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Register Number				

Code: 15EC11T

I Semester Diploma Examination, April/May-2018

BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING

Tim	ie: 3 Hours]	[Max. Marks : 100									
Note	Vote: (i) Answer any six questions from Part – A. (ii) Answer any seven full questions from Part – B.										
	PART – A	6 × 5 = 30									
I.	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									
	1 of 2	Turn over									

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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 more of force.	ment + 1 + 2
	i i i i i i i i i i i i i i i i i i i	
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

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.

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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 (ii) Answer any seven full questions from Part	
PART – A	
1. State Ohm's law. List its limitations.	5
2 Communication and a series	
2. Compute the equivalent resistance when three resistance	ors 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
1 of 2	[Turn over

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9.	Ехр	lain the features of logarithmic potentiometer.	5
		PART – B	
10.	Des	cribe 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.	Con	npute 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.	Exp	lain RL and RC series circuits.	10
15.	Exp	lain RLC series circuit with phasor diagram.	10
16.	Clas	sify the transformers based on cores, frequency power and applications.	10
17.	Des	cribe principle of operation and features of DC motors.	10
18.	Exp	lain principle of operation of thermistor. Write its applications.	10
19.	Clas	ssify the inductors based on core and frequency. List its applications.	10



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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

- Define unit of a Physical quantity.
- Define pitch of a Screw.
- 3. State Lami's theorem.
- 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.
- Define electrolysis.
- Define polymers.

SECTION - B

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

1 of 2

Turn over

- 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.
- 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.
- Distinguish between longitudinal and transverse waves.
- 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/m³. Calculate the pressure, water at the bottom of the tank.
- 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.
- Explain satellite communication system. Write four advantages of satellite communication system.
- Write the applications of polymers.

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I Semester Diploma Examination, April/May-2016

ENGINEERING MATHEMATICS – I

Time: 3 Hours |

| Max. Marks : 100

Note: (i)

- (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
$$\overrightarrow{a} = 5i + 3j + k$$
, $\overrightarrow{b} = 2i - j + 3k$, find $\overrightarrow{a} \times \overrightarrow{b}$.

3

3

3

3

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

3

10. Prove that
$$\sin(2A) = 2\sin A \cos A$$
.

3

1 of 4

Turn over

2 of 4 15SC01M 1503 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 Evaluate $\lim_{x\to 0} \left(\frac{x^2+x+1}{2x^2-3x-4} \right)$. 3 14. Evaluate $\lim_{\theta \to 0} \left(\frac{\sin 2\theta}{\sin 3\theta} \right)$. 3 SECTION - B Solve the equations $\frac{2}{x} + \frac{3}{y} = 1$, $\frac{3}{x} - \frac{4}{y} = 2$. Using Camer's rule. 5 Verity Cayley-Hamilton theorem for the matrix $A = \begin{bmatrix} 2 & -1 \\ -3 & 1 \end{bmatrix}$. 2. 5 Find the projection of $\vec{a} = i + 2j + 3k$ on $\vec{b} = 3i - 5j + k$. 3. 5 If $\vec{a} = 3i + 2j - 4k$, $\vec{b} = i - 2j + 5k$ are two sides of a triangle, find its area. 4. 5 If the vectors $\lambda i + 5j - 6k$ and 7i + 2j + 4k are orthogonal, find λ . 5. 5 Prove that $\frac{1}{\log_{10}^{60}} + \frac{1}{\log_{10}^{60}} + \frac{1}{\log_{10}^{60}} = 1$. 6. 5 7. Prove that

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

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

9. Prove that
$$tan A + cot A = 2cosec (2A)$$
.

10. Prove that
$$\sin 40^\circ + \sin 20^\circ - \cos 10^\circ = 0$$
.

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

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.
- 2. Find the inverse of the matrix $A = \begin{bmatrix} 1 & 2 & 3 \\ 1 & 3 & 3 \\ 2 & 4 & 3 \end{bmatrix}$.
- 3. A force $\overrightarrow{F} = 2i + j 2k$ acting on particle at (3, 2, 2) displaces it to the point (1, 3, -1), find the work done.
- 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?
- 5. If $\sec \theta = 17/8$ and $270^{\circ} < \theta < 360^{\circ}$, find the value of $\frac{15 \csc \theta 8 \tan \theta}{17 \cos \theta + 15 \csc \theta}$.
- 6. Prove that $\cos 20^{\circ} \cdot \cos 40^{\circ} \cdot \cos 60^{\circ} \cdot \cos 80^{\circ} = \frac{1}{16}$.
- 7. Express complex number (1 + i) in the polar from.
- 8. Evaluate $\lim_{x \to 2} \left[\frac{x^2 4}{\sqrt{x + 2} \sqrt{3x + 2}} \right]$.

