OUTCOME BASED CURRICULUM-2016

Workshop
On

Question Paper Setting and Model Answer

30th August, 2016

GOVERNMENT POLYTECHNIC, NAGPUR.

(An Autonomous Institute of Govt. of Maharashtra)

Curriculum Development Cell

I N D E X

1. Outcome Based Curriculum
2. Blooms Taxonomy
3. Good Question Paper
4. Model Question Paper
5. Model Answer
6. Examples
7. Do's and Don'ts
8. Model Test Paper
9. Good Question Papers for reference
10. References

❖ **Material in this booklet compiled and written by-**

1. Dr. S.W. Rajurkar
   In-charge Curriculum Development Cell,
   Government Polytechnic, Nagpur
2. Mr. G.V.Gotmare
   In-charge Curriculum Development Cell,
   Government Polytechnic, Nagpur

1. OUTCOME BASE CURRICULUM

❖ Background:

Government Polytechnic, Nagpur is implementing the outcome base curriculum from the academic year 2016-17.

There are some boards like Gujarat Technological University, Board of Technical Examinations, Bengaluru, Karnataka and State Board of Technical Education, Kerala state in India running outcome based curriculum. Government Polytechnic, Nagpur adopted the OBE approach for curriculum design because, National Board of Accreditation (NBA) focusing on the adoption of OBE approach for all engineering programmes in India from 2013. Programmes to be accredited from 2013 will have to be based on OBE approach.

In simple statement-

"No OBE= No Accreditation"

NBA adopted Outcome based Model because, OBE is "Learner Centric" rather than "Teacher Centric"

❖ Outcome Based Education Philosophy

Outcome based education (OBE) is an education approach that focuses on the graduate attributes or outcomes after completing an academic programme. Outcome based approach means knowing what you want to achieve and then taking the steps to do so.

Some Benefits of OBE are-

1. More directed and coherent curriculum.
2. Graduates (students) will be more "relevant" to industry and other stakeholders.

❖ KEY constituents of OBE

Figure 1 shows the key constituent of OBE

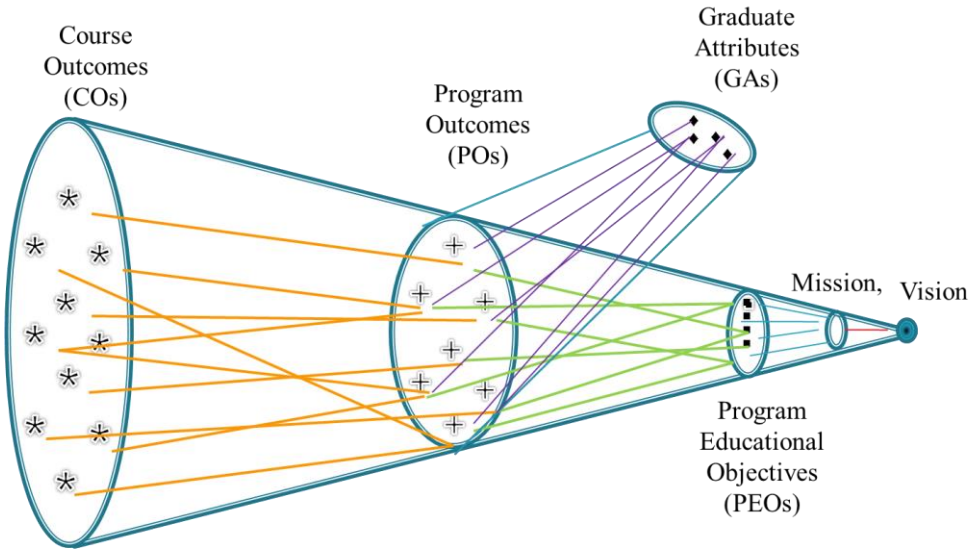


Fig 1 KEY constituents of OBE

1. **Vision**
   Vision is a picture of the future you seek to create, described in the present tense, as if it were happening now. It shows where we want to go, and what we will be like when we get there.
2. **Mission**
   Mission statement defines what an institution is, why the institution exists, its reason for being. It defines what we are here to do together.
3. **Graduate Attributes (GA's)**
   Graduate attributes are the **qualities**, **skills** and understandings a university community agrees its students should develop during their time with the institution. These attributes include but go beyond the disciplinary expertise or technical **knowledge** that has traditionally formed the core of most university courses. WA (Washington Accord) defines 12 GA's for Engineering Graduates.
4. **Program Outcomes (PO's)**
   Programme Outcomes (POs) describe what students should know and be able to do at the end of the programme. They are to be in line with the graduate attributes (GAs) of NBA. PO's are to be specific, measurable and achievable. POs transform the PEOs into specific student performance and behaviors that demonstrate student learning and skill development.
   Following are POs (Ten) for all programs as per NBA guidelines-

POs(new) given by NBA
1. **Basic Knowledge:** Ability to apply knowledge of basic Mathematics, Science and Engineering to solve the engineering problems
2. **Discipline Knowledge:** Ability to discipline specific knowledge to solve core and/or applied engineering problems
3. **Experiments and Practice:** Ability to plan and perform experiments and practices and use the results to solve engineering problems
4. **Engineering tools:** Apply appropriate technologies and tools with an understandings of limitations
5. **The Engineer and Society:** Demonstrate knowledge to assess the societal, health, safety, legal and cultural issues, and the consequent responsibilities relevant to engineering practice.
6. **Environment and Sustainability:** Understand the impact of engineering solutions in societal and environmental context, and demonstrate knowledge and need for sustainable development.
7. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.
8. **Individual and Team work:** Function effectively as an individual, and as a member or leader in diverse/ multidisciplinary teams.
9. **Communication:** An ability to communicate effectively.
10. **Life-long learning:** Recognize the need for, and have preparation and the ability to engage in independent and life-long learning in context of technological changes.

5. Program Educational Objectives (PEO's
   The Program Educational Objectives (PEOs) are broad statements that describe the career and professional accomplishments that the programme is preparing graduates to

accomplish. PEOs should be measurable, appropriate, realistic, time bound and achievable.

6. Program Specific Objectives (PSO's)
   No definition for PSO's is found in literature. According to Dr. B.L. Gupta, NITTTR, Bhopal, PSO's are the broad statements of Program specific objectives as per the local needs.
7. Course Outcomes (CO's)
   Course Outcomes (COs) are clear statements of what a student should be able to demonstrate upon completion of a course. They should be assessable and measurable knowledge, skills, abilities or attitudes that students attain by the end of the course. It is generally a good idea to identify between four and seven. All courses in a particular programme would have their own course outcomes. These course outcomes are designed based on the requirement of the programme outcomes (POs). Each course outcomes are mapped to a relevant PO and they are mapped to the programme educational objectives (PEO). The teaching learning process and assessment methods are to be designed in such a way to achieve the COs. It is important to ensure that the student is able to acquire the knowledge or skill required.

   ❖ **Course Objectives Vs Course Outcomes**
   Following table clarifies the difference between Course Objectives Vs Course Outcomes

Course Objectives	**Course Outcomes**
Describe what a teacher needs to teach, and what needs to be planned to teach.	Describe what students should demonstrate upon the completion of a course.
Example- At the end of the course, students will understand the types of wiring system.	**Example-** At the end of the course, students will be able to choose a suitable wiring system for particular installation.

8. Specific Learning Outcomes (SLO's) or Learning Outcomes (LO's)
   Learning outcomes (LO's) or Specific Learning Outcomes (SLO's) are "*statements of what is expected that the student will be able to do as a result of learning the activity*". (Jenkins and Unwin, 2001); i.e at the end of each unit or chapter. SLO's should also be assessable and measurable knowledge, skills, abilities or attitudes that students attain by the end of the unit

2. BLOOM's TAXONOMY

❖ Introduction

Benjamin Bloom (1948) Objectives are the statements which describe the expected learning outcome. Such statements enable teachers to plan instructional process with appropriate resources. These objectives also provide a direction to frame proper questions to assess the learning outcome. During last decade there has been research on cognitive approach in psychology. This approach is based on biological structure of brain and meta-cognitive knowledge dimension. Important elements of this approach which form basics of learning are explained below.

❖ Domains of Learning:

Learning is a process by which students develop relatively permanent change in mental associations through experience. This is how learning is defined by cognitive psychologists. Behavioral; psychologists define learning as a relatively permanent change in behavior.
There are following domains of learning:

A: Cognitive Domain relates to intellectual skills or abilities
B: Affective Domain relates to emotions, feelings, likes, dislikes etc.
C: Psychomotor Domain relates to manipulative skills of hands, legs. Eye-hand coordination in Engineering & Technology courses, endeavor is made to design curriculum with a focus on development of cognitive skills through classroom teaching. Where as manipulative (psychomotor) skills are developed in workshops, laboratories & seminars where students work individually or in a group. Development of affective skills attitudes and value is supposed to be acquired through projects and co curricular activities. These are also developed from the work culture or institutions.

How far a student has developed these abilities/skills especially from cognitive and psychomotor domains is assessed on the basis of suitable examinations. When classroom and laboratory teaching is viewed in this light, evaluation becomes an integral part of teaching – learning process.

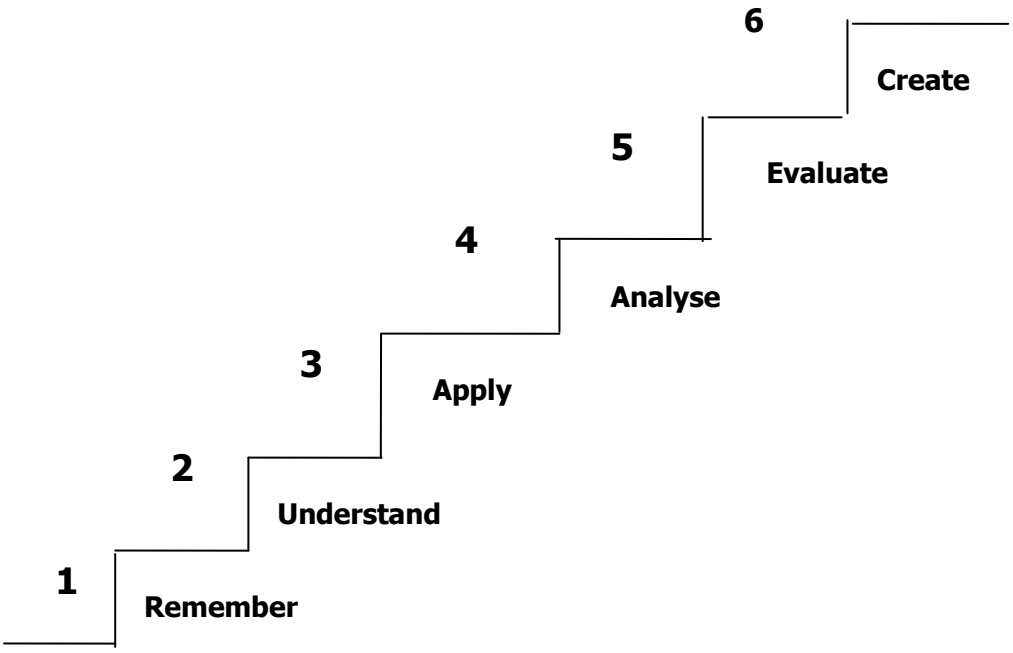
❖ LEVELS OF LEARNING:

Question paper is a tool/ instrument designed to test the extent of learning of the student. Various questions set in a question paper should assess the abilities of students to respond to level of learning. Dr. Bloom a German educationist classified levels of learning in cognitive domain for the purpose of writing objectives and assessment. Dr. Bloom's revised taxonomy is based on cognitive psychology and is two dimensional. First dimension is cognitive process dimension ad other is knowledge dimension. Details of these two dimensions are given below.

