1211

Code : 15SC-03S

Register Number | | | | | | | |

I/II Semester Diploma Examination, April/May-2017

APPLIED SCIENCE

Time : 3 Hours] **[Max. Marks : 100**

Note : (i) Answer any **10** questions from Section – **A**, each carries **2** marks.
(ii) Answer any **10** questions from Section – **B**, each carries **5** marks.
(iii) Answer any **5** questions from Section – **C**, each carries **6** marks.

SECTION – A

(Answer any **10** questions)

1. Write any two advantages of SI system. **2**

2. Define least count of a measuring instrument. **2**

3. State law of parallelogram of vectors. **2**

4. Define like parallel forces. **2**

5. Define Young's modulus of elasticity. **2**

6. Define angle of contact of liquids. **2**

7. State Bernoulli's theorem of liquids. **2**

8. Define convection of heat. **2**

9. Define specific heat of a substance. **2**

10. Define resonance. 2

11. Give any two examples of resonance. 2

12. Define electromagnetic waves. 2

13. Write any two advantages of Nano technology. 2

14. State Faraday's first law of electrolysis. 2

15. Define Polymerisation. 2

SECTION – B

(Answer any 10 questions)

16. Draw a neat diagram of screw gauge and label its parts. 3 + 2

17. Define moment of force. Mention its SI unit. Explain positive and negative moment of force. 2 + 1 + 2

18. Explain stress-strain graph. 5

19. Explain streamline flow and turbulent flow of liquids with examples. $2\frac{1}{2} + 2\frac{1}{2}$

20. Define Capillarity. Write any three applications of surface tension. 2 + 3

21. State I law and II law of thermodynamics. Give one practical example for each. $2\frac{1}{2} + 2\frac{1}{2}$

22. Derive an expression for the coefficient of thermal conductivity (K). 5

23. Explain the effect of pressure, temperature and humidity on velocity of sound in air. 1 + 2 + 2

24. Differentiate mechanical and non-mechanical waves with examples. $2\frac{1}{2} + 2\frac{1}{2}$

25. List the properties of electromagnetic waves. 5

26. Explain Satellite communication. Write any two advantages of satellite communication. 3 + 2

27. Write any five postulates of Arrhenius theory of electrolytic dissociation. 5

28. Define composite materials. Write any three applications of composite materials. 2 + 3

29. Define alloys. Write the purpose and uses of alloys. 2 + 3

30. Define pH of a solution. Explain acid, base and neutral solution on the basis of pH value. 2 + 3

SECTION – C

(Answer any **5** questions)

31. Derive the expressions for the magnitude and direction of the resultant of two vectors acting at a point. 6

32. Describe an experiment to determine the co-efficient of viscosity of water by Poiseuille's method. 6

33. State Charles' law. Calculate the temperature of a gas must be heated at constant pressure so that its volume at 20 °C is doubled. 2 + 4

34. Define Simple Harmonic Motion. Derive an expression for the displacement of a particle executing SHM. 6

35. Describe an experiment to determine the velocity of sound in air at room temperature by resonance air column method. 6

36. Define Beat. A string 0.5 m long weighs 3.25×10^{-3} kg. If the fundamental frequency of vibration is 512 Hz, find the tension. 2 + 4

37. Write the principle of optical fiber. Write any five applications of Laser. 1 + 5

38. Define corrosion. Write any four preventive methods of corrosion. 2 + 4

1429

Code : 15EC-11-T

Register Number | | | | | | | |

I Semester Diploma Examination, April/May-2016

BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING

Time : 3 Hours] **[Max. Marks : 100**

Note : (i) Answer any **six** questions from Part – **A** (**5 × 6 = 30** marks)

(ii) Answer any **seven** full questions from Part – **B** (**7 × 10 = 70** marks).

PART – A

1. State Ohm's law. List its limitations. **5**

2. Compute the equivalent resistance when three resistors are connected in series. **5**

3. Define : **5**
   (a) Electric field
   (b) Flux density

4. State and explain Faraday's Laws. **5**

5. Define : **5**
   (i) Phase difference
   (ii) Leading phase angle

6. Write sinusoidal wave label **5**
   (i) Peak value
   (ii) Amplitude
   (iii) Time period

7. Compute EMF equation of a transformer. **5**

8. Classify the resistors based on construction. **5**

9. Explain the features of logarithmic potentiometer. 5

PART – B

10. Describe features of Lead Acid Battery. 10

11. (a) Calculate the force between two unlike charges each of 10 μF and placed 2 mm apart. 6

    (b) Define power and energy. 4

12. Compute the total capacitance of 10

    (i) Series combination of capacitors

    (ii) Parallel combination of capacitors

13. (a) Define quality factor. 2

    (b) Compute an equation for energy stored in an inductor. 8

14. Explain RL and RC series circuits. 10

15. Explain RLC series circuit with phasor diagram. 10

16. Classify the transformers based on cores, frequency power and applications. 10

17. Describe principle of operation and features of DC motors. 10

18. Explain principle of operation of thermistor. Write its applications. 10

19. Classify the inductors based on core and frequency. List its applications. 10

1501

Code : 15SC03S

Register Number | | | | | | | |

I/II Semester Diploma Examination, April/May-2016

APPLIED SCIENCE

Time : 3 Hours] **[Max. Marks : 100**

Note : (i) Answer any **10** questions from Section – A, each carry **2** marks.
(ii) Answer any **10** questions from Section – B, each carry **5** marks.
(iii) Answer any **5** questions from Section – C, each carry **6** marks.