PART – B

10.	(a) (b)	Determine equivalent resistance of three resistances connected is parallel. List limitations of Ohm's law.	7. 3
11.	(a) (b)	Compare primary and secondary cells and quote examples of each. Compute total voltage of three cells each of 5 volts when connected in (i) series, (ii) parallel.	4 6
12.	Desc	ribe charging and discharging of capacitor with neat diagrams.	10
13.	(a) (b)	Derive the equation of energy stored in an inductor. Compute total inductance of series combination of two inductances for additive flux.	5 5
14.	(a) (b)	Summarize AC behaviour of R-L circuit. Compute impedance of RLC circuit connected to 50 Hz supply with R = 10 Ω , L = 20 H and C = 10 μ F.	6 4
15.	powe (i) (ii)	sistance of 50 Ω is connected in series a capacitor of 100 F to the 100 volts/50 Hz er supply. Compute: Impedance Current Power factor	0
16.	(a) (b)	Develop the EMF equation of transformer. Calculate current and voltage ratios for the transformer of $N_1=20$ and $N_2=10$ turns.	7 3
17.	(a) (b)	Describe principle of operation of DC motor with neat diagram. List applications of isolation transformer.	7 3
18.	(a) (b)	Classify the resistors based on construction. Describe principle of operation of LDR.	5 5
19.	(a) (b)	List features of capacitor. List applications of inductors.	5 5



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I Semester Diploma Examination, Nov./Dec. 2015

BASIC OF ELECTRICAL & ELECTRONICS ENGINEERING

Time: 3 Hours [Ma	x. Marks: 100
Note: (i) Answer any six questions from Part-A.	
(ii) Answer any seven full questions from Part-B.	
PART – A	
 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.	1 T 41 5
9. Classify capacitors based on dielectric materials used and write one app	lication each. 5
	[Turn over

5

PART - B

- (a) Develop an expression for total resistance of three resistances connected in parallel.
 - (b) Compute current through the resistor 10Ω in the following circuit.

 $E_1 = \frac{10 \Omega}{-10 V}$ $E_2 = \frac{10 \Omega}{5 V}$

11. Explain constructional features of lead-acid battery.

10

12. Discuss series and parallel combination of capacitors.

Define inductive reactance and quality factor.

10

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

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 μ F with a 50 Hz supply AC source. Compute impedance.
- 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:
 - (i) impedance
 - (ii) current

(b)

- (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
- (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



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Register Number						

I Semester Diploma Examination, Nov./Dec. 2015

APPLIED SCIENCE

Tim	ne: 3 Hours] [Max	. Marks : 100
Note	e: (i) Answer any 10 questions from Section – A, each carries 02 mar	ks.
	(ii) Answer any 10 questions from Section - B, each carries 05 mar	ks.
	(iii) Answer any 05 questions from Section - C, each carries 06 mar	
	SECTION - A	
1.	Define fundamental and derived units.	
2.	Define least count of measuring instrument.	
	Windleson Physical Review (197 per	
3.	Define moment of force.	
4.	Write the conditions of equilibrium when number of co-planar parallel on a body.	forces acting
5.	Define elasticity.	
Э.	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.

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|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.
- Define surface tension. Mention factors which affect surface tension.
- Define C_p and C_V. Write the relationship between them.
- 7. Define conduction. Write the application of conduction.
- Explain Newton's formula for velocity of sound in air and apply Laplace correction to it.
- 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.
- Explain any two methods of polymerization.

SECTION - C

- 1. Describe an experiment to verify law of parallelogram of forces.
- 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.
- Describe an experiment to determine unknown frequency of tuning fork by absolute method using sonometer.
- 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.
- 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.