❖ Cognitive Domain:

Dr. Benjamin Bloom (1956) analysed questions asked in various examinations in American situation and proposed a hierarchical arrangement of instructional objectives (Intellectual abilities) tested by these questions.
The lowest level of cognitive learning achieved by a student is demonstrated by the recall of information that the student retrieves from his long term memory. So, the storage and retrieval of specific facts, concepts, principles, laws, definitions, properties, procedures etc. directly from memory was classified as a knowledge level objective. Thus questions testing memory of

students were treated as at the lowest level of the hierarchy of intellectual abilities. The other levels of hierarchy proposed by Dr. Bloom in 1956 relate to the degree of information processing required in the brain needed to provide answer to a question. The various levels in the cognitive hierarchy proposed by Dr. Bloom in 1956 and further revised in 2001 are given below in the diagrammatic
form.



Following are the details of each level which indicate the general and specific objectives. Further appropriate verbs are given which are useful in setting good questions. In this table only four levels are considered for diploma students.

Description of the Major Levels in the cognitive Domain (Bloom's Taxonomy)	Illustrative General Instructional Objectives	Illustrative verbs for stating specific learning outcomes
Remember – Knowledge is defined as the remembering of previously learned material. This may involve the recall of a wide range of material, from specific facts to complete theories, but all that is required to mind of the appropriate information. This represents the lowest level of learning outcomes in the cognitive domain	Knows common terms, specific facts, basic concepts, principles, methods & procedures	Define, describe, identify label, list, match, name, outline, reproduce, select, state
Understand – This is defined as the ability to grasp the meaning of material. This may be shown by translating material from one form to another (words or numbers) by interpreting material (explaining or	Understands fact, principles Interprets verbal material, Interprets charts, tables, graphs.	Convert, distinguish estimate, explain, extend, generalize, give examples;

summarizing), and by estimating future trends (predicting consequences or effects). Draw sketches these learning outcomes go one step beyond the simple remembering of material and represent the lowest level of understanding.	Translates verbal material to mathematical formula. Estimates consequences implied in data. Justifies methods & procedures.	infer, paraphrase, predict, rewrite, summarize, draw labeled sketches.
Apply – Application refers to the ability to use learned material in new and concrete situations. This may include the application of such things as concepts, principles, rules, methods, laws and theories. Learning outcomes in this area require a higher level of understanding than those under the level described earlier.	Applies principles to new situations. Applies theories to practical situations. Solves mathematical problem. Construct charts, graphs Demonstrates correct usage of a procedure	Change, compile, demonstrate, discover manipulate, modify operate, predict, prepare, produce, show, solve, use.
Analyze – Analysis refers to the ability to break down material into its component parts so that its organizational structure may be understood. This may include the identification of the parts, analysis of the relationship between parts, and recognition of the organizational principles involved. Learning outcomes here represent a higher intellectual level than "understand" and apply because they require an understanding of both the content and the structural form of the material.	Recognizes unstated assumptions and logical fallacies in reasoning. Distinguishes between facts and inferences. Evaluates relevance/ adequacy of data.	Breakdown, diagram, differentiate, discriminate, distinguish, identify illustrate, infer, outline, point out, relate, select, separate, subdivide.

❖ **Categories of Knowledge Dimension**

After considering the various designations of knowledge types, especially developments in cognitive psychology that have taken place since the original framework of Bloom's taxonomy, knowledge is categorised in 4 types – Factual , Conceptual, Procedural and Meta-cognitive.

Factual Knowledge (A) is knowledge of discrete, isolated content elements. It includes knowledge of terminology and knowledge of specific details and elements. In contrast,

Conceptual Knowledge (B) is knowledge of "more complex, organised knowledge form". It includes knowledge of classifications and categories, principles and generalizations and theories, models and structures.

Procedural Knowledge (C) is "knowledge of how to do something". It includes knowledge of skills and algorithms, techniques and methods, as well as knowledge of criteria used to determine and/or justify "when to do what" within specific fields and disciplines.

Meta-cognitive knowledge (D) is "knowledge about cognition in general as well as awareness of and knowledge about one's own cognition. It encompasses strategic knowledge, knowledge about cognitive tasks, including contextual and conditional knowledge; and self-knowledge".

Assessment is required to be done on the basis of categories of knowledge and levels of learning. Table below indicates the two dimensional grid based on Blooms Taxonomy for setting questions.

Knowledge Dimension	COGNITIVE PROCESS DIMENSION			
	1 Remember	2 Understand	3 Apply	4 Analyze
A. Factual Knowledge				
B. Conceptual Knowledge				
C. Procedural Knowledge				
D. Meta-cognitive Knowledge				

1. **Remember Level**- Retrieve relevant knowledge from memory.
Recognizing /Identifying-Locating knowledge in long term memory that is consistent with presented material. (e.g.Recognize the dates of important events in Indian history)
Recalling/Retrieving -Retrieving relevant knowledge from long term memory. (e.g. Recall the dates of important events Indian history)

Examples

1. Define Newton's II law of motion.
2. State unit of force.
3. State meaning of following symbols.
4. Define- 'Super Conductivity'.
5. What is transition temperature?
6. Name the tool used;
   i) To prepare a hole in wall using hammer.
   ii) To cut PVC conduit pipe.
7. Suggest the material for the following.
   i) Standard resistance
   ii) Switch terminals
8. State the meaning of following terms.
   i) MCB
   ii) ELCB
9. Identify the following BIS symbols of electrical accessories.
   i)
   ii)

10. Match the Pairs.

Column 'A'	Column 'B'
(A) Conducting Material	(1) 10^{0} to 10^{2} ohm-m
(A) Insulating Material	(2) 10^{12} to 10^{12} ohm-m
	(3) 10^{-8} to 10^{-6} ohm-m

2. Understand Level - Construct meaning from instructional messages, including oral, written and graphical communication.

- **Interpreting** -Changing from one form of representations (e.g. Paraphrasing, numerical to another(e.g. verbal)(e.g. Paraphrase Representing, important speeches and documents.) translating
  1. Interpret a given graph/table/circuit/map/drawing/mechanism
  2. Suggest modifications/corrections in graph/table/circuit etc.
  3. Fill in the blanks or missing elements of a table/circuit graph.

- **Exemplifying** - Finding a specific example or illustration of a instantiating concept or principle (e.g. Give examples of various artistic painting styles.
  1. State the rule/law/principle/theory behind ----
  2. Give two examples of ------- (a vector quantity)

- **Classifying** - Determining that something belongs to a category (e.g. concept or principle) (e.g. Classify observed or described cases of mental disorders)
  1. From the following materials/components/tools classify ------(having common characteristics/properties/features)
  2. Which of the following is/are not -----? State reasons

- **Summarizing**-Abstracting a general theme or major point(s) (e.g. Write a short summary of the events)

- **Inferring**-Drawing a logical conclusion from presented information (e.g. In learning a foreign language infer grammatical principles from examples)
  1. State the effect of ----(doing or not doing something) on -----
  2. State consequences of providing/not providing ------
  3. What will happen if --- (certain thing is done/provide) in -----?
  4. What will happen if ----- (something is absent/not done) in -?
  5. Predict what will happen if ---- (a particular process is modified/changed/altered).
  6. What will happen if ---- is substituted for -----?

- **Comparing**-Detecting correspondences between two ideas objects, and the like (e.g. Compare historical events to contemporary situations)
  1. Compare ---- and ---- on the basis of ----
  2. State points of similarity between ---- and ----
  3. What is the relation between ----- and -----
  4. Write two/three points of difference between --- and ---
  5. How is ---- different from ----?

6. State items on which ---- differs from ----
7. Distinguish between --- and --- on the basis of ---
8. What is the significance (importance of ---- in ----?

- **Explaining-** Constructing a cause-and-effect model of a system (e.g. Explain the causes of important 18th century events in France)
  1. What is the reason for -----?
  2. Why is ---- provided in/on ----?
  3. State the causes of ----
  4. Why is ---- NOT provided in/on ----?
  5. Why you do (or don't do) ----(a certain activity/action)----?
  6. Give (State) reasons why ----
  7. What is the need for/purpose behind/objective of ----?

3. Apply Level- Carry out or use a procedure in a given situation.

- **Executing** - Applying a procedure to a familiar task (e.g. one whole number by another whole number, both with multiple digits)
  1. Describe the method ----
  2. State sequential steps to start a (given) machine
  3. Following actions were performed in starting a (centrifugal) pump. ---- Arrange them in proper sequence. Justify your answer.
  4. To conduct a (certain) test, what procedure/method will you use? State reasons.
  5. What actions (sequence of actions) are necessary to prevent -------- (something from happening)?
  6. What sequential actions are necessary to protect -----(a certain process/machine)?
  7. State precautionary measures to avoid ----------

- **Implementing** -Applying a procedure to an unfamiliar task (e.g. Use Newton's Second Law in situations in which it is appropriate.
  1. Distinguish between the two methods (procedures) of recording observations in a level book.
  2. State various points you will check before (concreting) procedure is started.
  3. Which of the following methods need a) More / less time b) more / less manpower c) more / less energy consumption
  4. What are the conditions (restrictions) under which ---- (a particular method) is adopted?
  5. What limits the use of ---- (a certain procedure/method)?
  6. When/how/where ---- (a method) is used?
  7. What are the risks involved in ---- (doing/not doing something)?
  8. Which are the critical factors in ensuring safety of ---- (in a certain method/running of machine)?
  9. Which conditions have to be satisfied to ensure ----(desired results/output/accuracy from a certain procedure/method of operating a machine)?
  10. How will you detect (presence/absence of) ----?
  11. How will you manipulate ---- ?