SECTION - A

1. Define unit of a Physical quantity.
2. Define pitch of a Screw.
3. State Lami's theorem.
4. Define couple.
5. Define compressibility. Write is SI unit.
6. Mention the factors affecting surface tension.
7. Write the effect of temperature on viscosity of gas.
8. Define conduction of heat.
9. State Zeroth law of thermodynamics.
10. Define periodic motion with example.
11. Write any two applications of beats.
12. Write the principle of optical fiber.
13. Write two advantages of Communication satellite.
14. Define electrolysis.
15. Define polymers.

SECTION – B

1. Write the difference between scalars and vectors. Give two examples for each.
2. Draw a net diagram of Vernier Callipers and label its parts.

3. Define cohesive and adhesive force with an example to each.
4. Define capillarity. Write any three applications of capillarity.
5. Define strain. Write the types of strain. Give e.g for each type of strain.
6. Write any five applications of Convection.
7. State Boyle's law and Charle's law. Give an ideal gas equation.
8. Explain a Stationary wave. Mention any three characteristics of stationary waves.
9. Distinguish between longitudinal and transverse waves.
10. Write any five properties of electromagnetic waves.
11. Write five advantages of nanotechnology.
12. Write any five preventive methods of corrosion.
13. Write two types of fuel cells. Give any three advantages of fuel cells.
14. Write the basic concepts of batteries. List any three applications of batteries.
15. Define : (i) minerals
    (ii) ore
    (iii) flux

SECTION – C

1. Describe an experiment to verify Lami's theorem.
2. Define viscosity of a liquid. A rectangular tank is 6 m long, 4 m wide and 3 m in height, it contains water to a depth of 2 m, the density of water is 1000 kg/m^3. Calculate the pressure, water at the bottom of the tank.
3. Explain three modes of heat transmission.
4. Describe an experiment to find the unknown frequency of the given tuning fork using sonometer by comparison method.
5. Explain various factors affecting velocity of sound in air.
6. A string of length 2 m is stretched by a force of 3200 N. If the frequency of vibration is 100 Hz, find the mass of the string.
7. Explain satellite communication system. Write four advantages of satellite communication system.
8. Write the applications of polymers.

Register Number | | | | | | | |

I Semester Diploma Examination, April/May-2016

ENGINEERING MATHEMATICS – I

Time : 3 Hours] **[Max. Marks : 100**

Note : (i) Answer any **10** questions from Section – **A**, any **8** questions from Section – **B** and any **5** questions from Section – **C**.

(ii) Each question caries **3** marks in Section – A

(iii) Each question caries **5** marks in Section – B

(iv) Each question caries **6** marks in Section – C

SECTION – A

1. If $A = \begin{pmatrix} 2 & -1 \\ 3 & -4 \end{pmatrix}$, find $A^1 - A$. **3**

2. If $A = \begin{pmatrix} 5 \\ 0 \\ -1 \end{pmatrix}$, $B = (2\ 3\ 4)$, then find AB. **3**

3. If $A = \begin{pmatrix} 2 & 1 \\ 0 & -5 \end{pmatrix}$, find A^{-1}. **3**

4. If $\vec{a} = i + j + k\ k$, $\vec{b} = 2i + 3j + 4k$, find magnitude of $2\vec{a} + 3\vec{b}$. **3**

5. If $\vec{a} = 5i + 3j + k$, $\vec{b} = 2i - j + 3k$, find $\vec{a} \times \vec{b}$. **3**

6. A coin is tossed twice. What is the probability that at least one tail occurs. **3**

7. Find the value of sin (–840°). **3**

8. Find the value of cos (75°). **3**

9. If tan A = 1/3, tan B = 1/2. Find tan (A + B). **3**

10. Prove that sin (2A) = 2sin A cos A. **3**

11. Prove that $\frac{\sin A + \sin B}{\cos A - \cos B} = -\cot\left(\frac{A-B}{2}\right)$. 3

12. Express $(3 + 4i)^{-1}$ in the a + ib form. 3

13. Evaluate $\lim_{x \to \infty}\left(\frac{x^2 + x + 1}{2x^2 - 3x - 4}\right)$. 3

14. Evaluate $\lim_{\theta \to 0}\left(\frac{\sin 2\theta}{\sin 3\theta}\right)$. 3

SECTION – B

1. Solve the equations $\frac{2}{x} + \frac{3}{y} = 1, \frac{3}{x} - \frac{4}{y} = 2$. Using Camer's rule. 5

2. Verity Cayley-Hamilton theorem for the matrix $A = \begin{bmatrix} 2 & -1 \\ -3 & 1 \end{bmatrix}$. 5

3. Find the projection of $\vec{a} = i + 2j + 3k$ on $\vec{b} = 3i - 5j + k$. 5

4. If $\vec{a} = 3i + 2j - 4k$, $\vec{b} = i - 2j + 5k$ are two sides of a triangle, find its area. 5

5. If the vectors $\lambda i + 5j - 6k$ and $7i + 2j + 4k$ are orthogonal, find λ. 5

6. Prove that $\frac{1}{\log_3^{60}} + \frac{1}{\log_4^{60}} + \frac{1}{\log_5^{60}} = 1$. 5

7. Prove that

$$\frac{\sin(180° - A) \cdot \cos(360° - A) \cdot \tan(180° + A)}{\cos(270° + A) \cdot \sin(90° + A) \cdot \cot(270° - A)} = 1.$$ 5