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I Semester Diploma Examination, Nov./Dec. 2015

ENGINEERING MATHEMATICS-I

Time: 3 Hours]

[Max. Marks : 100

Note:

- 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
$$A = \begin{bmatrix} 2 & -1 & 3 \end{bmatrix}$$
 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

3

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

3

3

Turn over

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

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

11. Prove that
$$\cos 100^{\circ} + \cos 80^{\circ} = 0$$
.

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

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

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

SECTION - B

Answer any 8 questions.

1. Solve for x using determinants.

$$x + y = 9$$
, $x - y + 3z = 2$ and $4y - 3z - 5 = 0$.

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

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

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

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

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

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

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.

10. If
$$A + B + C = \pi$$
, prove that $\tan 2A + \tan 2B + \tan 2C = \tan 2A \tan 2B \tan 2C$.

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

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.

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

- 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.
- 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.

Turn over

5. Simplify:

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

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

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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 $3A + 2B$.

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

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

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

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

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

7. Prove that
$$\sin \theta$$
. $\cos(90^{\circ} - \theta) + \cos \theta . \sin(90^{\circ} - \theta) = 1$.



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I Semester Diploma Examination, April/May-2017

BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING

Tim	e : 3 Hours J	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

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

3

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

3

10. Prove that $\frac{\sin 68^\circ + \sin 52^\circ}{\cos 68^\circ + \cos 52^\circ} = \sqrt{3}.$

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

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- 18. If A = (3, -4, 2), B = (-6, 8, 4), find the position vectors of A and B also find \overrightarrow{AB} vector and $|\overrightarrow{AB}|$.
- 19. Find the area of the parallelogram whose adjacent sides are $\overrightarrow{a} = 3i + 2j k$ and $\overrightarrow{b} = i + 2j + 3k$.
- 20. If $x = \log_7^9$, $y = \log_5^7$, $z = \log_3^5$, show that xyz = 2.
- 21. Evaluate cos 570°. sin 150° sin 330°. cos 390°.
- 22. If $\tan A = \frac{1}{2}$, $\tan(A + B) = \frac{7}{9}$, find $\tan B$.
- 23. Show that $\frac{1-\cos 2\theta + \sin 2\theta}{1+\cos 2\theta + \sin 2\theta} = \tan \theta$
- 24. Prove that $\cos 40^{\circ} + \cos 80^{\circ} + \cos 160^{\circ} = 0$.
- 25. Evaluate $\lim_{x \to 0} \left(\frac{\sqrt{1+x} \sqrt{1-x}}{x} \right)$.

SECTION-C

- 26. Solve for x, y & z from the equations 4x + y = 7, 3y + 4z = 5, 5x + 3z = 2 by Cramer's rule.
- 27. Find the inverse of A = $\begin{pmatrix} 3 & 1 & 2 \\ -2 & 1 & 1 \\ 3 & 0 & 2 \end{pmatrix}$.

Turn over

6

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

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

- 31. In a triangle ABC, Prove that $\sin A + \sin B + \sin C = 4\cos\left(\frac{A}{2}\right)\cos\left(\frac{B}{2}\right)\cos\left(\frac{C}{2}\right)$.
- 32. Evaluate $\left[i^{19} + \left(\frac{1}{i}\right)^{25}\right]^2$.
- 33. Evaluate $\lim_{n \to \infty} \left[\frac{(5-n^2)(n-2)}{(2n-3)(n+3)(5-n)} \right]$



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I Semester Diploma Examination, Nov./Dec. 2016

BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING

Tim	e: 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 = 7)	
	PART – A	
۱.	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	e. 5
7.	Explain the terms: (i) Turns Ratio	5
	(ii) Voltage Transformation Ratio	
8.	Define Resistance. List the applications of Resistors.	5
9.	List the features of L.D.R.	5
	[1 of 2]	Turn over