12. How will you rectify/modify/diagnose ----(certain faults / defects)?

4. Analyze Level

- **ANALYZE -** Break material into constituent parts and determine how parts relate to one another and to an overall structure or purpose.

- **Differentiating -**Distinguishing relevant from irrelevant parts or important from unimportant parts of presented material. (e.g. Distinguish between relevant &irrelevant numbers in mathematical world prob.
  1. State criteria for selecting/rejecting -----.
  2. Why is ---- preferred to ---- ?
  3. What is the alternative for ---- ?
  4. What is the basis for preferring ---- to ---- ?
  5. What is the substitute for ---- ?
  6. What are the underlying assumptions in ----?

- **Organizing -** Determining how elements fit or function within a structure (e.g. Structure evidence in a historical description into evidence for an against a particular historical explanation)
- **Attributing-**Determine a point of view, bias, values, or intent underlying presented material (e.g. Determine the point of view of the author of an essay in terms of his or her political perspective

3. GOOD QUESTION PAPER

- **Characteristics of good question paper**

Standard of any examination depends upon quality of question paper. A question paper can be called a good question paper if it possesses the following essential characteristics.

1. Validity
2. Reliability
3. Objectivity
4. Usability

1. Validity

Validity is the most important characteristic of an evaluation program, for unless a question paper is valid it serves no useful function. Validity means truth-fullness of a question paper. It means to what extent the question paper measures that, what the paper setter intends to measure. The content validity is related to the extent to which the question paper confirms to the curriculum content and the predetermine objectives. This validity is ensured by designing question paper that matches with the specification table, which contains content matter to be tested and the cognitive levels at which this content is to be tested.

There are some factors about which we are alert and can avoid easily. But there are some factors about which we are ignorant and it makes the test results invalid, for their intended use.

Following are the some points which affect the validity of question paper; these should be avoided while setting question paper: (http://www.yourarticlelibrary.com/education/test/top-4-characteristics-of-a-good-test/64804/)

1 Unclear directions to the students to respond the questions.
2 Difficulty of the reading vocabulary and sentence structure.
3 Too easy or too difficult questions.
4 Ambiguous statements in the question paper.
5 Inappropriate questions for measuring a particular outcome.
6 Inadequate time provided to solve the questions.
7 Length of the question paper is too short.
8 Questions not arranged in order of difficulty.
9 Identifiable pattern of answers.

2. Reliability

The dictionary meaning of reliability is consistency, dependence or trust. In measurement reliability is the consistency with which a question paper yields the same result in measuring whatever it does measure. A score is called reliable when we have reason for believing the score to be stable and trust-worthy.

Factors that influence Reliability (http://www.education.com/reference/article/factors-influence-reliability/)

1. **Test length.** Generally, the longer a test is, the more reliable it is.
2. **Speed.** When a test is a speed test, reliability can be problematic. It is inappropriate to estimate reliability using internal consistency, test-retest, or alternate form methods. This

is because not every student is able to complete all of the items in a speed test. In contrast, a power test is a test in which every student is able to complete all the items.

3. **Group homogeneity**. In general, the more heterogeneous the group of students who take the test, the more reliable the measure will be.
4. **Item difficulty.** When there is little variability among test scores, the reliability will be low. Thus, reliability will be low if a test is so easy that every student gets most or all of the items correct or so difficult that every student gets most or all of the items wrong.
5. **Objectivity.** Objectively scored tests, rather than subjectively scored tests, show a higher reliability.
6. **Test-retest interval.** The shorter the time interval between two administrations of a test, the less likely that changes will occur and the higher the reliability will be.
7. **Variation with the testing situation.** Errors in the testing situation (e.g., students misunderstanding or misreading test directions, noise level, distractions, and sickness) can cause test scores to vary.

3. Objectivity

Objectivity is an important characteristic of a good test. It affects both validity and reliability of test scores. Objectivity in testing is defined as "the extent to which the instrument is free from personal error (personal bias), that is subjectivity on the part of the scorer".

Objectivity is opposite to subjectivity.

The element of subjectivity can be substantially reduced and objectivity improved, if the following steps are taken.

1 Designing an assessment scheme for a course.
2 Developing specification table for question paper indicating distribution of marks for different topics and level.
3 Preparing a format of question paper showing distribution of topic in different question, and indicating types of questions for abilities to be tested.
4 Designing question paper as per specification table.
5 Editing question paper so that it meets all the criteria and confirm to the specification table.
6 Developing scheme of marking for the answers to supply type questions (i.e. questions which make students to provide answer in sentences/ figural/graphical form). This is the most necessary requirement for reducing subjectivity.

4. Usability

The test must have practical value from time, economy, and administration point of view. This may be termed as usability.

The examination system should satisfy the following practical requirements.

1 The system is economical from the point of view of both money and time.
2 The system should be easy for administration and marking.
3 The system should be simple and properly understood by the all concerned.

❖ **Specification Table**

Specification table is a blue print for setting question paper. It is useful for designing a valid question paper. In OBE 2016 curriculum; specification table is provided for question paper table as well as student; which shows the level wise cognitive process dimensions.

The specification table for EE301E Basic Electrical Engineering is given below for the reference.

Unit No.	**Units**	**Levels from Cognition Process Dimension**			**Total Marks**
		R	**U**	**A**	
01	Electrical Safety	00(02)	04(00)	00(00)	**04(02)**
02	Fundamentals of Electricity	06(02)	08(08)	06(00)	**20(10)**
03	DC Circuits	02(00)	04(00)	06(06)	**12(06)**
04	Electrostatics	02(00)	06(04)	00(00)	**08(04)**
05	Magnetism and Electromagnetism	06(04)	04(08)	06(00)	**16(12)**
06	AC Fundamentals	02(00)	08(00)	00(06)	**10(06)**
	Total	**18(08)**	**34(20)**	**18 (12)**	**70 (40)**

❖ **Format of Question Paper**

Theory term end examination question paper will be of 70 marks. There will be 20 marks for the progressive test conducted during the semester. (Two test to be conducted and average marks of two tests are given.) And 10 marks will be on the assignments given by the teacher to the students on theory content of the course.

All theory term end examination papers excluding on line examination papers should have following mark distribution.

- There will be six questions in each theory paper.
- Question 1 will be of 10 marks and Question 2 to 6 will be of 12 marks each.
- Question 1 will have seven bits of 2 marks each and student will have to attempt any 5.
- Question 2, 3, 4 will have five bits of 4 marks each and student will have to attempt any 3.
- Question 5, 6 will have three bits of 6 marks each and student will have to attempt any 2.
- Thus the students will have to solve questions of 70 marks out of 110 marks.

❖ **Question Paper Profile**

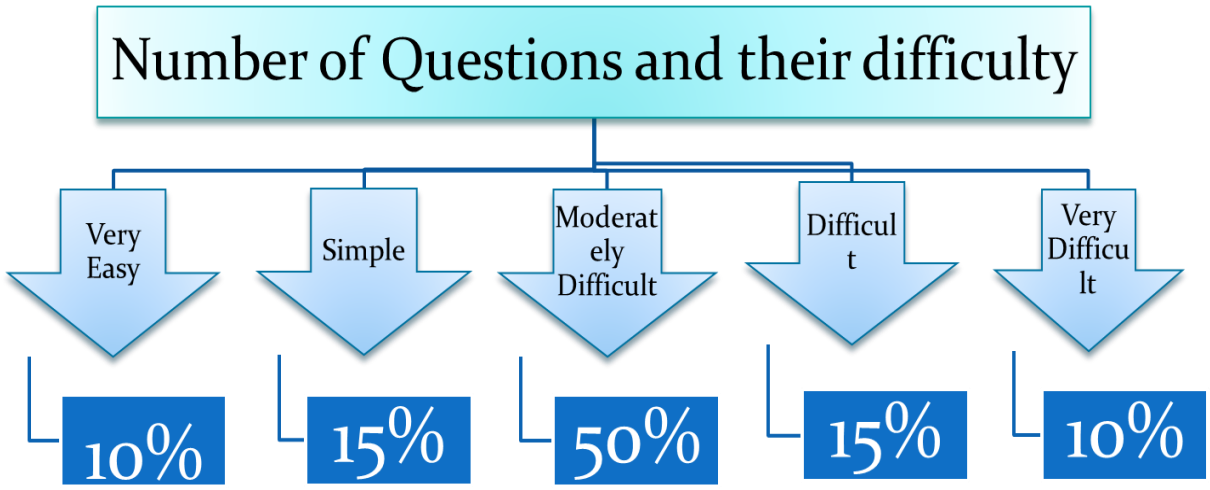
Question paper profile (QPP) is the steps to words the step of e-governance. In future we can generate the question paper using computer program with the help of QPP and question bank on each bit of QPP. QPP is also the ready reckoner to the setter for setting questions on different levels of cognitive domain and topics.

For reference QPP of EE301E Basic Electrical Engineering is given below.

Q. No	Bit 1			Bit 2			Bit 3			Bit 4			Bit 5			Bit 6			option
	T	L	M	T	L	M	T	L	M	T	L	M	T	L	M	T	L	M	
01	2	R	2	3	R	2	4	R	2	5	R	2	6	R	2	1	R	2	5/7
	2	R	2																
02	2	R	4	1	U	4	2	U	4	2	U	4	2	U	4				3/5
03	5	R	4	2	U	4	3	U	4	4	U	4	5	U	4				3/5
04	5	U	4	6	U	4	6	U	4	5	U	4	5	R	4				3/5
05	4	U	6	2	A	6	3	A	6										2/3
06	3	A	6	5	A	6	6	A	6										2/3

❖ **Important Tips For Setting Question Paper**

It is suggested that the question writer should use his/her judgment in assigning difficulty value to each questions. Following scale should guide you to set questions at different difficulty levels.



- Write simple, straight forward, precise wording.
- Start with proper action verbs which call for specific action on the part of students.
- Write unambiguous questions.
- Write short and simple sentences (avoid complex sentence structure)
- Provide full details/data required for correct answer.
- Give properly drawn correct figural data which gives clarity to the question.
- Test higher intellectual abilities from the cognitive process dimension e.g. understand, apply, analyze etc.
- Make students to think, before they can answer.

