



Name: Roll No.:

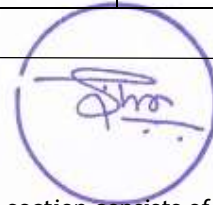
Branch: Signature of Invigilator:

Semester: VIth Date: 28/04/2022 (MORNING)

Subject with Code: BE318 BIOENERGY AND BIOFUELS

Marks Obtained	Section A (30)	Section B (20)	Total Marks (50)

INSTRUCTION TO CANDIDATE



1. The booklet (question paper cum answer sheet) consists of two sections. First section consists of MCQs of 30 marks. Candidates may mark the correct answer in the space provided / may also write answers in the answer sheet provided. The Second section of question paper consists of subjective questions of 20 marks. The candidates may write the answers for these questions in the answer sheets provided with the question booklet.
2. The booklet will be distributed to the candidates before 05 minutes of the examination. Candidates should write their roll no. in each page of the booklet.
3. Place the Student ID card, Registration Slip and No Dues Clearance (if applicable) on your desk. All the entries on the cover page must be filled at the specified space.
4. Carrying or using of mobile phone / any electronic gadgets (except regular scientific calculator)/chits are strictly prohibited inside the examination hall as it comes under the category of unfair means.
5. No candidate should be allowed to enter the examination hall later than 10 minutes after the commencement of examination. Candidates are not allowed to go out of the examination hall/room during the first 30 minutes and last 10 minutes of the examination.
6. Write on both side of the leaf and use pens with same ink.
7. The medium of examination is English. Answer book written in language other than English is liable to be rejected.
8. All attached sheets such as graph papers, drawing sheets etc. should be properly folded to the size of the answer book and tagged with the answer book by the candidate at least 05 minutes before the end of examination.
9. The door of examination hall will be closed 10 minutes before the end of examination. Do not leave the examination hall until the invigilators instruct you to do so.
10. Always maintain the highest level of integrity. Remember you are a BITian.
11. Candidates need to submit the question paper cum answer sheets before leaving the examination hall.

BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI			
(END SEMESTER EXAMINATION)			
CLASS:	B TECH		
BRANCH:	Biotech		
		SEMESTER: VI	
		SESSION: SP/2022	
SUBJECT: BE 318 Bioenergy and Biofuels			
TIME:	2 HOURS		
			FULL MARKS: 50

1. Bioenergy is the energy obtained from _____ a) Coal b) Natural Gas c) Alcohol d) Biomass
2. Which of the following is not organic waste? a) Animal wastes b) Agricultural wastes c) Forest residues d) Radioactive wastes
3. Production of bio ethanol is through fermentation of _____ and starch components(a) alcohol(b) sugar(c) milk(d) acid
4. Which of the following is not a biofuel? a) Ethanol b) Methanol c) Natural gas d) Butanol
5. In biomethane, the percentage of carbon dioxide is
(a) 55-60 (b) 35-45 (c) 30-40 (d) 32-43
6. Bioethanol is mixed with _____ to prepare transport fuel
(a) oil (b) petrol (c) kerosene (d) diesel
7. This is an example of starch crops biomass feedstocks
(a) corn stover (b) wheat straw (c) orchard prunings (d) sugar cane
8. The bio ethanol obtained in the fermentation process has _____ purity.
a) 99% b) 99.2% c) 99.4% d) 99.7%
9. With B20 biodiesel, the "20" indicates the percentage of what?
a) Biodiesel fuel b) Standard fuel c) energy d) All of these
10. **what is a by-product of producing Biodiesel?**
a) Salt b) Glycerin c) Polymer d) Methanol
11. The bio methane is produced by the _____ of biomass.
a) Aerobic oxidation b) Anaerobic oxidation c) Fermentation d) Rectification
12. Bio diesel is produced by the _____ of the vegetable oil.
a) Fermentation b) Distillation c) Transesterification d) Rectification
13. Fuels cell is an electrochemical device that converts the chemical energy into the _____
a) Electrical energy b) Mechanical energy c) Static energy d) Frictional energy
14. What are energy crops?
a) Crops grown to remove insects b) Crops grown to be used in generating energy c) Crops grown to feed people d) Crops that produce energy
15. What type of energy is biomass energy?
a) Conventional energy b) Non renewable c) Commercial energy d) Sustainable energy
16. Mixing biomass with fossil fuels in conventional power plants is referred to as _____
a) Agitation b) Infuse c) Co-firing d) Interbreed
17. Which gas can be chemically converted into other fuels or products, burned in a conventional boiler, or used instead of natural gas in gas turbine?
a) Freon b) Natural gas c) Syngas d) Noble gas
18. _____ is an example of cellulosic biomass.
a) Glucose b) Fats c) Lipids d) Agricultural residue