8. Prove that $\sin(A + B) \cdot \sin(A - B) = \cos^2 B - \cos^2 A$. 5

9. Prove that $\tan A + \cot A = 2\text{cosec}(2A)$. 5

10. Prove that $\sin 40° + \sin 20° - \cos 10° = 0$. 5

11. Evaluate $\lim_{x \to 1}\left(\frac{x^2 + x - 2}{x^2 - 1}\right)$. 5

SECTION – C

1. If the matrix $A = \begin{bmatrix} x & 2 & -1 \\ 2 & 5 & x \\ -1 & 2 & x \end{bmatrix}$ is singular, find the value of x. 6

2. Find the inverse of the matrix $A = \begin{bmatrix} 1 & 2 & 3 \\ 1 & 3 & 3 \\ 2 & 4 & 3 \end{bmatrix}$. 6

3. A force $\vec{F} = 2i + j - 2k$ acting on particle at (3, 2, 2) displaces it to the point (1, 3, –1), find the work done. 6

4. A family has two children. What is the probability that both the children are boys given that at least one of them is a boy ? 6

5. If $\sec\theta = 17/8$ and $270° < \theta < 360°$, find the value of $\frac{15\,\text{cosec}\,\theta - 8\tan\theta}{17\cos\theta + 15\,\text{cosec}\,\theta}$. 6

6. Prove that $\cos20° \cdot \cos40° \cdot \cos60° \cdot \cos80° = \frac{1}{16}$. 6

7. Express complex number (1 + i) in the polar from. 6

8. Evaluate $\lim_{x \to 2}\left[\frac{x^2 - 4}{\sqrt{x+2} - \sqrt{3x+2}}\right]$. 6

1293

Code : 15EC11T

Register Number | | | | | | | |

I Semester Diploma Examination, April/May-2018

BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING

Time : 3 Hours] **[Max. Marks : 100**

Note : (i) Answer any **six** questions from Part – **A**.
(ii) Answer any **seven** full questions from Part – **B**.

PART – A **6 × 5 = 30**

1. Define current and EMF. Mention their units. **5**

2. State and explain Ohm's law. **5**

3. State and illustrate Coulomb's second law of electro-statics. **5**

4. Define self inductance and absolute permeability. **5**

5. Define and explain leading and lagging phase angles. **5**

6. Summarize behaviour of pure resistive circuit for AC signals. **5**

7. Describe the principle of operation of transformer. **5**

8. Distinguish active and passive components. Quote examples. **5**

9. Classify inductors based on core and frequency. **5**

PART – B

10. (a) Determine equivalent resistance of three resistances connected is parallel. 7
    (b) List limitations of Ohm's law. 3

11. (a) Compare primary and secondary cells and quote examples of each. 4
    (b) Compute total voltage of three cells each of 5 volts when connected in (i) series, (ii) parallel. 6

12. Describe charging and discharging of capacitor with neat diagrams. 10

13. (a) Derive the equation of energy stored in an inductor. 5
    (b) Compute total inductance of series combination of two inductances for additive flux. 5

14. (a) Summarize AC behaviour of R-L circuit. 6
    (b) Compute impedance of RLC circuit connected to 50 Hz supply with R = 10 Ω, L = 20 H and C = 10 μF. 4

15. A resistance of 50 Ω is connected in series a capacitor of 100 F to the 100 volts/50 Hz power supply. Compute : 10
    (i) Impedance
    (ii) Current
    (iii) Power factor

16. (a) Develop the EMF equation of transformer. 7
    (b) Calculate current and voltage ratios for the transformer of $N_1 = 20$ and $N_2 = 10$ turns. 3

17. (a) Describe principle of operation of DC motor with neat diagram. 7
    (b) List applications of isolation transformer. 3

18. (a) Classify the resistors based on construction. 5
    (b) Describe principle of operation of LDR. 5

19. (a) List features of capacitor. 5
    (b) List applications of inductors. 5

2572

Code : 15EC-11T

Register Number | | | | | | | |

I Semester Diploma Examination, Nov./Dec. 2015

BASIC OF ELECTRICAL & ELECTRONICS ENGINEERING

Time : 3 Hours] **[Max. Marks : 100**

Note : (i) Answer any **six** questions from Part-A.

(ii) Answer any **seven** full questions from Part-B.

PART – A

1. Define power and energy along with their units. **5**

2. State and explain Kirchoff's current law. **5**

3. Define charge and field strength. **5**

4. State Lenz's law. **5**

5. Define r.m.s. and average value of AC signal and write their equations. **5**

6. Describe AC behaviour in pure capacitive circuit. **5**

7. Describe step-up and step-down transformers. **5**

8. List and explain specifications of resistors. **5**

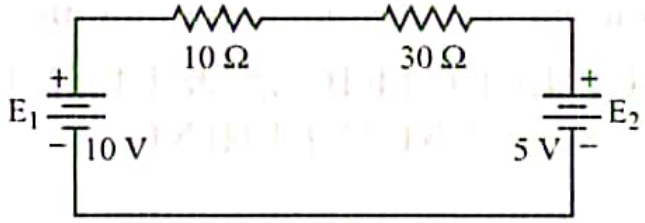
9. Classify capacitors based on dielectric materials used and write one application each. **5**

[Turn over

PART – B

10. (a) Develop an expression for total resistance of three resistances connected in parallel. 5