- Do not pose questions like “write short note on ---------“.
- Use sketches/figures/graphs wherever possible; Instead of describing the question, situation or event and making it a lengthy question. Remember that one sketch/figure is equivalent to 100 words.
- Draw sketches neatly. See that they are complete and there are no technical mistakes in the drawing. If there are important dimensions, they should be properly shown. Sketches should preferably be of such size as will look appropriate to the size of the normal question paper of A4 size. A thumb rule is that you keep the size not more than 10cm x 10cm.
- Refer frequently learning material provided to you; for framing different types of questions.
- Use standard text books. Make yourself sure about the final answer you expect. Make use of your personal collection of questions/question papers.

4. MODEL QUESTION PAPER

GOVERNMENT POLYTECHNIC, NAGPUR.

(An Autonomous Institute of Govt. of Maharashtra)

Term End Examination- 16 ODD

Program : Diploma in Electrical Engineering

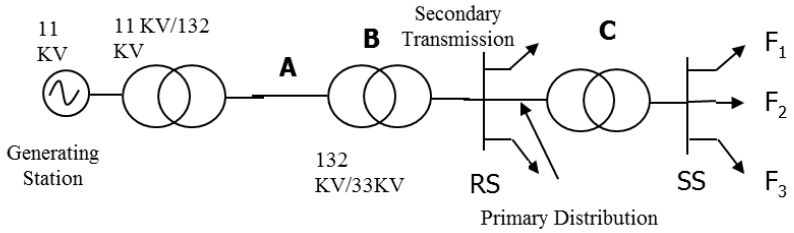
Course Code : EE301E **Course Name : Basic Electrical Engineering**

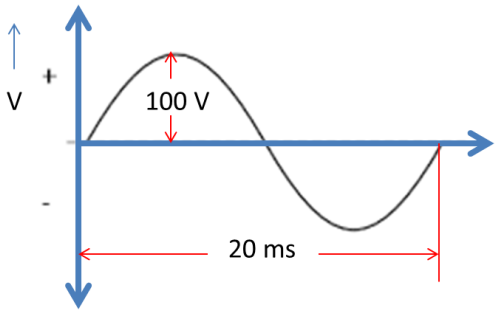
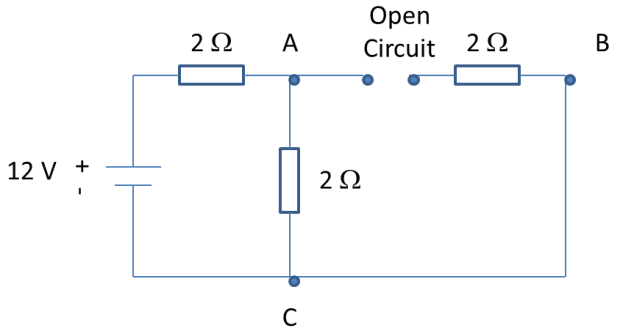
Time : 3 Hours **Max. Marks : 70**

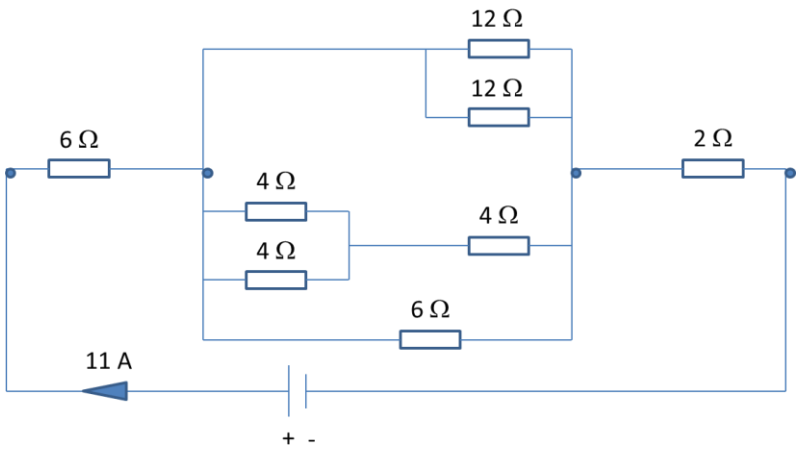
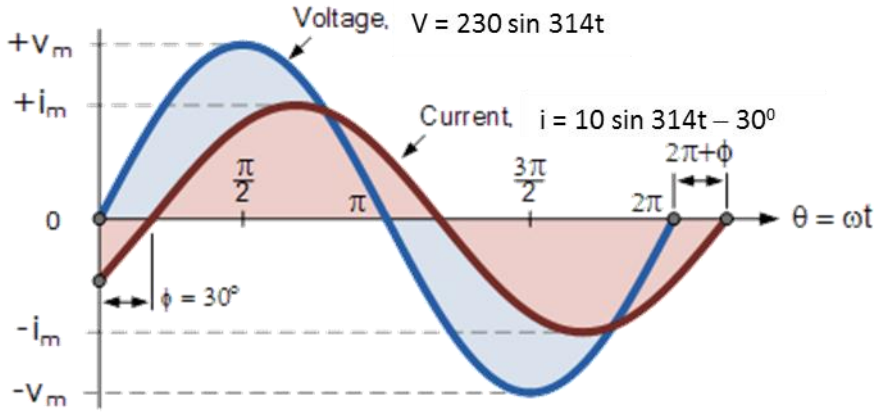
Instructions:

1. All questions are compulsory
2. Illustrate your answers with neat sketches wherever necessary
3. Figures to the right indicate full marks
4. Use of non-programmable calculator is permissible
5. Assume suitable data if necessary
6. Preferably, write the answers in sequential order.

Q1		**Attempt any FIVE**	**(10)**
2R2	a)	State relation between followings i. Metric H.P and watts ii. Kwh and Kcal	
3R2	b)	State any two properties of parallel resistive circuit.	
4R2	c)	State any one application of following types of capacitor i. Electrolytic capacitor ii. Air capacitor	
5R2	d)	State Faraday's Laws of electromagnetic induction.	
6R2	e)	Define following terms related to AC fundamentals i. Frequency ii. Cycle	
1R2	f)	Identify following electrical safety signs i.  ii. 	
2R2	g)	Draw BIS symbols as per IS:2032 for the followings i. Fuse ii. Resistance	
Q2		**Attempt any THREE**	**(12)**
2R4	a)	Define resistance. State its unit. State the factors on which the resistance of material depends.	
1U4	b)	Describe Schaefer's method of artificial respiration.	
2U4	c)	Compare EMF, Terminal voltage and Voltage drop. State relation	

		between them.	
2U4	d)	Classify following materials into conductors, insulators and semiconductors. Copper, Mica, Germanium, Eureka, Tin, Bakelite, Nicrome, Pyrex.	
2U4	e)	The field winding of a generator has a resistance of 108.56 ohm at 20^0C and 121.4 ohm at 50^0 C. Find (i) temperature co-efficient at 0^0C (ii) resistance at 0^0C.	
Q3		**Attempt any THREE**	**(12)**
5R4	a)	Define following terms related to magnetism. i. Magnetic field ii. Magnetic flux iii. Magnetic flux density iv. Field intensity	
2U4	b)	Study the figure 1 and answer following questions:-  **Figure 1** i. Which part is shown by 'A'? ii. State the meaning of symbol shown at 'B' point. iii. State the voltage rating of equipment at point 'C'. iv. What are F1, F2 & F3 shown at SS point? Which consumers are connected to them?	
3U4	c)	Describe the term open circuit and short circuit in an electric circuit with the help of diagram.	
4U4	d)	Answer the following questions related to capacitor. i. State the difference between the term capacitor and capacitance. ii. State, how you will connect the number of capacitors to decrease its capacity.	
5U4	e)	Compare electric circuit and magnetic circuit on the basis of their similarity points.	
Q4		**Attempt any THREE**	**(12)**
5U4	a)	Describe the stepwise procedure of finding total ampere-turns of the series magnetic circuit.	
6U4	b)	Describe the term phase and phase difference with the help of wave diagram.	
6U4	**c)**	Calculate frequency, RMS value, average value and amplitude of the wave form shown in figure 2.	

		 **Figure 2**	
5U4	**d)**	Answer the following questions related to inductance. i. Describe the condition when the mutual inductance between the two coils will be maximum. ii. Calculate the value of mutual inductance between two magnetically coupled coils of self-inductances of 100 mH and 400 mH respectively, if coefficient of coupling is 0.8	
5R4	**e)**	State Fleming's right hand rule. State where it is applicable.	
Q5		**Attempt any TWO**	**(12)**
4U6	a)	Calculate the equivalent capacitance of three capacitors of 100µF, 150µF and 200µF, when they are connected in series and parallel.	
2A6	b)	Find temperature co-efficient at 0^0C, resistance at 0^0C and temperature coefficient at 20^0C.of a field winding of a generator having resistance of 108.56 ohm at 20^0C and 121.4 ohm at 50^0 C.	
3A6	c)	Study the given figure 3 and answer the following questions.  **Figure 3** i. Find the current flowing through the branch A-B. State, its reason. ii. Find the voltage, if short circuit occurred between A and C point. State its reason.	
Q6		**Attempt any TWO**	**(12)**
3A6	a)	Find the total resistance of circuit shown in figure 4, if the total current taken by this circuit is 11 ampere. Find supply voltage and also find voltage drop across branch A-B and C-D.	

		 **Figure 4**	
5A6	b)	Calculate the ampere-turn required to produce a flux of 8×10^{-4} wb for the following. A ring has mean diameter of 21 cm and cross sectional area 10 cm^2. The ring is made up of semi-circle sections of cast iron and cast steel with each joint having reluctance equal to an air gap of 0.2 mm. Assume the relative permeability of cast steel and cast iron are 800 and 200 respectively. Neglect fringing and leakage current.	
6A6	c)	Study the figure 5 and answer the following questions.  **Figure 5** i. State the type of ac circuit shown in figure. ii. State the value of supply frequency. iii. Calculate average value of supply voltage. iv. Calculate the rms value current. v. State the power factor of circuit. vi. State, whether power factor is lagging or leading?	