PART - B

10.	Anal	yse 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.	Thre	ee capacitors of capacitance 20 μF, 40 μF and 100 μF are connect					
	acro	ss 200 V supply:	(2+2+6=10)				
	(i)	Sketch the circuit					
	(ii)	Find total capacitance					
	(iii)	Find charge on each capacitor					
13.	Calc	Calculate X_L and Q offered by a coil of inductance 20 mH and R = 50 Ω for an					
	appl	lied voltage at 50 Hz frequency.	10				
14.		lyse the behaviour of RL series circuit for AC sinusoidal i/p grams.	with phasor				
15.		culate the inductive reactance and impedance in RLC series 20 mH $C = 20 \mu F$, $R = 100 \Omega$ and $f = 50 Hz$.	circuit with				
16.	Exp	plain the working of Auto-transformer and list its applications.	10				
17.	Der	ive the EMF equation for a transformer.	10				
18.	Brie	efly explain the classification of capacitors based on the dielectric r	material. 10				
19.	List (i) (ii)	t applications of : Inductors Capacitors	10				



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## 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.
- Define equilibrant.
- 4. Define moment of force.
- 5. Defining stress, write its S.I. unit.
- Define cohesive force.
- 7. List any four applications of capillarity.
- 8. Define specific heat of a gas at content volume.
- Defining heat, write its S.I. unit.
- Define Beat frequency.
- Define Resonance.
- 12. Write any two properties of Electro-magnetic waves.
- 13. Write any two uses of X-rays.
- Define Ore.
- 15. Write any two disadvantages of composite materials.

1 of 2 ]

Turn over

### SECTION - B

 $5 \times 10 = 50$ 

- Stating Lami's theorem, write line diagram and equations of Lami's theorem.
- 17. Draw neat diagram of screw gauge and name its parts.
- Explain stress-strain graph.
- 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.
- 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.

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**Code**: 15SC-01M

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

3

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

3

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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  $\overrightarrow{a} = 4i 2j 3k$  and  $\overrightarrow{b} = 2i 3j + 4k$ . 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.
- 19. If  $\vec{a} = i + j + 2k$  and  $\vec{b} = 2i j + k$ , then show that  $(\vec{a} + \vec{b})$  is perpendicular to  $(\vec{a} \vec{b})$ .
- 20. If  $x = \log_a bc$ ,  $y = \log_b ca$ ,  $z = \log_c ab$ , then prove that  $\frac{1}{1+x} + \frac{1}{1+y} + \frac{1}{1+z} = 1$ .
- 21. Find the numerical value without using trigonometric table/calculator 5 sin 120° · cos 330° sin 240° · cos 390°.
- 22. Prove that  $\frac{\cos 17^{\circ} + \sin 17^{\circ}}{\cos 17^{\circ} \sin 17^{\circ}} = \tan 62^{\circ}$ .
- 23. If  $\cos \alpha = \frac{3}{5}$  and  $\cos \beta = \frac{5}{13}$ , find the value of  $\sin (\alpha + \beta)$ .
- 24. Prove that  $\frac{1 + \sin 2A + \cos 2A}{1 + \sin 2A \cos 2A} = \tan (90^{\circ} A).$
- 25. Evaluate  $\lim_{x \to 0} \frac{\sin 4x \sin 2x}{\sin 6x + \sin 2x}$ .

### 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  $A = \begin{bmatrix} 3 & 2 \\ 4 & 5 \end{bmatrix}$ .

- 28. If A (2, 5, 7), B (3, 9, 4), C (-2, 5, 7) are three vertices of parallelogram, then find its area.
- 29. A pair of dice is thrown once. If the two numbers appearing are different, find the probability that sum of numbers is 6.
- 30. If  $\tan \alpha = 4/3$  and  $\alpha$  is acute, then find the value of  $\frac{2 \sin \alpha 3 \cos \alpha}{3 \sin \alpha + \cos \alpha}$ .
- 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.
- 33. Evaluate  $\lim_{x \to -3} \frac{x^2 + 4x + 3}{x^2 + 5x + 6}$



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

## APPLIED SCIENCE

	APPLIED SCIENCE				
Time : 3 Hours     Max. Marks : 10					
Note	<ul> <li>(i) Answer any 10 questions from Section – A, each carries 2 mark</li> <li>(ii) Answer any 10 questions from Section – B, each carries 5 mark</li> <li>(iii) Answer any 5 questions from Section – C, each carries 6 marks</li> </ul>	cs.			
	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			