(b) Compute current through the resistor 10 Ω in the following circuit. 5



11. Explain constructional features of lead-acid battery. 10

12. Discuss series and parallel combination of capacitors. 10

13. (a) State and explain Faraday's second law of electro-magnetic induction. 6

(b) Define inductive reactance and quality factor. 4

14. (a) Analyze AC behaviour in RC circuit. 6

(b) A circuit consist of resistance of 10 Ω, inductance of 0.2 H and capacitance of 10 μF with a 50 Hz supply AC source. Compute impedance. 4

15. A resistance of 20 Ω and an inductance of 10 H are connected in series to an AC supply of 100 V, 50 Hz. Compute : 10

(i) impedance

(ii) current

(iii) power factor

16. (a) Describe working principle of auto transformer. 5

(b) Calculate EMF induced in the secondary of transformer of 100 turns, when the primary is operating on 50 Hz supply produces a maximum flux of 0.04 webers. 5

17. (a) Describe operation of DC motors. 7

(b) List applications of pulse transformer. 3

18. (a) Explain principle of operation of VDR. 6

(b) List specifications of inductors. 4

19. (a) Describe principle of operation of linear thermistor. 6

(b) List features of linear potentiometer. 4

2669

Code : 15SC03S

Register Number | | | | | | | |

I Semester Diploma Examination, Nov./Dec. 2015

APPLIED SCIENCE

Time : 3 Hours] **[Max. Marks : 100**

Note : (i) Answer any **10** questions from Section – **A**, each carries **02** marks.
(ii) Answer any **10** questions from Section – **B**, each carries **05** marks.
(iii) Answer any **05** questions from Section – **C**, each carries **06** marks.

SECTION – A

1. Define fundamental and derived units.

2. Define least count of measuring instrument.

3. Define moment of force.

4. Write the conditions of equilibrium when number of co-planar parallel forces acting on a body.

5. Define elasticity.

6. Mention the types of flow of liquids.

7. Define pressure at a point inside a liquid.

8. Define heat. Write SI unit of heat.

9. State Boyle's law.

10. Define resonance.

11. Write the effect of humidity on velocity of sound in air.

|Turn over

12. Define nanotechnology.

13. Give any two types of LASER.

14. Write any two types of fuel cells.

15. Define composite materials.

SECTION – B

1. Draw a neat diagram of Screw Gauge and label its parts.

2. Write the advantages of SI system.

3. Define stress. Write the types of stress.

4. Define K.E. of liquid. State Bernoulli's theorem.

5. Define surface tension. Mention factors which affect surface tension.

6. Define C_p and C_v. Write the relationship between them

7. Define conduction. Write the application of conduction.

8. Explain Newton's formula for velocity of sound in air and apply Laplace correction to it.

9. Define simple harmonic motion. Derive an expression for displacement of a particle executing SHM.

10. Write any five advantages of LASER.

11. Explain satellite communication. List any three disadvantages of satellite communication system.

12. Explain the mechanism of electrolysis of HCl.

13. Define corrosion and give methods of corrosion control.

14. Write any five postulates of Arrhenius theory of electrolytic dissociation.

15. Explain any two methods of polymerization.

SECTION – C

1. Describe an experiment to verify law of parallelogram of forces.

2. Define thrust of liquid. Derive an expression for pressure at any point inside the liquid at rest.

3. Define specific heat of a substance. Derive an equation for specific heat of substance.

4. Describe an experiment to determine unknown frequency of tuning fork by absolute method using sonometer.

5. If the frequency of tuning fork is 400 Hz and velocity of sound is 300 m/s. Find how far the wave travels while the fork completes 25 vibrations.

6. State the laws of transverse vibration of stretched strings. Derive an expression for fundamental frequency of vibrations of stretched string.

7. Write the principle of optical fiber. Write four applications of optical fiber.

8. Define pH value of a solution. Write any four applications of pH value.

2613

Code : 15SC01M

Register Number | | | | | | | |

I Semester Diploma Examination, Nov./Dec. 2015

ENGINEERING MATHEMATICS-I

Time : 3 Hours] **[Max. Marks : 100**

Note : (i) Answer any **10** questions from Section-A. Each carries **3** marks.
(ii) Answer any **8** questions from Section-B. Each carries **5** marks.
(iii) Answer any **5** questions from Section-C. Each carries **6** marks.

SECTION – A

Answer any **10** questions.

1. If $A = \begin{bmatrix} 1 & -1 \\ 2 & 3 \end{bmatrix}$, find $A^2 + A$. **3**

2. If $A = [\ 2 \quad -1 \quad 3\ ]$ and $B = \begin{bmatrix} 5 & -2 \\ 3 & 1 \\ 2 & 4 \end{bmatrix}$, find AB matrix. **3**

3. If $A = \begin{bmatrix} 3 & -2 \\ 2 & -1 \end{bmatrix}$, find its characteristic equation. **3**

4. Find the magnitude of vector $i + 2j + k$. **3**

5. If $\vec{a} = i + 2j - k$, $\vec{b} = 3i - 5j + 2k$, find the magnitude of $3\vec{a} - 2\vec{b}$. **3**

6. A coin is tossed twice, what is the probability that atleast one tail occurs ? **3**

7. If $\sin\theta = \frac{5}{13}$, $\frac{\pi}{2} < \theta < \pi$, find the value of $\tan\theta + \sec\theta$. **3**

8. Find the value of $\cos 75°$. **3**

[Turn over

9. Prove that $\frac{\sin 2A}{\sin A} - \frac{\cos 2A}{\cos A} = \sin A$. 3

10. If $A + B + C = 180°$, Prove that $\cot\left(\frac{A+B}{2}\right) = \tan\frac{C}{2}$. 3

11. Prove that $\cos 100° + \cos 80° = 0$. 3

12. Find the real and imaginary part of $\frac{1}{\sqrt{2}+2}$. 3

13. Find $\lim_{x \to 2} \frac{x^4 - 16}{x - 2}$. 3

14. Evaluate $\lim_{x \to 0} \frac{1 - \cos 2x}{x^2}$. 3

SECTION – B

Answer any **8** questions.