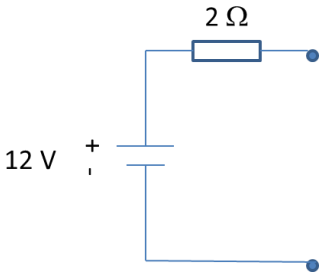
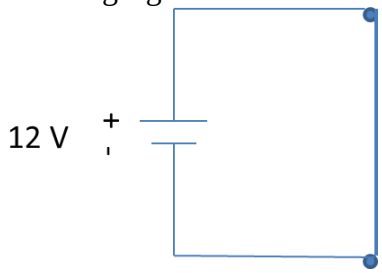
5. MODEL ANSWER

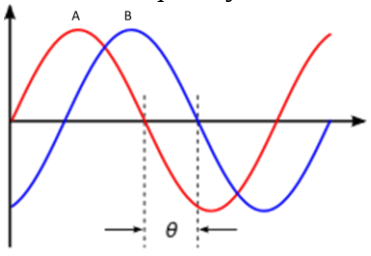
GOVERNMENT POLYTECHNIC, NAGPUR.
(An Autonomous Institute of Govt. of Maharashtra)
Model Answer

Program : Diploma in Electrical Engineering
Course Code : EE301E Course Name : Basic Electrical Engineering

Q	Sub Que. No.	Answer Key	Marking Scheme	Maximum Marks for Questions/sub questions
1		**Attempt any FIVE**	**(2 x 5)**	**10 Marks**
	a) i.	1 metric HP = 735.5 watts	1 mark	2 Marks
	a) ii.	1 kwh = 860 kcal	1 mark	
	b)	1. Voltage across parallel paths is same. 2. Total resistance of a parallel circuit is always less than the smallest of the resistances.	1 mark each	2 Marks
	c) i.	Electrolytic capacitor- Power supplies, filters (any one)	1 mark	2 Marks
	c) ii.	Air capacitor- Radio frequency tuning	1 mark	
	d)	First Law- When flux linking a conductor or coil changes, an emf is induced in it.	1 mark	2 Marks
		Second law- The magnitude of induce emf in a coil is equal to the rate of change of flux linkages.	1 mark	
	e) i.	Frequency- The number of cycles of an alternating quantity per second ia called frequency.	1 mark	2 Marks
	e) ii.	Cycle- A set of positive and negative alteration is called cycle.	1 mark	
	f) i.	Electrical hazard	1 mark	2 Marks
	f) ii.	Explosive	1 mark	
	g) i.	Resistance - 	1 mark	2 Marks
	g) ii.	Fuse - 	1 mark	
2		**Attempt any THREE**	**(3 x 4)**	**12 Marks**
	a)	**Resistance** The property of a material which opposes the flow of current is called resistance.	1 mark	4 Marks
		The unit of resistance is ohm. (Symbol Ω).	1 mark	
		The resistance R of a material (conductor) depends on following factors- 1. Length (l), 2. Cross sectional area (a), 3. Nature of material, 4. Temperature.	½ marks each	

	b)	Schaefer's method of artificial respiration 1. Lay the patient on his stomach One arm extended directly overhead, the other arm bent at the elbow and with the face turned outward and resting on hand or forearm, so that the nose and mouth are free from breathing. 2, Kneel over the patient's back and place both the hands on the patient's small portion of the back, near the lower rib in such a manner that the fingers remain spread on the sides and the two thumbs touches each other and are parallel to spine. 3. Press slowly for about 3 second by leaning forward on hands. Reduce the pressure and come to kneeling position for about 2 seconds. 4. Repeat the process for about 12 to 15 times in a minute. It expands and contracts the patient's lungs so as to initiate breathing. The process should be continued with great patience and in no case violence shall be used.	1 mark for each step	**4 Marks**
	c)	EMF -The force which causes current to flow in the circuit is called e.m.f.	1 mark	**4 Marks**
		Terminal voltage - It is the voltage available at the terminal of the source of supply.	1 mark	
		Voltage drop- The voltage lost by the resistance in the circuit is called the voltage drop.	1 mark	
		emf = voltage at terminal of source of supply + voltage drop in the source of supply. emf = V + IR Where R is the resistance.	1 mark	
	d)	Conductors- Copper, Eureka, Tin, Nicrome,	½ mark each	**4 Marks**
		Insulators- Mica, Bakelite, Pyrex.	½ mark each	
		Semiconductors- Germanium,	½ mark each	
	e)	(i) $R_{20} = R_0 (1+\alpha_0 \times 20)$ $R_{50} = R_0 (1+\alpha_0 \times 50)$ Or $\frac{R_{20}}{R_{50}} = \frac{1+\alpha_0 \times 20}{1+\alpha_0 \times 50}$ Or $\frac{108.56}{121.4} = \frac{1+20\alpha_0}{1+50\alpha_0}$ On solving we get, $\alpha_0 = 0.00428 / {}^0C$	1 mark 1 mark	**4 Marks**

		(ii) $R_{20} = R_0 (1+\alpha_0 \times 20)$ $R_0 = \frac{R_{20}}{1+\alpha_0 \times 20}$ $R_0 = \frac{108.56}{1+0.00428 \times 20}$ $R_0 = \frac{108.56}{1.0856}$ $R_0 = 100$ ohm	1 mark 1 mark	
3		**Attempt any THREE**	**(3 x 4)**	**12 Marks**
	a) i.	Magnetic field- It is the space around a magnetic pole or a magnet with in which magnetic force is experience.	1 mark	4 Mark
	a) ii.	Magnetic flux- The total number of magnetic lines of force in the magnetic field is called magnetic flux.	1 mark	
	a) iii.	Magnetic flux density –The magnetic flux per unit area is called magnetic flux density	1 mark	
	a) iv.	Magnetic Field intensity- It is the force which maintains the magnetic flux.	1 mark	
	b) i.	Primary Transmission	1 mark	4 Mark
	b) ii.	Transformer	1 mark	
	b) iii.	33/11 KV	1 mark	
	b) iv.	Feeders, Industrial /commercial consumers	1 mark	
	c)	Following figure shows Open circuit  No current will flow in the open circuit as the circuit is not closed. Following figure shows short circuit  Heavy current will be flow in the circuit as resistance is zero.	1 mark 1 mark 1 mark 1 mark	

	d) i.	A capacitor is a device which stores an electrical charge between the two plates. The ability of capacitor to store the charge is known as its capacitance.		1 mark 1 mark	4 Mark
	d) ii.	In series		2 mark	
	e)	**Magnetic Circuit**	**Electric Circuit**		
		The close path for magnetic flux is called magnetic circuit.	The close path for electric current is called magnetic circuit.	Any four 1 mark each	
		Flux = MMF/Reluctance	Current = EMF/Resistance		
		MMF (ampere turn)	EMF (Volts)		**4 Marks**
		MMF drop = flux x reluctance	Voltage drop = current x resistance		
		Flux density = Flux/ Area	Current density = Current /Area		
		Permeance = 1/ Reluctance	Conductance = 1/ Resistance		
4		**Attempt any THREE**		**(3 x 4)**	**12 Marks**
	a)	Step wise procedure of finding ampere-turn (AT) for series circuit. 1. Find field intensity (H) for each part of the series magnetic circuit. For air $H = B/\mu_0$; whereas for magnetic material, $H = B/\mu_0\mu_r$ 2. Find mean length (l) for the magnetic path for each part of the circuit. 3. Find AT required for each part of the magnetic circuit using the relation AT = H x l 4. The total AT required for the entire series circuit is equal to the sum of AT for various part.		1 mark for each step	**4 Marks**
	b)	Phase- Phase of ac voltage or current means the fraction of the time period of that alternating voltage or current has passed through its zero position of reference. Phase difference- Phase difference is the time or angle measured between the zero positions of references of two ac sinusoidally varying quantity of same frequency.  		1 mark 1 mark 1 mark	**4 Marks**

		Two wave forms A and B are shown in figure. There, zero positions of references have a difference of 60^0. Phase difference θ is shown in figure.	1 mark	
	c)	i. Frequency (f) = 1/T = 1/ 20 x 10^{-3} = 50 Hz ii. RMS value, V_{rms} = 0.707 x V_m = 0.707 x 100 = 70.7 volts iii. Average value, V_{av} = 0.637 x V_m = 0.637 x 100 = 63.7 volts iv. Amplitude = V_m = 100 volts	1 mark 1 mark 1 mark 1 mark	**4 Marks**
	d) i.	Since, Mutual Inductance, M = k √ L_1L_2 Therefore, M will be maximum, when k i.e. coefficient of coupling is one (1).	2 marks	
	d) ii.	Since, Mutual Inductance, M = k √ L_1L_2 = 0.8 √ 100 x 10^{-3} x 100 x 10^{-3} = 160 x 10^{-3} H = 160 mH	2 marks	**4 Marks**
	e)	Fleming's Right Hand Rule Hold thumb, forefinger and middle finger of a right hand at right angle to each other. If thumb indicates the motion of the conductor, forefinger indicates the direction of magnetic flux, then middle finger gives the direction of induced emf. This rule is applicable to the generator.	2 marks 2 marks	**4 Marks**
5		**Attempt any TWO**	**(2 x 6)**	**12 Marks**
	a)	i. When capacitors are connected in series, equivalent capacitance is given by, 1/C = $1/C_1$+ $1/C_2$+$1/C_3$ 1/C = 1/100 + 1/150 +1/200 1/C = 13/600 Therefore, C = 600/13 μF = 46.154 μF ii. When capacitors are connected in parallel, equivalent capacitance is given by, C = C_1+ C_2+C_3 C = 100 + 150 + 200 Therefore,	 1 mark 1 mark 1 mark 1 mark 1 mark	**6 Marks**

		C = 450 μF	1 mark	
	b)	(i) $R_{20} = R_0 (1+\alpha_0 \times 20)$ $R_{50} = R_0 (1+\alpha_0 \times 50)$ Or $\frac{R_{20}}{R_{50}} = \frac{1+\alpha_0 \times 20}{1+\alpha_0 \times 50}$ Or $\frac{108.56}{121.4} = \frac{1+20\alpha_0}{1+50\alpha_0}$ On solving we get, $\alpha_0 = 0.00428 / {}^0C$ (ii) $R_{20} = R_0 (1+\alpha_0 \times 20)$ $R_0 = \frac{R_{20}}{1+\alpha_0 \times 20}$ $R_0 = \frac{108.56}{1+0.00428 \times 20}$ $R_0 = \frac{108.56}{1.0856}$ $R_0 = 100$ ohm (iii) $\alpha_{20} = \frac{\alpha_0}{1+\alpha_0 \times 20}$ $\alpha_{20} = \frac{1}{(1/\alpha_0)+20}$ $\alpha_{20} = \frac{1}{(233.64)+20}$ $\alpha_{20} = \frac{1}{253.64}$ $= 0.0039426 / {}^0C$	1 mark 1 mark 1 mark 1 mark 1 mark 1 mark	**6 Marks**
	c) i.	Zero Reason- Open circuit	1 mark 2 mark	
	c) ii.	Zero Reason- In short circuit voltage is zero. OR As shown in figure, if point A-C is short circuited only 2 ohm resistance is in the circuit and total 12 volt is across other 2 ohm resistance, which remains in a circuit. Therefore, voltage across point A-C is 12-12 volt i.e. zero.	1 mark 2 mark	**6 marks**
6		**Attempt any TWO**	**(2 x 6)**	**12 Marks**
	a)	Equivalent resistance of branch BC 12 ohm parallel to 12 ohm = 6 ohm		**6 Marks**

