FACULTY OF ENGINEERING
B.E. II – Semester (CBCS) (Supple.) Examination, Nov./Dec. 2018
Subject: Engineering Mathematics – II

Time: 3 Hours
Max. Marks: 70

Note: Answer all questions from Part A and Five questions from Part B.

PART – A (10x2 = 20 Marks)

1) Solve \( \frac{dy}{dx} = \frac{1}{e^{-y} - x} \)

2) Find the orthogonal trajectories of the family of curves \( r = c \theta^2 \)

3) Solve \( x^2 y'' + xy' - y = 0 \)

4) Find a particular integral of \( (D^3 + D)y = x^2 \)

5) Using power series method, find the general solution of \( y' = xy \) about the origin.

6) Evaluate \( \int_{-1}^{1} x^3 P_3(x) \, dx \)

7) Prove that \( B(m, n) = 2 \int_{0}^{\frac{\pi}{2}} x^m \cos^{n-1} x \, dx \)

8) Evaluate \( \int x^5 J_4(x) \, dx \) in terms of Bessel’s functions

9) Find \( L\{\sin 2t \cosh 2t\} \)

10) Obtain the inverse Laplace transform of \( \frac{e^{-px}}{s^2 + 1} \)

PART – B (50 Marks)

11. a) Solve \( xy' \, dx + \left( x^2 + 2y^2 + 2 \right) \, dy = 0, y(0) = 1 \)

b) Find the general solution of the Riccati’s equation

\( \frac{dy}{dx} = 3 y^2 + (1 + 6x) y + 3x^2 + x + 1 \) if \( y = x \) is a particular solution

12. a) Solve the initial problem \( y'' + 4y'' - 2y = 0, y(0) = 2, y'(0) = 2, y''(0) = -3 \)

b) Solve \( y'' + 4y' + 4y = e^{-2x} \sin x \) by the method of variation of parameters

contd...2
13. a) Prove that \( P_n(x) = \frac{1}{2^n n!} \frac{d^n}{dx^n} \left( x^2 - 1 \right)^n \left( x^2 - 1 \right)^n \)

b) Using the generating function of Legendre polynomial, prove that
\[ P_{2n}(0) = (-1)^n \frac{1, 3, 5, \ldots, (2n-1)}{2, 4, 6, \ldots, 2n} \quad \text{and} \quad P_{2n+1}(0) = 0 \]

14. a) Prove that \( \int_{-1}^{1} \left( 1 - x^2 \right)^n dx = \frac{2^{2n+1} (n!)^2}{(2n+1)!} \), \( n \) is a positive integer.

b) Express \( J_{-m}(x) \) in terms of sine and cosine functions.

15. a) Evaluate \( \int_{0}^{\infty} \frac{e^{-t} - e^{-3t}}{t} dt \)

b) Find \( L^{-1} \left\{ \frac{1}{s^2 (s^2 - 4)} \right\} \) using convolution theorem.

16. a) If the temperature of the air is 30\(^\circ\)C and the substance cools from 100\(^\circ\)C to 70\(^\circ\)C in 15 minutes, then find the time at which the temperature will be 40\(^\circ\)C.

b) Solve \( (D - 1)^2 y = e^x (x^2 + \cos 2x) \)

17. a) Prove that \( \frac{d}{dx} \left[ x^n J_n(x) \right] = x^n J_{n+1}(x) \)

b) Find \( L \{ f(t) \} \), where \( f(t) = \begin{cases} \frac{t}{4}, & 0 < t < 1 \\ 0, & 1 < t < 2 \end{cases} \) and \( f(t + 2) = f(t), t > 0 \)

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FACULTY OF ENGINEERING

B.E. II – Semester (CBCS) (Supple.) Examination, Nov./Dec. 2018

Subject: Engineering Physics – II

Time: 3 Hours  Max. Marks: 70

Note: Answer all questions from Part A and any Five questions from Part B.

PART – A (10x2 = 20 Marks)

1) Calculate the longest wavelength that can be analyzed by rock – salt crystal of spacing 2.5 Å in the first order.

2) Define space lattice. How it is helpful to describe a crystal structure.

3) What are ferrites?

4) Define critical transition temperature and critical field for superconductors.

5) Calculate the Hall coefficient of a specimen whose electrical conductivity is 2.12 ohm/m and charge carrier mobility is 0.3 m²/v.sec

6) Discuss the important applications of ferroelectric materials.

7) Distinguish between bulk, thin films and nano materials.

8) What are the applications of AFM?

9) Discuss the effect of surface to volume ratio in nano materials.

10) Mention the optical and magnetic properties of nano materials.

PART – B (50 Marks)

11. a) Distinguish solid materials based on band theory of solids
     b) Discuss the seven crystal systems in terms of lattice parametric consideration and type of Bravais lattice.

12. a) What are magnetic domains? Explain the Hysteresis loop of ferromagnetic material.
     b) Write a note on high temperature superconductors and their applications.

13. a) How the P-N junction is formed? Explain V-I characteristic graph of forward and reverse bias phenomenon in PN junction diode.
     b) How do you determine the dielectric constant by capacitance bridge method?