1. Solve for x using determinants.
   $x + y = 9$, $x - y + 3z = 2$ and $4y - 3z - 5 = 0$. 5

2. Verify Cayley-Hamilton theorem for the matrix $A = \begin{bmatrix} 3 & 2 \\ 4 & 5 \end{bmatrix}$. 5

3. Find the cosine of the angle between the vectors $4i - 2j - 3k$ and $2i - 3j + 4k$. 5

4. Find the projection of $\vec{a} = i + 2j + k$ on $\vec{b} = 2i - 3j + k$. 5

5. Find the area of Parallelogram, whose adjacent sides are $3i + 2j - k$ and $i + 2j + 3k$. 5

6. If $\log\left(\frac{a+b}{3}\right) = \frac{1}{2}(\log a + \log b)$, show that $a^2 + b^2 = 7ab$. 5

7. Prove that : $\sin^2\frac{\pi}{4} + \sin^2\frac{3\pi}{4} + \sin^2\frac{5\pi}{4} + \sin^2\frac{7\pi}{4} = 2$ 5

8. Prove that cos (A + B) = cosA cosB – sinA sinB geometrically. 5

9. If $A + B = \frac{\pi}{4}$, prove that (1 + tan A) (1 + tan B) = 2. 5

10. If A + B + C = π, prove that tan 2A + tan 2B + tan 2C = tan 2A tan 2B tan 2C. 5

11. Find $\lim_{x \to 0} \frac{3x + \tan 2x}{\sin 3x - 5x^2}$ 5

SECTION – C

Answer any **5** questions.

1. If $\begin{vmatrix} 2 & m-1 & -3 \\ 1 & -2 & 4 \\ 3 & -1 & 5 \end{vmatrix} = 3m - 1$, find the value of m. 6

2. If $A = \begin{bmatrix} -1 & 0 \\ 5 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 3 & 5 \\ 2 & 4 \end{bmatrix}$, prove that adj (AB) = (adj B) (adj A). 6

3. A particle is acted by constant forces 3i – j + 2k, – i + 3j + k and i + j – 2k and is displaced from the point (–1, 2, 3) to (2, – 1, 5). Calculate the total work done by the forces. 6

4. One card is drawn from a well shuffled pack of 52 cards. If E is the event "The card drawn is a king or an ace" and F is the event "The card drawn is an ace or a jack" then find the conditional probability of the event E, when the event F has already occured. 6

[Turn over

5. Simplify :

$$\frac{\sin(\pi+\theta)}{\cos(\frac{3\pi}{2}-\theta)}+\frac{\tan(-\theta)}{\cot(\frac{\pi}{2}+\theta)}+\frac{\sec(\pi-\theta)}{\operatorname{cosec}(\frac{\pi}{2}-\theta)}$$ 6

6. Prove that : $\cos 20^\circ \cos 40^\circ \cos 60^\circ \cos 80^\circ = \frac{1}{16}$ 6

7. Find the amplitude of $(-\sqrt{3}+i)$ and represent it in Argand diagram. 6

8. Evaluate : $\lim_{\theta \to \frac{\pi}{2}} \frac{\cot\theta}{\frac{\pi}{2}-\theta}$ 6

1347

Code : 15SC01M

Register Number | | | | | | | |

I Semester Diploma Examination, Nov./Dec. 2016

ENGINEERING MATHEMATICS - I

Time : 3 Hours] **[Max. Marks : 100**

Note : (i) Answer any **Ten** questions from Section-**A**, any **Eight** questions form Section-**B** and any **Five** questions from Section-**C**.

(ii) Each question carries **3** marks in Section-**A**.

(iii) Each question carries **5** marks in Section-**B**.

(iv) Each question carries **6** marks in Section-**C**.

SECTION – A

1. If $A = \begin{pmatrix} 1 & -1 \\ 2 & 3 \end{pmatrix}$, $B = \begin{pmatrix} 3 & 2 \\ -1 & 4 \end{pmatrix}$, find $3A + 2B$. **3**

2. If $A = \begin{pmatrix} 2 & 0 \\ 1 & 4 \end{pmatrix}$, $B = \begin{pmatrix} -1 & 5 \\ 2 & 3 \end{pmatrix}$, find AB. **3**

3. If $A = \begin{pmatrix} 3 & 1 \\ -1 & 4 \end{pmatrix}$, $B = \begin{pmatrix} 2 & 3 \\ 0 & -1 \end{pmatrix}$, find adjoint of AB. **3**