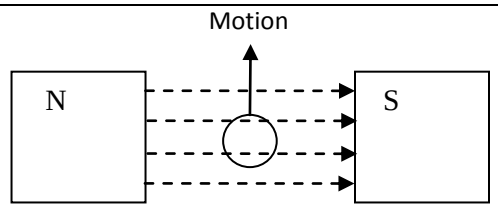
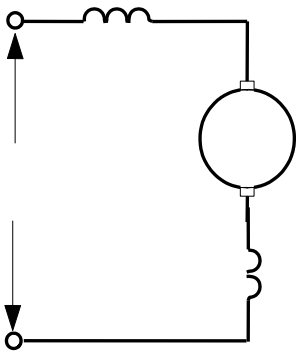
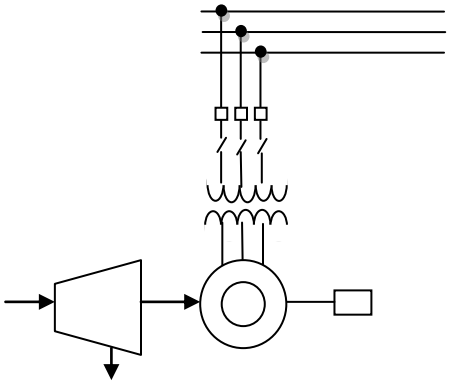
		4 ohm parallel to 4 ohm = 2 ohm 2 ohm series with 4 ohm = 6 ohm Now, Branch BC becomes, Three 6 ohm resistances parallel to each other. Therefore, R_{BC} = 2 ohm Now, Total circuit becomes 6, 2 and 2 ohms is in series. Therefore, R_{AD} = 10 ohm Therefore, Supply voltage, V = I x R_{AD} = 11 x 10 = 110 volts Voltage across branch AB , V_{AB} = I x R_{AB} = 11 x 6 = 66 volts Voltage across branch CD , V_{CD} = I x R_{CD} = 11 x 2 = 22 volts **Note: Allot marks for alternative method also.**	1 mark 1 mark 1 mark 1 mark 1 mark 1 mark	
	b)	Mean diameter of ring, D = 21 cm = 21x 10^{-2} m Length of iron ring, l = Π x D = 3.14 x 21x 10^{-2} m = 0.66 m Length of half ring, l/2 = 0.33 m Cross sectional area, A = 10 cm^2 = 10x 10^{-4} m^2 Length of air gap = 0.2 mm = 0.2 x 10^{-3} m Length of two air gap, L_g = 0.4 mm = 0.4 x 10^{-3} m Flux, ϕ = 8 x 10^{-4} wb Relative permeability of steel = 800 Relative permeability of cast iron = 200 Therefore, Flux density, B = ϕ / A = 0.8 wb/m^2 AT required for cast iron path- AT_{ci} = H_{ci} x l_{ci} = ($B/\mu_0 \mu_r$) x l_{ci} = (0.8/ 4 Π x10^{-7}x 200) x 0.33 = 1050 AT AT required for steel path- AT_{cs} = H_{cs} x l_{cs} = ($B/\mu_0 \mu_r$) x l_{cs}	1 mark 1 mark 1 mark	**6 marks**

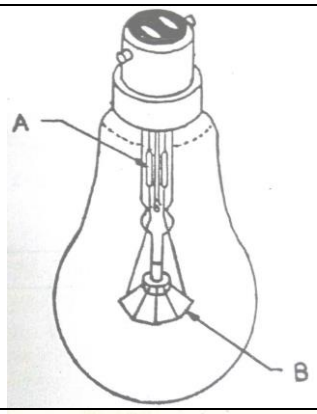
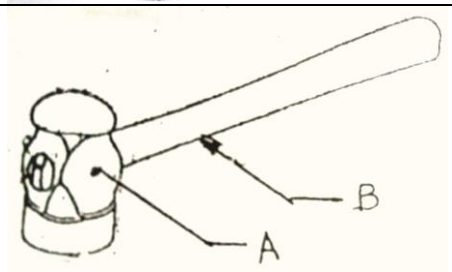
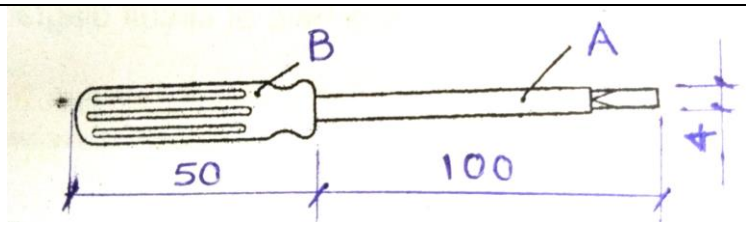
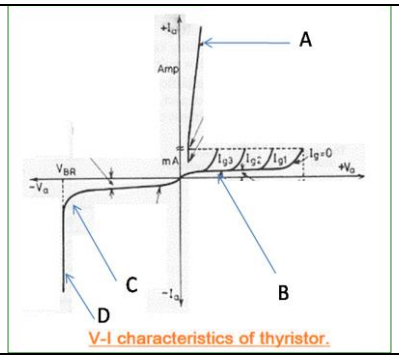
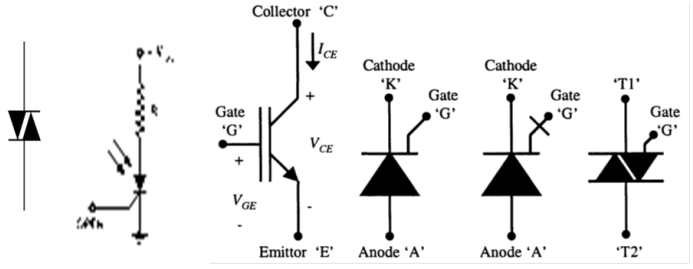
		= (0.8/ 4 Π x10^{-7}x 800) x 0.33 = 262.6 AT AT required for air at two joints- $AT_g = H_g \times l_g$ = $(B/\mu_0\ \mu_r) \times l_g$ = (0.8/ 4 Π x10^{-7}x 1) x 0.4 x10^{-3} = 254.6 AT Total AT = $AT_{ci} + AT_{cs} + AT_g$ = 1050 + 26.6 + 254.6 = 1567.2 AT	1 mark 1 mark 1 mark	
	c)i.	RL series circuit- Inductive circuit	1 mark	
	c)ii.	Since, ω = 314 = 2 Π f Therefore, F= 314/2 x 3.14 = 50 Hz	1 mark	
	c)iii.	Average value, $V_{av} = 0.637 \times V_m$ = 0.637 x 230 = 146.51 volts	1 mark	**6 Marks**
	c)iv.	RMS value, $I_{rms} = 0.707 \times I_m$ = 0.707 x 10 = 7.07 Ampere	1 mark	
	c)v.	Power factor of circuit = cos ϕ = $\cos 30^0$ = 0.866	1 mark	
	c)vi.	Lagging power factor	1 mark	

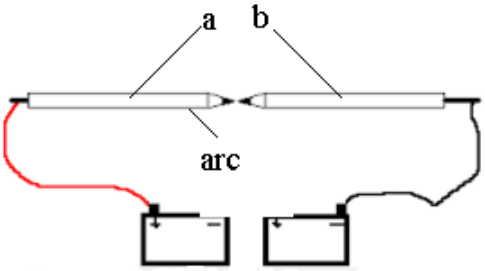
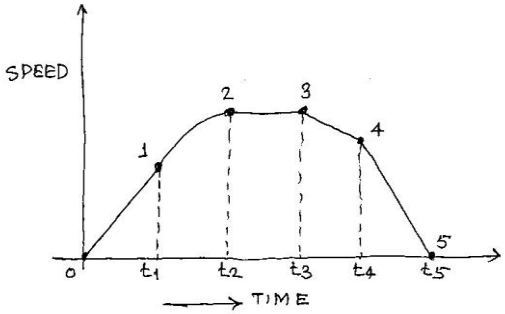
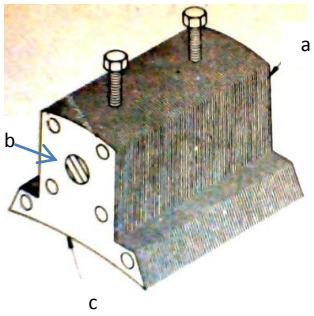
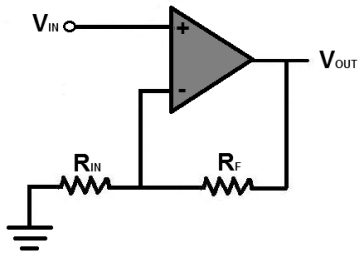
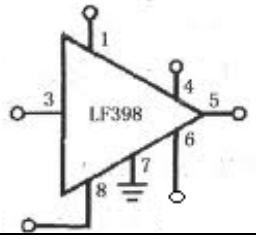
6. EXAMPLES

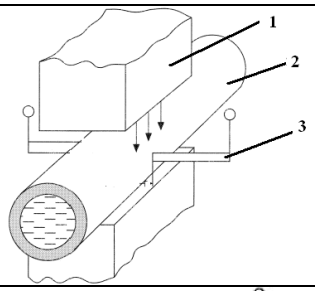
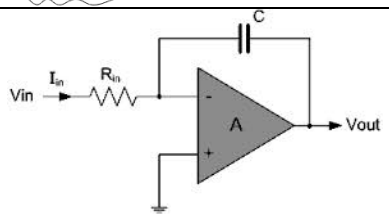
❖ Figural Questions

- Normally there is tendency of avoiding questions based on the figures.
- It is possible to use figures/sketches to ask questions which will test understanding of concept and principles.
- Effort should be made to ask many question of the type shown below.
- Most of the sample questions given below, test understanding of simple concepts and principles.

Question 1: State the direction of current induced in conductor shown in figure 1. Justify your answer.	 Figure 1
Question 2: Label the schematic diagram of universal motor shown in figure and state the function of each part.	
Question 3: The unlabeled schematic diagram of electrical system in steam power plant is shown in figure. What are the mistakes in a given diagram (if any)? Redraw the correct schematic diagram showing the correct labeling.	