19. Value of any biomass depends on _____ properties.
 a) chemical and physical b) chemical and photo sensitive c) physical and photo sensitive
 d) the number of carbon molecules and on the number of tin molecules
20. What is higher heating value?
 a) Amount of energy available in the fuel + energy contained in water vapour in the exhaust gases
 b) Total amount of energy available in the fuel – energy contained in water vapour in the exhaust gases
 c) Total amount of energy available in the fuel * energy contained in water vapour in the exhaust gases
 d) Total amount of energy available in the fuel
21. Moisture content can be calculated on two bases, namely _____
 a) light and heavy b) weighted and even c) wet and dry d) light and dry
22. What are the main components of cellulosic biomass?
 a) Hemicellulose and lignin b) Hemicellulose and sugars c) Cellulose, sugars and fats
 d) Cellulose, hemicellulose and lignin
23. Which of the following best indicates the steps of anaerobic digestion?
 a) Waste water feed → biogas storage → generator → biogas
 b) Waste water feed → digester → biogas → biogas storage → generator
 c) Generator → waste water feed → digester → biogas → biogas storage
 d) Waste water feed → biogas → digester → biogas storage → generator
24. What occurs in the hydrolysis step of anaerobic digestion?
 a) Large polymers combine with water molecules b) Large polymers break down to form water molecules
 c) Small polymers combine to form large polymers with the help of water molecules
 d) Large polymers break down into amino acids, fatty acids and simple sugars
25. Which of the following is produced apart from acetates in acetogenesis step in anaerobic digestion?
 a) Carbon monoxide b) Charcoal c) Carbon dioxide d) Acetone
26. What are the two main products of anaerobic digestion?
 a) Carbon monoxide and hydrogen b) Methane and carbon dioxide c) Methane and carbon monoxide
 d) Hydrogen and carbon dioxide
27. Which of the following is best suited to decompose lignin?
 a) Anaerobic digestion b) Fermentation c) Thermo-chemical conversion techniques
 d) Bio-chemical conversion techniques
28. In terms of green house gas emissions, how good or bad is hydrogen fuel?
 a) Major contributor of greenhouse gas emissions b) Zero-emission fuel
 c) Lowest contributor of greenhouse gas emissions d) Hydrogen cannot be used as fuel
29. What is the aim of Paris Agreement in 2015? Note that C indicates Celsius.
 a) To keep the decrease in global average temperature to below 2 degree C
 b) To keep the decrease in global average temperature to above 2 degree C
 c) To keep the increase in global average temperature to above 2 degree C
 d) To keep the increase in global average temperature to below 2 degree C
30. Which of the following organisms can perform photosynthesis?
 a) Autotrophs b) Algae c) Photoautotrophs d) Plants

Answer all the questions

31. Write in detail about (i) First generation (ii) Second generation (iii) Third generation of Biofuels with suitable examples? [4]
32. Describe briefly conventional and non-conventional energy sources? [2]
33. Discuss about the aerobic & anaerobic processes for biofuel production with examples [2]
34. Write in detail about different energy harvesting biochemical pathways & their exploitation to Biofuels [2]

35. Describe the different pre-treatment processes undertaken for ethanol production from lignocellulosic materials. [2]
36. Explain in detail the steps involved in the production of biobutanol through thermochemical and biochemical processes? [2]
37. Explain the concept of biorefinery and its economics. [2]
38. Define biodiesel and the properties of biodiesel. [2]
39. Comment on Hydrogen as fuel of the future. [2]