Ref.No. Ex/PROD/T/422/2017(OLD)

B. PRODUCTION ENGINEERING EXAMINATION, 2017

(4TH Year 2nd Semester)

ECOLOGY AND ENVIRONMENT

Time: Three hours **Full Marks 100**

(Answer all questions) (4X25=100)

No. Of Questions	QUESTIONS	Marks
Q1.	a) *Briefly explain the effect of CO on human health.*	6
	b) *Mention the reactions contributing to the formation of tropospheric ozone in the atmosphere.*	4
	c) *Derive an expression for adiabatic lapse rate.*	4
	d) *A rising parcel of dry air has a temperature of 35°C at sea level. Assuming a dry adiabatic lapse rate determine the temperature at 3000 m.*	4
	e) *Explain the environmental impact of thermal power plants on the surrounding.*	7
Q2.	a) *Estimate the quantity of Carbon (Gt-C) in the atmosphere corresponding to a concentration of 1ppm$_v$ of CO_2. Assume suitable data as required*	10
	b) *The following data on air pollutants has been obtained for an industrial belt on a particular day. Based on the Ministry of Environment And Forests Notification, Govt. of India dated 16th November, 2009, prepare the Air Quality Index for the area and comment on the air quality of the area:* *i) PM_{10} Concentration= 250 $\mu g/m^3$* *ii) SO_2 Concentration= 150 $\mu g/m^3$* *iii) NO_2 Concentration= 2500 $\mu g/m^3$* *iv) $PM_{2.5}$ Concentration=150 $\mu g/m^3$* *v) 1 hr O_3 Concentration= 600 $\mu g/m^3$* *vi) 1 hr CO Concentration=4500 $\mu g/m^3$*	07

	c) A man is working in an abandoned well where the CO concentration is found to be 200 ppmv. Make a rough estimate of the saturation value of HbCO in his blood and also calculate the necessary exposure time required for this to develop. The following informations may be used if required: *i) Oxygen content of air breathed in =21% by volume* *ii) M=220* *iii) Physical Activity Level=3*	08
Q3.	*Write short notes on any five of the followings:* *a) Global heat energy budget* *b) Environmental management planning* *c) Temperature lapse rates* *d) Hauled container system* *e) Air quality indexing* *f) Photochemical Smog*	5X5= 25
Q4.	*a)* A contractor agreed to haul the solid waste from a individual district of a city. The industry agreed to store their waste in large containers located at strategic points. Due to the sizes of the containers, the hauled container system of collection is to be used. Based on the traffic study, t_1, t_2 and d_1 were found to be 30, 15 and 8 mins respectively. If the round trip haul distance averaged 60 km at a speed limit of 55 mph, then how many containers can be serviced on a collection day of 8 hrs. Given, w=0.15, m u=0.4 hr/trip, s= 0.133 hr/trip	09

b) *Derive an approximate chemical formula formula for the organic portion of 100kg solid waste sample with the composition given below:* 09

Component	Wet Mass (kg)	Dry Mass (kg)	C	H	O	N	S	Ash
1. Food waste	15	4.5	2.16	0.29	1.69	0.12	0.02	0.23
2. Paper	45	42.3	18.4	2.54	18.61	0.13	0.08	2.54
3. Card Board	10	9.5	4.18	0.56	4.24	0.03	0.02	0.48
4. Plastics	10	9.8	5.88	0.71	2.23	-	-	0.98
5.Garden Trimmings	10	4.0	1.91	0.24	1.52	0.14	0.01	0.18
6.Wood	5	4.0	1.98	0.24	1.71	0.01	-	0.06

c) *What is meant by Exceedence Factor ?* 03

d) *What is meant by Criteria Air Pollutants ?* 04