14. a) Explain the principle and applications of X-ray Fluorescence.
     b) Explain in detail about thermal evaporation technique to prepare thin films?

15. a) What are nano materials? Why do they exhibit different properties?
     b) Discuss the ball milling synthesis of nano materials.

16. a) Discuss the free electron theory of metals.
     b) Write a note on Type-I and Type-II superconductors? Explain their importance.

17. a) Explain the phenomenon of ferro electricity and discuss how dielectric constant of Barium Titanate changes with temperature.
     b) Describe the working of a thin film solar cell.

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FACULTY OF ENGINEERING
B.E. II-Semester (CBCS) (Suppl.) Examination, November /December 2018
Subject : Engineering Chemistry-II

Time: 3 Hours
Max. Marks: 70

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

PART-A (10x2 =20 Marks)
1 Define the terms (i) equivalent conductance and (ii) Molar conductance.
2 Represent glass electrode and mention its use.
3 Explain the concept of fuel cells
4 Differentiate primary and secondary batteries
5 What is pilling-Bed worth rule? Explain
6 Explain tinning method
7 What are the characteristics of a good fuel?
8 Why are gaseous fuel more advantageous than solid fuels?
9 What is layered composite? Provide one example of layered composite
10 Explain importance of “atom economy” with a suitable example.

PART-B (5x10=50 Marks)
11 a) At 298K, The solution of 0.1M KCl and 0.1M AgNO₃ gave the resistance of 337.6 and 397.9 ohms respectively. Calculate (i) the cell constant (ii) equivalent conductance of 0.1M Ag NO₃, given conductivity of 0.1M KCl = 1.286x10⁻³ S-cm⁻¹
b) Define the term Single electrode potential. How do you determine the electrode potential of Zn/Zn²⁺ using potentiometer? Explain.
12 a) Explain H₂-O₂ fuel cell with diagram and cell reaction
b) What are Lithium ion batteries? Explain its advantages and applications.
13 a) What is meant by electrochemical corrosion? Explain its mechanism.
b) Write a note on cathodic protection by impressed current method.
14 a) Calculate the volume of air required for complete combustion of 1m³ of gaseous fuel having the composition : CO=46%, CH₄=10%, H₂ = 4%, C₂H₂= 2.0%, N₂ = 1.0% and remaining being CO₂.
b) Explain the terms (i) Knocking (ii) Octane number (iii) Cetane number
15 a) Differentiate between fibre and particle-reinforced composites.
b) Explain the molecular ordering in liquid crystals and mention their applications.
16 a) Derive Nerst equation and explain its use.
b) Write a note on photovoltaic cells.
17 a) What are the various factors effecting rate of corrosion? Explain.
b) Explain ultimate analysis of coal and mention its significance.

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FACULTY OF ENGINEERING

B.E II-Semester (Suppl.) Examination, November / December 2018
BUSINESS COMMUNICATION AND PRESENTATION SKILLS

TIME: 3 Hours
Max. Marks: 70

Note: (i) Answer all questions from Part-A and any Five questions from Part-B
(ii) Answers to the questions of Part-A must be at one place and in the same order as they occur in the question paper
(ii) Missing data, if any, may be suitably assumed.

PART-A (20 Marks)

a. Choose the right option for the sentences given below. (1x2=2)

1. Which of the following is best explains downward communication?
   a. message sent from the board of directors to the lowest level of employees
   b. a message from a subordinate to a superior
   c. a message from a company officer to a company employee
   d. a message that follows along an organization's chain of command

2. Which of the following is a disadvantage of downward communication?
   a. Efficiency
   b. Case a delegation
   c. Clarity
   d. Support

b. Choose the right option for the sentences given below. (1x2=2)

1. To be a successful conversationalist one should be the workplace
   a. submissive
   b. assertive
   c. aggressive
   d. rude

2. "Tease" or "stress" questions are intended to judge
   a. the candidate's intelligence quotient
   b. how the candidate handles them
   c. the candidate's technical skill
   d. the candidate's stress level

c. State whether the following are true or false. (1x2=2)

a. The first objective in a group discussion is to act as a self-appointed leader of the group.

b. The group discussion evaluates the candidate's ability to argue with others.

d. Choose the right option for the sentences given below. (1x2=2)

1. The best way to apply for a job is to submit a resume that is
   a. full of personal information
   b. self-recommending
   c. specifically written for that particular job
   d. suitable for any job
2. A summary placed at the beginning of the CV acts as a
   a. preface
   b. statement of objectives
   c. synopsis
   d. letter of recommendation

e. **Match the following**
   
<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Bonding</td>
<td>a. asking questions to gain information</td>
</tr>
<tr>
<td>2. Experimenting</td>
<td>b. formal announcement of the relationship</td>
</tr>
<tr>
<td>3. Intensifying</td>
<td>c. get into a shared relational identity</td>
</tr>
<tr>
<td>4. Integrating</td>
<td>d. revealing themselves fully</td>
</tr>
</tbody>
</table>

f. **Fill in the blanks with appropriate words**
   a. Which quadrant of the Johari window reveals information about one’s secret dreams and ambitions_________________________
   b. In_________________________ stage team members work according to rules.

g. **Directions:**
   1. Use all the phrases/hints given
   2. Minimum words should be 50 otherwise your email cannot be validated
   3. Addressing and signing should be done as in the question given.
   4. Common grammatical rules, punctuation should be according to standard English.
   5. You can use your own phrases along with the phrases given below.