4. Find the unit vector of $\vec{a} = 2i + 3j - k$. **3**

5. If $\vec{a} = i + 2j - 3k$, $\vec{b} = 3i - 5j + 2k$, find $\vec{a} \cdot \vec{b}$. **3**

6. Three coins are tossed simultaneously. List the sample space for event. **3**

7. Prove that $\sin\theta . \cos(90° - \theta) + \cos\theta . \sin(90° - \theta) = 1$. **3**

[Turn over

8. Show that $\tan(45° + \theta) = \frac{1 + \tan\theta}{1 - \tan\theta}$. 3

9. Prove that $\cos 2A = 2\cos^2 A - 1$. 3

10. Prove that $\frac{\text{Sin } 68° + \text{Sin}52°}{\text{Cos } 68° + \text{Cos } 52°} = \sqrt{3}$. 3

11. If $\sin A = \frac{1}{2}$, find the numerical value of $\sin(2A)$. 3

12. Find the conjugate of $\frac{1}{\cos\theta + i \sin\theta}$ 3

13. Find the value of $\lim_{n \to (-2)} \left[\frac{x^3 + 8}{x + 2}\right]$ 3

14. Evaluate $\lim_{\theta \to 0} \left[\frac{\theta}{\tan 5\theta}\right]$ 3

SECTION – B

15. Solve for x if $\begin{vmatrix} 1 & 2 & 3 \\ 2 & x & 3 \\ 3 & 4 & 3 \end{vmatrix} = 0$ 5

16. Find the characteristic equation and roots of a square matrix $A = \begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix}$. 5

17. Find the Cosine of the angle between the vectors $i + j - 3k$ and $2i + j - k$. 5

18. If A = (3, – 4, 2), B = (– 6, 8, 4), find the position vectors of A and B also find $\overrightarrow{AB}$ vector and $|\overrightarrow{AB}|$. 5

19. Find the area of the parallelogram whose adjacent sides are $\vec{a} = 3i + 2j - k$ and $\vec{b} = i + 2j + 3k$. 5

20. If $x = \log_7^9$, $y = \log_5^7$, $z = \log_3^5$, show that $xyz = 2$. 5

21. Evaluate cos 570°. sin 150° sin 330°. cos 390°. 5

22. If tan A = ½, $\tan(A + B) = \frac{7}{9}$, find tan B. 5

23. Show that $\frac{1 - \cos 2\theta + \sin 2\theta}{1 + \cos 2\theta + \sin 2\theta} = \tan\theta$ 5

24. Prove that cos 40° + cos 80° + cos 160° = 0. 5

25. Evaluate $\lim_{x \to 0} \left(\frac{\sqrt{1+x} - \sqrt{1-x}}{x} \right)$. 5

SECTION-C

26. Solve for x, y & z from the equations $4x + y = 7$, $3y + 4z = 5$, $5x + 3z = 2$ by Cramer's rule. 6

27. Find the inverse of $A = \begin{pmatrix} 3 & 1 & 2 \\ -2 & 1 & 1 \\ 3 & 0 & 2 \end{pmatrix}$. 6

[Turn over

28. A force $\vec{F} = 2i + j + k$ is acting at the point (–3, 2, 1). Find the magnitude of the moment of force $\vec{F}$ about the point (2, 1, 2). 6

29. A box contains cards numbered from 1 to 20. A card is drawn at random. Find the probability that the card drawn bears
    (i) a prime number
    (ii) an even number
    (iii) a number divisible by 4. 6

30. If $\tan\theta = \frac{4}{5}$ and $180° < \theta < 270°$, find the value of $\frac{5\sin\theta + 7\cos\theta}{6\cos\theta - 3\sin\theta}$ 6

31. In a triangle ABC, Prove that $\sin A + \sin B + \sin C = 4\cos\left(\frac{A}{2}\right)\cos\left(\frac{B}{2}\right)\cos\left(\frac{C}{2}\right)$. 6

32. Evaluate $\left[i^{19} + \left(\frac{1}{i}\right)^{25}\right]^2$. 6

33. Evaluate $\lim_{n \to \infty}\left[\frac{(5 - n^2)(n - 2)}{(2n - 3)(n + 3)(5 - n)}\right]$ 6

1001

Register Number | | | | | | | |

I Semester Diploma Examination, Nov./Dec. 2016

BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING

Time : 3 Hours | **[Max. Marks : 100**

Note : (i) Answer any **six** questions from **Part-A** ($5 \times 6 = 30$ marks)
(ii) Answer any **seven** full questions from **Part-B** ($7 \times 10 = 70$ marks)

PART – A

1. State Ohm's law. List its limitations. **5**

2. State Kirchoff's First and Second Law. **5**

3. Explain the charging and discharging of a capacitor. **5**

4. Define : **5**
   (i) Self Inductance.
   (ii) Mutual Inductance.

5. Analyse the behaviour of pure resistive circuit for AC i/p. **5**

6. Compare average value and peak value with reference to sine wave. **5**

7. Explain the terms : **5**
   (i) Turns Ratio
   (ii) Voltage Transformation Ratio

8. Define Resistance. List the applications of Resistors. **5**

9. List the features of L.D.R. **5**

|Turn over

PART – B

10. Analyse the effective Resistance of two resistors connected in : **10**
    (i) Series combination
    (ii) Parallel combination

11. (a) Explain the series parallel combination of cells. **6**
    (b) List the precautions to be taken in Battery maintenance. **4**

12. Three capacitors of capacitance 20 μF, 40 μF and 100 μF are connected in parallel across 200 V supply : **(2 + 2 + 6 = 10)**
    (i) Sketch the circuit
    (ii) Find total capacitance
    (iii) Find charge on each capacitor

