICTE) (I.T) (Main)Examination, December 2019

**Subject: MATHEMATICS- III**

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

**Note: Answer all questions from Part-A & any five questions from Part-B**

**PART – A (20 Marks)**

1. Define Random Experiment, Sample Space, and Event.
2. A Variant *X* has the Following Distribution.

| *x* : | -3 | 6 | 9 |
|---|---|---|---|
| P(*X*=*x*) | 1/6 | 1/2 | 1/3 |

Find E $(2X+1)^2$.

3. Find the Variance of Poisson distribution.
4. Define Kurtosis of a distribution.
5. Explain Uniform distribution.
6. Find the Mean of Exponential distribution.
7. Derive the normal equations for the curve $y = ax^b$ using the method of least squares.
8. Show that correlation coefficient is the geometric mean between the two regression coefficients.
9. Define Central Limit Theorem.
10. Define Type I Error and Type II Error.

**PART – B (5 x 10 = 50 Marks)**

11. a) The content of three urns are: 1 white, 2 red,3 green balls; 2 white,1 red,1 green balls and 4 white, 5 red, 3 green balls. Two balls are drawn from an urn chosen at random. These are found to be one white and one green. Find the probability that the balls so drawn came from the third urn.

    b) The probability density function $P(x)$ of a continuous random variable is $P(x) = y_0 e^{-|x|}, -\infty < x < \infty$. Prove that $y_0 = 1/2$. Find the mean and variance of the distribution.

12. a) Fit a Binomial frequency distribution for the following data.

| *x* | 0 | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| *f* | 2 | 14 | 20 | 34 | 22 | 8 |

    b) In a certain factory turning out razor blades, there is a small chance of 0.002 for any blade to be defective. The blades are supplied in packets of 10, use Poisson distribution to calculate the approximation number of packets congaing no defectives, one defective and two defective blades respectively in a consignment of 10,000 packets.

13. a) Find the variance and moment generating function of uniform distribution. Also find mean, variance the uniform distribution $f(x) = 1$, $0 \le x \le 1$.

    b) In a Normal distribution, 31% of the items are under 45 and 8% are over 64. Find the mean and standard deviation of the distribution.

14. a) An experiment gave the following values

| *v* (ft/min): | 350 | 400 | 500 | 600 |
|---|---|---|---|---|
| *t* (min): | 61 | 26 | 7 | 2.6 |

……2

It is known that *v* and *t* are connected by the relation $V = at^b$. Find the best possible values of $a$ and $b$

b) Find the correlation coefficient between $x$ and $y$ for the following data

| $x$ | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| $y$ | 2 | 5 | 3 | 8 | 7 |

15. a) The mean of simple samples of size 1000 and 2000 are 67.5cm and 68cm respectively. Can the samples be regarded as drawn from the same population of S.D. 2.5cm?

b) The theory predicts the proportion of beans in the four groups G1, G2, G3, G4 should be in the ratio 9:3:3:1. In an experiment with 1600 beans the numbers in the four groups were 882, 313, 287 and 118. Does the experiment result support the theory?

16. a) Find the rank correlation coefficient for the following data

| $x$ | 3 | 8 | 9 | 2 | 7 | 10 | 4 | 6 | 1 | 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| $y$ | 5 | 9 | 10 | 1 | 8 | 7 | 3 | 4 | 2 | 6 |

b) Two independent sample of sizes 7 and 6 had the following values

| Sample A | 28 | 30 | 32 | 33 | 31 | 29 | 34 |
|---|---|---|---|---|---|---|---|
| Sample B | 29 | 30 | 30 | 24 | 27 | 28 | |

Examine whether the samples have been drawn from normal populations having the same variance.

17. a) Two random variables have the regression lines with equations $3x + 2y = 26$ and $6x + y = 31$. Find the mean values and correlation coefficient between $x$ and $y$.

b) Fit the curve $y = ae^{bx}$ to the following data.

| $x$ | 77 | 100 | 185 | 239 | 285 |
|---|---|---|---|---|---|
| $y$ | 2.4 | 3.4 | 7 | 11.1 | 19.6 |

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