   **As an intern at ABC consulting Pvt.Ltd, write an email to your internship project Manager.**
   Mr. Ramesh, informing about the progress that you are making and some difficulties that your are encountering. Sign the email as Sharma.

   **Outline:**

h. **Write short notes on the following:**
   **Importance of Time Management**
   i. How is Persuasion Technique useful for you as an engineering student? Discuss with an example.
   j. Why is Group Discussion conducted in job selection? What are different traits that are observed during the Group Discussion?

**PART-B (10x5=50 Marks)**
11. Discuss Johari Window and its various quadrants giving suitable examples.
12. Elucidate different styles of communication? Which communication style do you think is healthy? Why?
13. Explain the differences between Delphi technique and nominal group technique in detail?

14. Write statement of purpose as a student who aspires to pursue MS in Computer Science at the Boston University.

15. Write a job application letter along with suitable resume to Sofsol Solutions, Bangalore applying for the position of a software engineer.

16. What are the ins and outs of a good and well rated group discussion?

17. As the Head, Department of English, RKCT, write a report to the Principal of the college on the feasibility of opening a new multimedia language laboratory in your department.

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FACULTY OF ENGINEERING

B.E (ECE) II-Semester (CBCS) (Suppl.) Examination, November / December 2018

Subject : Basic Circuit analysis

Time : 3 Hours

Max Marks : 70

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

Part – A (20 Marks)

1. Find \(V_x\) and \(I_x\) in the following Circuit?

2. Find the voltage between AB Terminals \(V_{AB}\) in the following circuit?

3. Find the incidence matrix of the following graph?

4. Explain briefly about power triangle?

5. In the following circuit find the condition for maximum power transfer when the load is resistive

6. Find 'h' Parameters of the following Two port network?

7. Derive the condition for symmetry in terms of 'Z' parameters?

8. Convert the following 'T' Network into \(\Pi\) - network
9. Find the resonant frequency of the following circuit?

10. Explain briefly about zero state response?

PART B (50 Marks)

11. a) Find $V_1$ and power supplied by the dependent source?

11. b) Find the Thevenin's equivalent of the following circuit?

12. a) Find the condition for maximum power transfer and also find maximum power delivered to the load in the following circuit when the load is pure resistive?

12. b) Prove that maximum energy stored in capacitor is $CV^2$

13. a) For the circuit determine the value of $V_2$ such that the current in the $(2+j3)\Omega$ impedance is zero?

13. b) Find the Norton's equivalent of the following circuit?
FACULTY OF ENGINEERING
B.E. II- Semester(Supply) Examination, November / December 2018

Subject: Electrical Technology

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. What is the purpose of yoke in a DC machine. [2]
2. Give the significance of back emf in a DC motor. [2]
3. In three phase system, what do you mean by balanced load. [2]
4. Write the relation between the line and phase voltages and currents in a balanced delta connected load. [2]
5. Draw the vector diagram of 3-phase alternator for lagging p.f load. [2]
7. What is the purpose of laminating the core in a transformer? [2]
8. How transformers are classified according to their construction? [2]
9. A 3-phase, 6 pole, 50 Hz induction motor has a slip of 4% at full load. Find the synchronous speed and the frequency of rotor current at full load. [2]

PART – B (50 Marks)

11. a) Explain simple lap winding for DC machine with help of neat schematic diagram. [5]
   b) A 6 pole, wave-wound DC generator has 75 conductors & 12m Wb flux/pole. Determine the speed of the armature if the induced emf is 400V. What will be the speed when it is lap wound and generating 400V? Armature reaction weakens the field by 3%. [5]

12. a) Derive the torque equation of a DC motor. [5]
   b) Explain the speed control of DC shunt motor with help of neat circuit diagrams. [5]

13. a) Show with a relevant phasor diagram how power factor can be measured by two wattmeter method in 3-phase system. [5]
   b) Three similar coils each having resistance of 12 Ω and reactance of 10 Ω are connected in star across a 420 V, 3 phase supply. Determine the total power and reading of each wattmeters connected to measure power. [5]
14. a) With sketches explain the constructional features of salient pole and non-salient pole alternators. Where are the two types used. [5]  
b) A 3-phase, 4 pole, star connected alternator revolves at 1500 rpm. The stator has 90 slots and 8 conductors per slot. The flux per pole is 0.06 Wb. Calculate the line voltage generated by alternator, if the winding factor is 0.97. [5]

15. a) Explain the principle of operation of auto transformer with help of neat circuit diagram. [5]  
b) Explain OC and SC tests conducted on 1-phase transformer with help of neat circuit diagrams. [5]

b) Explain the constructional detail and principle of operation of shaded pole motor with help of neat schematic diagram. [5]

17. Write short notes on the following: (10)  
a) Auto-transformer. 
b) Production of rotating magnetic field. 
c) Synchronous impedance.