13. Calculate X_L and Q offered by a coil of inductance 20 mH and R = 50 Ω for an applied voltage at 50 Hz frequency. **10**

14. Analyse the behaviour of RL series circuit for AC sinusoidal i/p with phasor diagrams. **10**

15. Calculate the inductive reactance and impedance in RLC series circuit with L = 20 mH C = 20 μF, R = 100 Ω and f = 50 Hz. **10**

16. Explain the working of Auto-transformer and list its applications. **10**

17. Derive the EMF equation for a transformer. **10**

18. Briefly explain the classification of capacitors based on the dielectric material. **10**

19. List applications of : **10**
    (i) Inductors
    (ii) Capacitors

1349 **Code : 15SC-03S**

Register Number | | | | | | | |

I/II Semester Diploma Examination, Nov./Dec. 2016

APPLIED SCIENCE

Time : 3 Hours | **| Max. Marks : 100**

Note : (i) Answer any **10** questions from Section-**A** – each carries **2** M.

(ii) Answer any **10** questions from Section-**B** – each carries **5** M.

(iii) Answer any **05** questions from Section-**C** – each carries **6** M.

SECTION – A $2 \times 10 = 20$

1. Name supplementary units of S.I. system with their physical quantities.
2. Define pitch of a Screw.
3. Define equilibrant.
4. Define moment of force.
5. Defining stress, write its S.I. unit.
6. Define cohesive force.
7. List any four applications of capillarity.
8. Define specific heat of a gas at content volume.
9. Defining heat, write its S.I. unit.
10. Define Beat frequency.
11. Define Resonance.
12. Write any two properties of Electro-magnetic waves.
13. Write any two uses of X-rays.
14. Define Ore.
15. Write any two disadvantages of composite materials.

SECTION – B $5 \times 10 = 50$

16. Stating Lami's theorem, write line diagram and equations of Lami's theorem.
17. Draw neat diagram of screw gauge and name its parts.
18. Explain stress-strain graph.
19. Define surface tension of liquids. Write any four applications of surface tension of liquids.
20. Defining Thrust. Derive $P = \rho gh$ for a liquid at rest.
21. Defining conduction and convection, write one application of each.
22. Defining isothermal process, state first and second laws of thermodynamics.
23. Defining free and forced vibrations, write any two examples for each.
24. Defining beats, write any three applications of beats.
25. Defining Nano-technology, write any three advantages of Nano-technology.
26. Defining optical fiber, write any three applications of it.
27. State two Faraday's laws of electrolysis. Give two applications of electrolysis.
28. Defining Alloy, write any three purposes of making alloys.
29. Explaining addition polymerization, write any two examples of addition polymerization.
30. Define fuel cells and write any three types of fuel cells.

SECTION – C $6 \times 5 = 30$

31. Describe an experiment to verify law of parallelogram of forces.
32. Defining Young's modulus, obtain an expression for Young's modulus.
33. The volume of a gas at 27 °C and 2 atmosphere pressure is 2 litres. If the pressure is doubled and absolute temp. is reduced to half, calculate New volume of gas.
34. Derive an expression velocity of a particle in its Simple Hormonic Motion.
35. Discuss Newton-Laplace equation for velocity of sound in air.
36. Describe an experiment to determine velocity of sound in air by Resonance Air Column method.
37. Define satellite communication. Write the block diagram of communication system.
38. Defining corrosion, explain electro-chemical theory of corrosion.

1129

Code : 15EC11T

Register Number | | | | | | | |

I Semester Diploma Examination, April/May-2017

BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING

Time : 3 Hours] **[Max. Marks : 100**

Note : (i) Answer any **six** questions from **Part-A.**
(ii) Answer any **seven** full questions from **Part-B.**

PART – A **5 × 6 = 30**

1. State and explain ohm's law. **5**

2. Define : **5**
   (i) Current
   (ii) EMF

3. State Coulomb's Laws of Electrostatics. **5**

4. Define : **5**
   (i) MMF
   (ii) Reluctance

5. Explain the terms w.r.t. sinewave **5**
   (i) Amplitude
   (ii) Frequency

6. Calculate the current through a 50 Ω resistor in a circuit, when applied voltage across resistor is $v = 100 \sin (314\ t)$ **5**

7. List applications of Transformer. **5**

8. Define following : **5**
   (a) Permeability
   (b) Mutual Inductance

9. Distinguish between LDR and VDR. **5**

PART – B **7 × 10 = 70**

10. (a) Compare primary and secondary cells (any five). **5**

    (b) State & apply KVL for simple circuit. **5**

11. Three resistance 10 Ω, 20 Ω & 30 Ω are connected in series across a 60 v supply. Find

    (i) Effective Resistance

    (ii) Total current in the circuit

    (iii) Voltage drop across each resistor **(2 + 2 + 6) = 10**

12. Analyse capacitors in **10**

    (i) Series combination

    (ii) Parallel combination

13. Explain about self inductance and mutual inductance with suitable diagrams. **10**

14. Analyse the behaviour of RC series Ckt for AC sinusoidal input. **10**

15. Calculate capacitive reactance and impedance in RLC circuit given C = 5μf, L = 10mH, R = 100 Ω and F = 50 Hz. **10**

16. Derive the EMF equation for transformer. **10**

17. Mention and Explain the classification of transformer based on Primary and Secondary voltages. **10**

18. List and explain the specifications of Resistors. **10**

19. Write the symbol and explain the working of variable capacitors with neat diagrams. **10**

1209

Code : 15SC-01M

Register Number | | | | | | | |

I Semester Diploma Examination, April/May-2017

ENGINEERING MATHEMATICS – I

Time : 3 Hours] **[Max. Marks : 100**

Note : (i) Answer any **ten** questions from Section – **A**, any **eight** questions from Section – **B** and any **five** questions from Section – **C**.