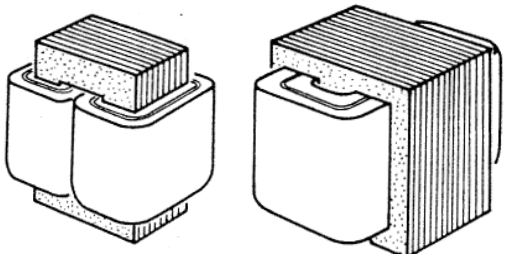
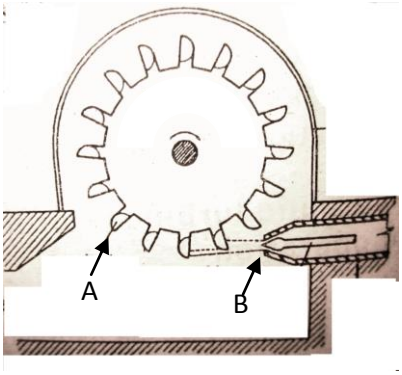
Question 4: Study the given figure of gas filled incandescent lamp and answer the following questions. 1. Name the part ‘A’ and ‘B’ 2. Name the gas used in it. 3. State the meaning of incandescent 4. State its working principle	
Question 5: Study the given figure and answer the following questions 1. Identify the tool 2. Name the part ‘A’ 3. State, why part ‘B’ is made up of wood?	
Question 6: Study the given figure and answer the following questions 1. State the size of screw driver 2. Name the material use for part ‘A’ and state its purpose	
Question 7: Name the regions indicated by letters A, B, C and D in the figure	
Question 8: Identify the power electronic devices shown in figure and Classify them as unidirectional and bidirectional devices.	 i ii iii iv v vi

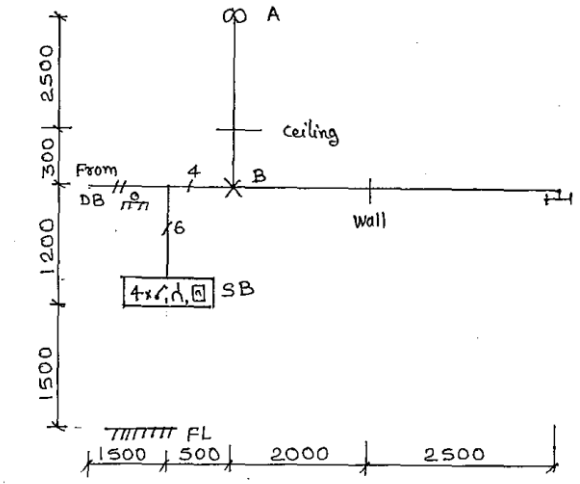
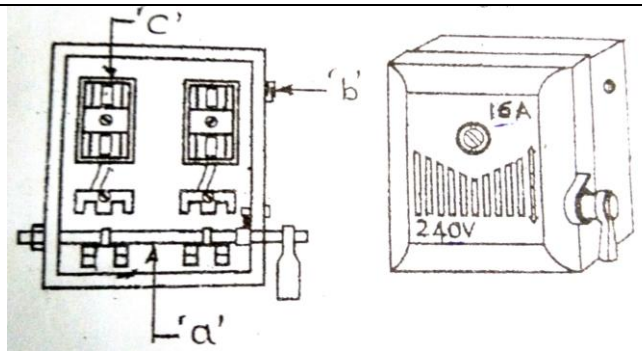
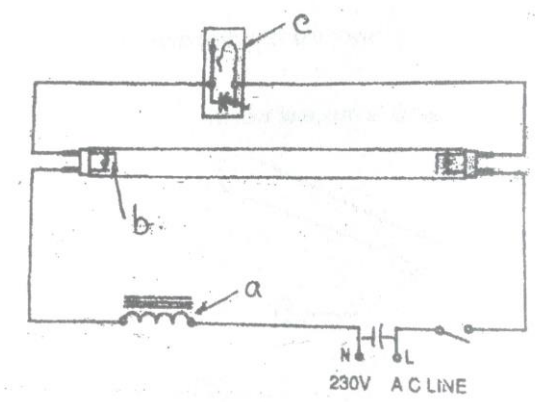
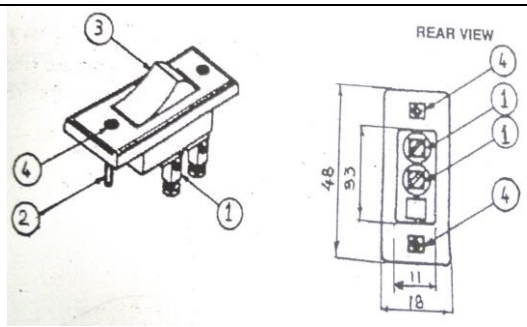
Question 9: Study the given figure and answer the following questions. 1. Name the part a 2. Name the part b. 3. Describe the working of lamp?	 carbon arc lamp
Question 10: Study the given typical speed time curve of train running on main line shown in Figure. Redraw the diagram and name the given time periods: (i) 0- t_1 (ii) t_1 - t_2 (iii) $t_2 - t_3$	
Question 11: Study the given figure of DC machine and answer the following questions. 1. Name the component "a" 2. State the purpose of hole "b" 3. State the function of part "c" 4. State, why the part is made up from the laminated sheet?	
Question 12: Identify the following configuration of op-amp. Write the gain equation for the same.	
Question 13: Label the pin no. 1, 4, 3 and 5 in the following diagram of LF 398.	

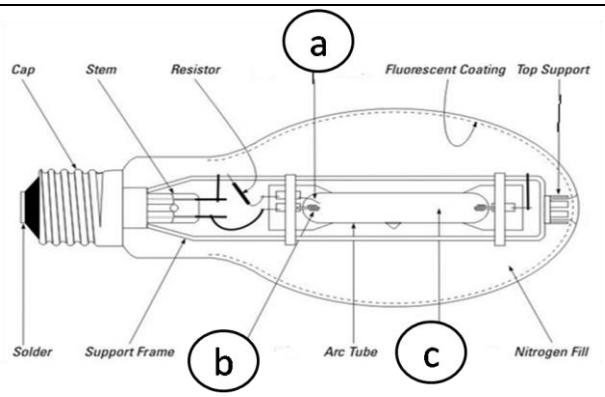
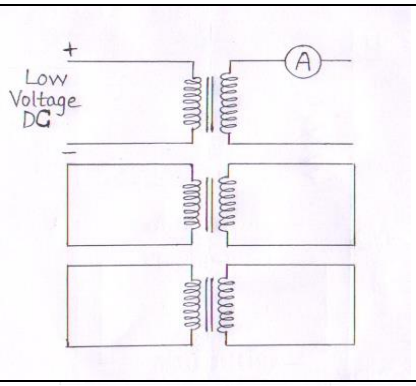
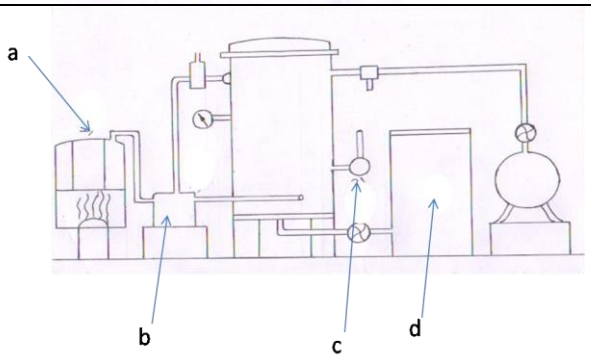
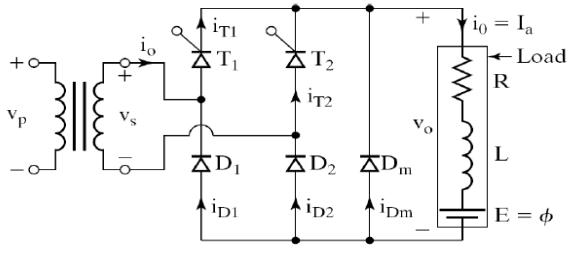
Question 14: Identify following transducer and label the parts shown.	
Question 15: Identify the application of op-amp in following circuit diagram. Draw the same application circuit diagram in other configuration of op-amp.	

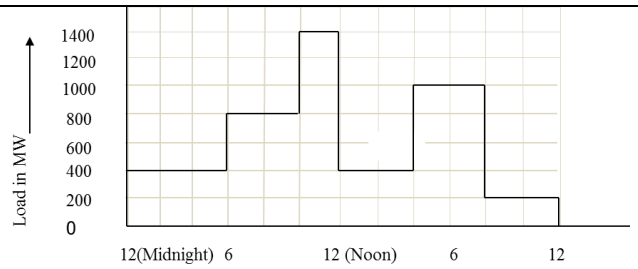
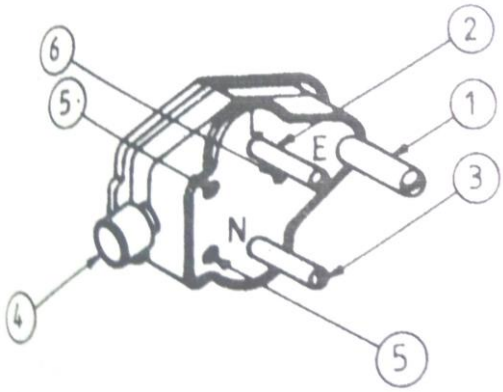
Structured Essay Questions

- As the name suggests, these questions are the improved forms of traditional essay type of questions, properly structured to test different abilities at taxonomy levels.
- Questions can be set on information given in Graph, Figure, Circuit, Diagram or an Incident/Case.
- The essential requirement of a structured question is that it does not consist of a collection of isolated and unrelated short answer questions, but the sub-questions form a related series. Each sub question should, therefore, be based on and related to the central theme of the question.

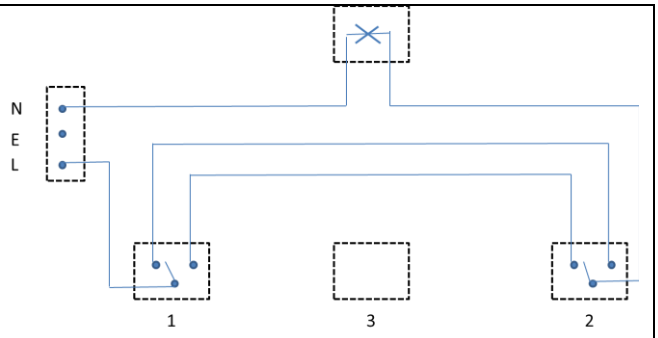
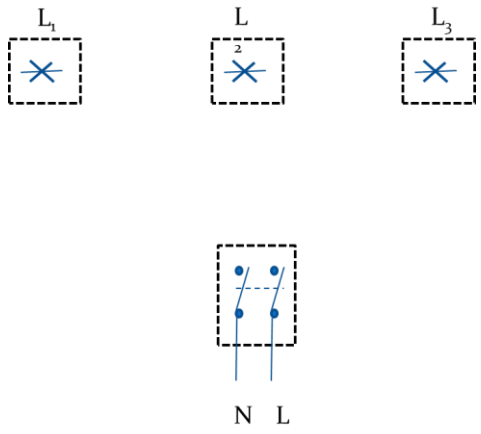
Question 1: Study the given figures and answer the following questions. 1. State the types of transformers A and B. 2. On what basis they are different?	
Question 2: Study the following figure and answer the following questions. 1. Identify the type of turbine. 2. Name the part ‘A’ 3. State the function of part ’B’ 4. State the particular application of this turbine.	

Question 3: Study the given single line diagram shown in Figure 1 and answer the following questions. 1 Identify the type of wiring. 2 Identify any two symbols. 3 Estimate the length of wire required for the given installation.	
Question 4: Study the given figure and answer the following questions. 1. Identify the accessory 2. State its specification 3. Name the material of part 'a' 4. State the purpose of screw 'b' 5. Name the part 'c' 6. State the material of part ,c.	
Question 5: Study the following circuit and answer the following questions. 1. Identify the type of lamp shown by the circuit. 2. Name the part 'a' 3. State the function of part 'a' 4. Name the part 'b' 5. State the material used for part 'b'. 6. What will happen, if the capacitor across the supply is disconnected?	
Question 6: Study the following figure and answer the following questions. 1. Identify the accessory and state its specification. 2. Name the part '1' 3. Name the material of part '1' from which it is made 4. State the size of profile to be cut for mounting it on the board.	

Question 7: Study the given figure and Answer the following questions. 1. Identify type of the lamp. 2. Name the part **a** 3. State the function of part **b** 4. State the function of part **c** 5. State the purpose of fluorescent coating. 6. State, why the cap of lamp is having threaded shape?	
Question 8: Study the following incorrect figure of phasing out test of three-phase transformer and answer the following questions. 1. Identify the two mistakes in the above figure. 2. Draw the correct figure. 3. What is the significance of this test?	
Question 9: Study the given figure of vacuum impregnating plant and answer the following questions. 1. Identify the parts a, b, c and d. 2. What temperatures to be maintained in the vacuum impregnating chamber during Baking? For what period it should be maintained?	
Question 10: Study the converter configuration shown in figure 3, Identify the configuration and answer the following questions. 1. State sequence of triggering of SCRs. 2. Draw current path in all the stages. 3. State function of D_m shown in the figure. 4. Draw load voltage and load current waveforms. 5. Describe operation of converter. 6.	

Question 11: The daily load curve of a power station is shown in following figure. Study the figure and answer the following questions. 1. What is the maximum demand on the power station? 2. Calculate units generated per day. 3. Find the average load. 4. What is the load factor?	
Question 12: Study the given figure and answer the following questions 1. Identify the accessory 2. State the specification of this accessory used in light circuit 3. Identify part '3' 4. Identify part '4' 5. State the purpose of part '7' 6. State, why the size of part '1' is bigger than part '2'	

Application Level Questions

Question 1: What changes are to be made in given circuit, if third controlling switch is require for lamp at place 3 shown in figure? 1. Redraw the circuit for above situation. 2. Name the switch required at place at place 3.	
Question 2: Three lamps and one two pole switch is shown in figure. Draw the wiring diagram for following both situations. 1. When switch is 'OFF', all three lamps are in series. 2. When switch is 'ON', all three lamps are in parallel.	

Question 3: Draw the circuit diagram for connection of two lamps by using two one way switches, for the following situation. 1. When switch is 'OFF', all three lamps are in series. 2. When switch is 'ON', all three lamps are in parallel.	

Don'ts and Do's

Don'ts	**Do's**
What do you mean by Ohm's law.	State Ohm's law.
Define Electricity	Define current
Compare core and shell transformer	Compare core and shell transformer on the basis of construction and maintenance.
Explain nuclear power plant	Describe nuclear power plant with the help of block diagram
Describe TPH	Describe water cooling system of thermal power plant with the help of block diagram
Tell the meaning of 'moderator'	State the meaning of 'moderator'
Show charging and discharging of capacitor with help of diagram	Describe charging and discharging of capacitor with help of graphical representation.

- **Some Examples of Don'ts**

1. State causes of electrical accident
   - Reason:
   - Question is not specific.
   - How many causes to be written are not given.

2. State the law/rule related to operation of DC generator
   - Reason:
   - Question is not specific.
   - Faraday's law is related to DC generator as well as Fleming's right hand rule is related to it.

3. Describe the flux control method of speed control for DC series motor with neat diagram

- Reason:
- Question is not specific.
- There are three types of flux control methods of speed control of DC series motor. Field diverter, armature diverter, tapped field control.
- Name of method is absent in question

4. Derive the expression for torque developed in a three-phase induction motor.

- Reason:
- Question is not specific.
- Students can derive the expression for any of the following.

1. Torque under running condition
2. Maximum torque under running condition
3. Starting torque

❖ **Planning and Conduct of Progressive Test**

- Two tests of 20 marks each should be conducted during the semester.
- Each test should be of one hour duration or as mentioned in curriculum.
- Format of question paper for tests should be as per the sample progressive test paper.
- Progressive tests should be conducted as per the academic calendar and portion for each test should be declared well in advance.
- There are no minimum passing marks for the progressive test.
- Discuss the progressive test question paper and its model answer in the class after the assessment of progressive test paper.
- Display the model answers of progressive test question paper on notice board.
- Assessment of the progressive test papers should be done by highlighting the mistakes.
- Progressive test papers should be shown to students and faculty should give the feedback to students about their performance.
- Progressive tests marks should be displayed on the notice board in prescribed format.

❖ **Details about assignments**

- Assignment of 10 marks should be given to the student on each unit.
- All the students should be asked to keep one separate assignment book for the assignments.
- After completion of the topic one assignment should be given on that topic
- Preferably, the assignments should cover all the subtopics of the topic.
- Number of Numericals (i.e. problems) should be given in the assignments.
- The assignments should be displayed on the notice board of the department; to save the time.
- Assignments given should be regularly checked and feedback should be given to the students.

Guidelines for Setting Progressive Test Question Paper

- All Program should maintain course wise Record of Progressive Test Marks in Register.
- Each Progressive Test paper will have Three Questions based on remember, understanding as well as application/apply level as per SLO written on the units:
- Question 1 will be for SIX marks. This question will have each bit of two marks and students will have to attempt any THREE out of FOUR bits. The questions on these are preferably on remembering level (R).
- Question 2 will be for EIGHT marks. This question will have each bit of FOUR marks and students will have to attempt any TWO out of THREE bits. The questions on these are preferably on understanding level (U).
- Question 3 will be for SIX marks. This question will have each bit of SIX marks and students will have to attempt any ONE out of TWO bits. The questions on these are preferably on application/apply level (A).
- Question Paper for First progressive Test should be based on 40% to 50% of the curriculum of the course and Second test on 40% to 50% of the remaining curriculum.

SAMPLE PROGRESSIVE TEST PAPER

GOVERNMENT POLYTECHNIC, NAGPUR.

(An Autonomous Institute of Govt. of Maharashtra)

First Progressive Test

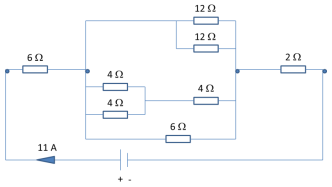
Program : Diploma in Electrical Engineering

Course Code : EE301E **Course Name : Basic Electrical Engineering**

Time : 1 Hour **Max. Marks : 20**

Instructions:

1. All questions are compulsory
2. Illustrate your answers with neat sketches wherever necessary
3. Figures to the right indicate full marks
4. Use of non-programmable calculator is permissible
5. Assume suitable data if necessary
6. Preferably, write the answers in sequential order.

Q1		**Attempt any THREE**	**(06)**
1R2	a)	State any two causes of electrical accident.	
2R2	b)	State relation between followings i. Metric H.P and watts ii. Kwh and Kcal	
2R2	c)	Draw the BIS symbols for the followings i. Resistance ii. Inductance	
3R2	d)	State any two properties of parallel resistive circuit.	
Q2		**Attempt any TWO**	**(08)**
2U4	a)	Classify following materials into conductors, insulators and semiconductors. Copper, Mica, Germanium, Eureka, Tin, Bakelite, Nicrome, Pyrex.	
2U4	b)	Compare EMF, Terminal voltage and Voltage drop. State relation between them.	
3U4	c)	Describe the term open circuit and short circuit in an electric circuit with the help of diagram.	
Q3		**Attempt any ONE**	**(04)**
2A6	a)	Find temperature co-efficient at 0^0C and resistance at 0^0C of a field winding of a generator having resistance of 108.56 ohm at 20^0C and 121.4 ohm at 50^0 C.	
3A6	b)	Find the total resistance of circuit shown in figure 1, if the total current taken by this circuit is 11 ampere. Find supply voltage and also find voltage drop across branch A-B and C-D.  Figure 1	

❖ **References**

- http://www.nbaind.org/files/workshops/Three%20days%20workshop%20-%20Outcome%20based%20education.pdf , assessed on 23rd August, 2016
- http://www.nbaind.org/files/workshops/Training%20Text%20Material.pdf , assessed on 23rd August, 2016
- http://www.yourarticlelibrary.com/education/test/top-4-characteristics-of-a-good-test/64804/ , assessed on 23rd August, 2016
- **http://www.education.com/reference/article/factors-influence-reliability/** , assessed on 23rd August, 2016
- Maharashtra State Board of Technical Education, Mumbai, Curriculum Revision Project, 2012 Teacher Guide of different subjects, June 2013
- Maharashtra State Board of Technical Education, Mumbai, Question Bank Project
- Government Polytechnic, Nagpur, Workshop on Question Bank Development (Under TEQIP) , 8th & 9th February, 2007
- Maharashtra State Board of Technical Education, Mumbai, examination question papers
- Government Polytechnic, Nagpur examination question papers