(ii) Each question carries **3** marks in Section – **A**.

(iii) Each question carries **5** marks in Section – **B**.

(iv) Each question carries **6** marks in Section – **C**.

SECTION – A

1. Given $A = \begin{bmatrix} 2 & 3 \\ 4 & -1 \end{bmatrix}$, $B = \begin{bmatrix} 3 & 0 \\ -1 & -3 \end{bmatrix}$, find $3B - 2A$. **3**

2. If $A = \begin{bmatrix} 2 & -1 \\ 3 & 4 \end{bmatrix}$, find the matrix A^2. **3**

3. Find the inverse of the matrix $A = \begin{bmatrix} 2 & -1 \\ -1 & 2 \end{bmatrix}$. **3**

4. If $\vec{a} = i + 2j + 3k$, and $\vec{b} = 4i - j - 5k$, find $\vec{a} + \vec{b}$ and $|\vec{a} + \vec{b}|$. **3**

5. If $\vec{a} = 2i - j + k$, and $\vec{b} = 3i + j - k$, find $\vec{a} \cdot \vec{b}$. **3**

6. A coin is tossed twice, what is the probability that atleast one head occurs ? 3

7. If $\sin\theta = \frac{5}{13}, \frac{\pi}{2} < \theta > \pi$, find the value of $\cos\theta + \tan\theta$. 3

8. Find the value of $\cos 15°$. 3

9. Show that :

$\tan 5A - \tan 3A - \tan 2A = \tan 5A \cdot \tan 3A \cdot \tan 2A$. 3

10. Show that $(\sin\theta + \cos\theta)^2 = 1 + \sin 2\theta$. 3

11. Prove that $\frac{1 + \cos 2x}{\sin 2x} = \cot x$. 3

12. Evaluate i^{+9} and i^{-9}. 3

13. Evaluate $\lim_{x \to 1} \frac{x^2 - 2x + 3}{x^2 + x + 1}$. 3

14. Evaluate $\lim_{x \to 0} \frac{\sin px}{\tan qx}$. 3

SECTION – B

15. Solve the equations for x & y by Cramer's rule $5x - 3y = 1$, and $2x - 5y = -11$. 5

16. If $A = \begin{bmatrix} -1 & 0 \\ 5 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 3 & 5 \\ 2 & 4 \end{bmatrix}$, then prove that adj. (AB) = (adj. (B)) . (adj(A)). 5

17. Find cosine of the angle between the two vectors $\vec{a} = 4i - 2j - 3k$ and $\vec{b} = 2i - 3j + 4k$. 5

18. If the vertices of a triangle have position vectors $4i + 5j + 6k$, $5i + 6j + 4k$ and $6i + 4j + 5k$, then prove that triangle is an equilateral triangle. 5

19. If $\vec{a} = i + j + 2k$ and $\vec{b} = 2i - j + k$, then show that $(\vec{a} + \vec{b})$ is perpendicular to $(\vec{a} - \vec{b})$. 5

20. If $x = \log_a bc$, $y = \log_b ca$, $z = \log_c ab$, then prove that $\frac{1}{1+x} + \frac{1}{1+y} + \frac{1}{1+z} = 1$. 5

21. Find the numerical value without using trigonometric table/calculator 5

$\sin 120° \cdot \cos 330° - \sin 240° \cdot \cos 390°$.

22. Prove that $\frac{\cos 17° + \sin 17°}{\cos 17° - \sin 17°} = \tan 62°$. 5

23. If $\cos \alpha = \frac{3}{5}$ and $\cos \beta = \frac{5}{13}$, find the value of $\sin (\alpha + \beta)$. 5

24. Prove that $\frac{1 + \sin 2A + \cos 2A}{1 + \sin 2A - \cos 2A} = \tan (90° - A)$. 5

25. Evaluate $\lim_{x \to 0} \frac{\sin 4x - \sin 2x}{\sin 6x + \sin 2x}$. 5

SECTION – C

26. Solve for x, y, z using determinants method, $x + y = 9$, $x - y + 3z = 2$, $4y - 3z - 5 = 0$. 6

27. Verify Cayley-Hamilton theorem for the matrix $A = \begin{bmatrix} 3 & 2 \\ 4 & 5 \end{bmatrix}$. 6

28. If A (2, 5, 7), B (3, 9, 4), C (–2, 5, 7) are three vertices of parallelogram, then find its area. 6

29. A pair of dice is thrown once. If the two numbers appearing are different, find the probability that sum of numbers is 6. 6

30. If $\tan \alpha = 4/3$ and α is acute, then find the value of $\frac{2 \sin \alpha - 3 \cos \alpha}{3 \sin \alpha + \cos \alpha}$. 6

31. In a triangle ABC, prove that $\sin 2A + \sin 2B + \sin 2C = 4 \sin A \cdot \sin B \cdot \sin C$. 6

32. Express $-\sqrt{3} - i$, in polar form. 6

33. Evaluate $\lim_{x \to -3} \frac{x^2 + 4x + 3}{x^2 + 5x + 6}$ 6